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EDUCATION
FOR SUSTAINABLE DEVELOPMENT

A tool to design training courses

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NJ ESD COM

*New Jobs through Education
for Sustainable Development Competencies*

Preface by
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www.njesd.com

SUMMARY

WARNING

The commitment with which the proofs have been checked, the typos corrected and the sources cited was great; in spite of this, something might be missing. We kindly ask readers to report any errors or outstanding rights by writing to: info@njesd.com

PREFACE

by Edo Ronchi*

20 years after the Rio Conference in 1992, which launched the global strategy for Sustainable Development, the world population has grown by about 1.7 billion, more than 30%, world GDP has almost tripled, from 24.3 trillion dollars in 1992 to about 72 trillion dollars estimated in 2012, but the global environmental situation is getting worse and worse.

According to the latest OECD report (2012, *Environmental Outlook to 2050*), if there are not any new interventions, it will probably get worse in coming decades.

Emissions of greenhouse gases, in fact, have never been so high and have increased by 45% over the past 20 years and, if we proceed at this pace, we will rapidly go beyond the threshold of the 2°C change in average global temperature.

Species at risk of extinction or threatened are increasing, natural resources are unsustainably affected, primary forests continue to decline, marine fish stocks are rapidly decreasing: the erosion of *natural capital* goes on at rates well above its capacity for renewal and resilience.

The *ecosystem services,* essential to our quality of life and to economic development itself, such as water, air, climate, fertile soil, are subjected to heavy pressures and a worrying deterioration.

The strategy for Sustainable Development that should have fostered economic and social development, improving environmental conditions in these twenty years, has not been successful. There has not been, in fact, a decoupling between economic growth and environmental impacts, and - even worse - continuing with current trends, not only the situation would not improve, but would incur additional, serious environmental deterioration on a global scale. Why?

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Some argue that the same strategy would be wrong because, given the level reached by the global ecological crisis, it would not be possible to have both economic development and environmental sustainability. Therefore, the proposal of "sustainable development" would be an oxymoron, because it would combine two words that would express opposing concepts: sustainability and development, such as hot ice or parallel convergence.

If this criticism to Sustainable Development were well founded and without alternatives, we would be doomed to fall into a severe and inevitable global ecological crisis.

As the world population will continue to grow until at least 9 billions and it is not possible to stop the ongoing economic growth in major countries of rapid development, inhabited by billions of people, such as China, India and Brazil, there would be no mercy.

This might happen. It is not, unfortunately, possible to exclude it beforehand, given the present situation and the current trends. These trends may however be changed.

The change towards Sustainable Development has been hindered and stopped for ethical and cultural deficiencies and for the prevalence of short term economic interests, that have hindered the spread of available alternatives.

There is no obligatory way, but there are possibilities of choices.

Either we can bet on the worst part of ourselves and society, and thus help to produce corresponding results, or we can try to do our best, wherever we operate, in the belief that we share common good, that is worth and it is important to fight to win a better future for many, and not only for us or for few individuals.

One can give voice to the apathetic alibi that "that is the way it is done", and to disengagement because "I cannot do anything", or we can try to live our days in a conscious way.

Major changes, such as those required by a new development paradigm, cannot prevail unless they mobilize cultural and ethical resources.

Resources that can lead us to make some choices and reject others, not only for convenience, but because we believe it is fair.

It would have been much easier if, while each individual or country were only concerned in its own interests, the invisible hand of the global market would have produced the common good for everyone. But this has not happened, let alone with the current economic globalization, which is aggravating the ecological crisis.

As soon as we take note, the better.

The second reason that has prevented us to find the way to Sustainable Development has been the insufficient dissemination of available alternatives: *cultural alternatives* (consumption patterns, behaviors, values), *social alternatives* (lifestyles and possibility of low-impact welfare), and *knowledge and technology* (which offer enormous opportunities for eco-efficiency, dematerialization and recycling, saving energy and materials, development of new materials and renewable energy, clean or minimal impact technologies).

In assessing sustainability one must pay attention not only to the processes of material and energy consumption, but also to that extraordinary resource, both renewable and growing, which is *knowledge* that could help us definitely to find the way to Sustainable Development.

It is true that an increase in efficiency, energy and/or use of resources, has, in some cases, resulted in a rebound effect, lowering prices and increasing consumption, thus rising the amount of products sold and hence also the global consumption of materials and energy.

But this is neither an inevitable dynamic, nor a physical law.

Neither lower prices nor greater availability of income should lead to ecologically unsustainable consumption: this trend can be opposed by proper information to consumers, punishing, for example, misleading advertising and using economic and fiscal instruments capable of directing the market.

Analyzing the current trends, one runs the risks of seeing only the prevalent ones and of exchanging them for unique, especially in economic processes. On the contrary, there are already substantial economic initiatives, although not yet prevalent because they are hindered by opposing economic interests, which are in the direction of Sustainable Development.

For example, a strong development of renewable energy sources, in different countries and different sectors, a substantial increase in energy efficiency and savings, a relentless growth in the quantity of waste recycled and in the production processes of goods and services of high environmental quality.

Not by chance, green economy was at the centre of the United Nations Summit of Rio +20, in June 2012, with the extensive awareness that, to find the way to Sustainable Development, one should attack the core of economy and base development on the pillar of green economy: an

economy of industrial reorganization, innovations and differentiation for the promotion of new products, new goods and services and therefore new development. An economy that takes on the challenge of limits, of environmental sustainability, of low carbon emissions, of renewable resources, of reduction of withdrawals of natural resources and of environmental impact. Furthermore taking care of *social equity and inclusion*.

All these cultural and ethical reasons, together with availability and feasibility of alternatives, can promote Sustainable Development better, if they are supported by appropriate legislation and far-sighted governments.

But they will not be implemented by decree and top down.

This is due to delays of a policy that is based on short-term national consensus, to economic interests that are still strongly opposing, to economic and financial globalization occurring in the absence of a corresponding ability to govern and control.

Sustainable Development requires actually deep economic and social changes, not only in one country, as it happened in the past, but, for the first time in our history, changes truly global, involving both the mature industrial countries and those engaged in development, without neglecting the countries and peoples that continue to be affected by poverty and hunger.

The first step in a process of education for Sustainable Development starts from here: from the awareness of living among many on a planet that has become small, and to have a common destiny and common responsibilities.

Such education should help us in all areas, to translate this awareness into environmental and civic engagement so as no one feels entitled to live only to make money and confuse the beauty and quality of life with consumerism.

It should be an education to sobriety as a positive and desirable value, to live better together, with less waste and less environmental damage.

Education for the development of knowledge of good and best practices and sustainable techniques already available – or which may become available – would be of great help for massive and rapid spread, and for identifying and overcoming the opposition of rival economic interests.

Suggesting green economy as a fundamental pillar of Sustainable Development requires a *joined commitment of all the members of society*.

The commitment of companies and entrepreneurs through education to social and environmental responsibility, the commitment of those who have governance responsibility by a proper legal framework, and the commitment of citizens that affect the economy as consumers: their education for Sustainable Development might contribute significantly, in part as it is already happening in many countries, to change market trends.

Education for Sustainable Development, finally, could help us cope with the economic and financial crises with innovative attitudes and ideas.

Instead of getting to the blind alley of nostalgia of the past and think about the post-crisis period as a return to pre-crisis, to the same production and to the same consumption, Education for Sustainable Development would help us to understand that to solve one's problems one should try to get rid of the mentality that has helped to create them and to try new ways.
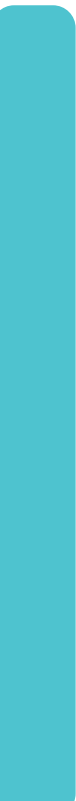
INTRODUCTION

The present manual, was developed within the European project New Jobs through Education for Sustainable Development Competencies (NJ ESD COM).

The project, funded under the EU, Lifelong Learning Programme (LLP), Leonardo da Vinci sectoral programme, was achieved through a Transfer of Innovation multilateral action (TOI Transfer of Innovation), instrument through which the European Union increases the quality and attractiveness of European education and vocational training through the adaptation and integration of the content of innovative projects within vocational training systems and companies, to make them increasingly responding to emerging needs.

In the Italian Education System a strong methodological competences requirement for designing and the livering training actions in the field of sustainable development is emerging, in response to recent Ministry guidelines and in line with the guidelines set at European and international level from UNECE (2005) and UNESCO in the framework of the Decade for Sustainable Development (2005-2014).

The inter-ministerial agreements of 2008 between the Ministry for the Environment, Land and Sea (MATTM) and the Ministry of Education, University and Research and the Guidelines for Environmental Education and Sustainable Development of the MIUR (December 14, 2009), trace the guidelines on Education for Sustainable Development in the education system for the introduction of Educazione Ambientale e per lo Sviluppo Sostenibile Development (EASS) in school curricula.

The approach of the Ministry of Education requires to overcome the dichotomy between learning goals and educational objectives, and suggests the development of skills, and in particular of personal skills (***Citizenship Skills***, European Parliament and Council, 2006), rather than only the contents, as the way to form aware and responsible citizens.

In achieving this objective the paper suggests the use of "active methods and learning strategies able to engage in a personal and responsible manner the students, [...] the presentation of real tasks that bring together to school internal and external resources, [...] the use of experiential teaching methodologies that support teamwork and cooperative learning (MIUR, 2009).

It is in this light that Education for Sustainable Development is included in the area of Education – Citizenship and Constitution – (art. 1, Law 168/08).

The Ministry guidelines and the subsequent reflection on the need for a system action for the training of teachers of all disciplines, levels and grades of school, are one of the cornerstones of the project NJ ESD COM.

The other basic element identified is the growing demand for skills and competences for a sustainable approach to development coming from the world of business, work and attainable thruogh Vocational Training.

The integration of economic, socio-cultural, environmental and governance issues which characterizes the approach to Sustainable Development, creates a system of interrelations and actions that recalls the need to spread competences and synergies among all development players.

Instances of Green Economy on one hand and those of development policies on the other, starting from the UN Programme of Action for the Sustainable Development Agenda 21 (1992), to the European Union Strategy (**EU COM, 2001**) (**EU COM, 2005**) (**EU COM, 2010**) link al DOC INTRO 3 up to the national, regional and local programming plans, demand skills and competences for sustainable development at all economic and governance levels.

The challenges that Humanity as a whole is facing, from the mitigation of climate change to models of production of production and more sustainable consumption, from the sustainable management of natural resources to the conservation of biodiversity, from the improvement of the quality of lifestyle to the fight against social exclusion and poverty, pose complex and interrelated objectives for the achievement of which the EU attributes to the *knowledge society* a driving role.

"Economic growth, social cohesion and environmental protection must go hand in hand – says the European Union Strategy (EU COM, 2001, p. 2) – and education and training are the cross-sectoral strategies that can stimulate behavioral changes and can equip citizens with the skills necessary to achieve the objectives set, in collaboration with a scientific and technological innovation that should be able to link universities, research institutes, companies and public officials [...]. Even if the public authorities play a key role by ensuring a clear and long-term con-

text, ultimately it will be up to the citizens and businesses to make changes in patterns of consumption and investment needed to achieve sustainable development" (EU COM, 2001, p. 5).

Communication, financial support, the building of partnership networks between European and national public authorities, businesses, non governmental organizations and citizens, are the ways that are suggested to the Member States to implement national strategies.

The sustainability of development is therefore a challenge and a commitment that involves the political and economical world of national and local systems too. The networks of local Agenda 21 and the Covenant of Mayors are two of the strongest actions at the local level to foster and sustain the equitable and long lasting development of communities.

In Italy the Local Agenda 21 associates 11 Regions, 45 Provinces and 370 Municipalities, and plays a key role in raising awareness among all social actors through information, support and activities for the protection and enhancement of the environment, with a view to make sustainable the development by integrating economic, social and environmental aspects, along the lines of the papers of Aalborg, Gotebörg and Ferrara.

The Covenant of Mayors, promoted by the European Commission to support efforts by local governments in implementing policies to reduce emissions and use renewable energy sources, is the leading European movement that involves local authorities in the effort to increase energy efficiency in their territories, and is considered by the European institutions as an outstanding model of multilevel governance, for its characteristic to mobilize all local stakeholders pursuing of European objectives.

Italy ranks among the leaders in Europe with almost 2000 signatories up to June 2012.

In the business world, economic activities related to Sustainable Development are growing in Italy too, as shown in the **study** of the National Council of Economy and Labour (Cesaretti Barbabella et alii, 2009); the attention to issues of sustainable development within the business system is also demonstrated by the recent adoption of the Carta dei Principi della Sostenibilità di Confindustria Italia (Charter of Principles of Sustainability by national Confederation of Industry, January 25, 2012).

The Charter, created together with the Ministry of Environment, was signed by more than 150 companies at the time of its proposition; companies engage themselves to carry out a series of actions in line with the principles of environmental protection, technological innovation and social responsibility in a vision of sustainability as an opportunity to meet the challenge of the green economy.

The interest in the issues and challenges posed by sustainability is in-

creasingly involving all parts of society, raising awareness on the effectiveness of synergic action as evidenced by the participation in the signing of the Manifesto per un Futuro Sostenibile per l'Italia (Manifesto for a Sustainable Future for Italy). Individuals and institutions, enterprises and associations are subscribing it, to be subscribed are joining individuals and institutions, enterprises and associations, with the aim to "tackle the economic and social crisis together with the ecological crisis, redefining our development towards a green economy."

Some studies by CEDeFoP, the European Centre for the Development of Vocational Training, bring to light very well the strong demand in terms of skills for a sustainable approach to development that is emerging across Europe, in the economic world and in the labour market, both by workers and by applicants.

"The need for skills and qualifications will increase significantly by 2020 in the EU, and new opportunities are identified in jobs requiring a higher skill level, reflecting the growing demand for skills and jobs based on knowledge" (CEDeFoP, 2008; CEDeFoP, 2010b, p. 6).

"As for skills in information technologies, which have become essential for many aspects of working life, everything suggests that in the same way the ecological expertise will become important for almost all jobs. [...]

[For those who already belong to the world of work], the skills developed in the "old" or declining sectors can be valuable, [and] the level of professional development needed to enable workers to move to employment in the "greener" sector may be lower than expected (CEDeFoP, 2010a, p. 2), there [...] is not [up to date however,] a sufficient number of trainers and teachers aware of environmental issues and able to CEDeFoP new techniques" (CEDeFoP, 2010a, p. 4).

While the introduction of the themes of sustainable development in school curricula will develop in future generations competences through educational courses all those who are engaged today in the world of work must be able to bridge this gap by getting them through training.

Basic training on these issues therefore meets an essential requirement to enable those who are currently the levers of development to be able to confront and fit properly in this radical paradigm shift.

The objective of the project NJ ESD COM was to develop, test and validate a proposal for the construction of a training action, aimed at developing competences for designing and delivering training courses on Sustainable Development, in line with the international debate which includes the orientation to ethical values and the knowledge of contents that reflect issues of global change.

Using the reflections of a previous Comenius project on the compe-

tences required to teachers educating to Sustainable Development (**Competencies for ESD – Education for Sustainable Development – teachers. A framework to integrate ESD in the curriculum of Teacher Training Institutes.** Comenius 2.1 project 118277-CP -1-2004-BE-Comenius-C2), the the NJ ESD COM project proposal processes content, methodologies and tools for the construction of a training action for teachers and trainers.

This proposal is the object of the present manual, which is published in a printed and in a digital version.

This choice was supported by the intention to offer a real time usage of hyperlinks to documents and websites mentioned in the manual.

Since the issues related to Sustainable Development are characterized by continuous updating, easy and direct accessibility allows data and information to be always updated.

In the digital version numerous projections of slides are also included, ready to use for trainers.

All words printed in violet, indicate links active in the digital version.

At last please note some choices of translation:

▸ the use of the word *teacher*, to write about both trainer and school teacher;

▸ the use of the acronym EASS (Educazione Ambientale ed allo Sviluppo Sostenibile) to refer to Italian laws and bibliography;

▸ the use of the acronym ESD[1] (Education for Sustainable Development) to refer to international documents, websites and bibliography.

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1   In international literature this acronym is sometimes stated outright as Sustainable development, meaning ESD Environmental Sustainable Development; in the present work we use this meaning for the acronym SD Sustainable Development.

BACKGROUND AND CONDITIONS OF THE TRAINING ACTION

1.
THE EDUCATIONAL CHALLENGE
IN THE COMPLEX SOCIETY

The contemporary historical and social context, within which the theme of sustainable development and education to it emerged, is described by some authors using the definition of *complex society*, while others define it as *risk society* or *reflexive modernization of society.*

This chapter deals with these concepts, highlighting the challenges modern society poses to reflect on goals and methods of education.

1.1. EDUCATING FOR SUSTAINABILITY IN COMPLEX SOCIETY

The elements that recall the reality of the complex society, require thinking about the meaning of this term.

Among the many definitions and interpretations that exist, what follows looks appropriate for the context of this work.

"The definition of a complex society in relation to others that are not complex or may be to a lesser extent, requires at the outset a clear enunciation of the concept of complexity. Otherwise, the status becomes so general and approximate, to lose all meaning [...].

Among the criteria that identify a complex society, at the forefront is the intensity of the pace of change in social systems, determined by the rising of new and unusual problems to solve.

A radical acceleration of this rate was given in the modern age [...] by the expansion of production bases, produced mainly by the technologies that were the result of scientific progress.

The most complex societies have the highest number of new problems, not only economic but social and political, arising from mismatches in the system produced by the driving forces of economy and science.[...]

It is clear that the high frequency of friction and conflict is due to the dynamics of transformation at all levels in the systemic balance of a complex

society. This involves that the management system of relationships between individuals, social groups with different and conflicting interests has to be in turn more articulated and complex [...]" (Tentori, 1999, pp. 41-43).

Today the issues of global change (see Agenda 21) are a challenge for society, and by that for education and the educational systems. This requires to face old themes under a new perspective and to deal with new themes, such as climate change and the decline of cultural diversity. At the same time, a demand for new ways of learning and teaching is rising, approaches to cope with the openness and complexity of Sustainable Development.

The important and difficult challenges of a complex society pose problems to which, in the course of human history, societies and civilizations have responded in very different ways.

Jared Diamond, a biologist and physiologist professor at the University of California, Los Angeles (UCLA), studied the elements that are common to the crises of ancient and modern civilizations and the ways in which these were faced by determining their revival or decline.

Reflecting on the current scenarios, the author identifies the present societies chances and responsibilities: "My reasons for hope are also a consequence of the interconnectivity of the modern globalized world; our television documentaries and our books show in detail, why [...] ancient peoples like the Maya disappeared. So, we have the opportunity to learn from the mistakes of distant peoples in time and space.

This is an opportunity that past societies have not been able to benefit from and to such a high degree" (Diamond, 2005).

Some paradigms of sociology and social psychology can help to understand the socio-cultural aspects of sustainability of development in today's society, that can no longer be interpreted with the theoretical references helpful in the past century, relating to industrial and post industrial society; now, as some authors suggest, we are in the *risk society* and we have to deal with it.

1.1.1   The risk society and the theory of reflexive modernisation[1]

In 1992, the year of the UN conference in Rio, the English translation of Ulrich Beck's book '*Risikogesellschaft auf dem Weg in andere Moderne*', was published as '*Risk Society: Towards a New Modernity*'.

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1   Adapted from: *Competencies for ESD (Education for* Sustainable Development) teachers. *A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 18-19.

In this work, the author presents an analysis of the transition from the pre-industrial society, via the modern society to the second modernity (Beck, 1992). This analysis led him to describe the present society as a *risk society* and to introduce the concept of *reflexive modernisation*.

Up to the first half of the 18th century, *traditional communities* existed, in which traditional institutions, such as the church, the family, the village ... gave shape and sense to people's life. Gradually, and in the name of individual freedom and autonomy, these traditional institutions and structures became less influential and were replaced by new ones: new *industrial communities* emerge and the ties with the family become restricted to a small number of very close relatives. The nation replaces the village and takes over part of the responsibility for the organisation of people's lives. In exchange for more welfare, people choose the organisations and structures to which they prefer to express their loyalty. At the same time science develops exponentially and individuals have an almost unlimited faith in new scientific knowledge. From the Industrial Revolution onwards, educational systems in the industrialised world are increasingly designed to stimulate economic growth (Wielemans, 2003).

The increasing large-scaled industrial activities cause side-effects which become obvious only many years later, for besides the negative impact on the natural environment – and consequently on people's health – the industrial activities threaten to exhaust the natural resources in the short or medium term. Since the middle of the 20th century, these effects have been clearly visible and, for the first time and from different stakeholders, the alarm has been given. It is clear from incidents such as the nuclear disaster at Chernobyl, from the many environmental disasters with oil-tankers and from the growing awareness of global climate change that the scale of environmental disasters is greater than ever before and that these disasters very often have a global character. Events in other fields such as crashes on the stock-market and the global risk of terror attacks demonstrate that we do live in a *global village.*

Alongside the emergence of increasing risks, the end of the 20th century and the first part of the 21st century are characterised by a decreasing faith in scientific knowledge. More often, scientific studies contradict each other regarding the same issue, as is clearly illustrated by the studies about the possible cause of global warming. For common citizens, it becomes increasingly difficult to critically select from the impressive amount of information that reaches them. Furthermore, scientific knowledge is fallible, which makes every form of scientific knowledge more or less tentative and uncertain.

Ulrich Beck uses the concept of *reflexive modernisation* to describe the reflection on science and the lack of scientific knowledge which characterises the present period.

1.1.2   Cultural theory as an interpretation framework for sustainability issues[2]

Individuals will make interpretations of the environment, taking into consideration the aspects of uncertainty and the possible risks involved. The *cultural theory*, developed by Thompson and his collaborators (Scott & Gough, 2003), presents a useful framework to classify the different possibilities people use to make interpretations of their environment.

According to some sociologists, there are two dimensions along which people make interpretations of their environment: the first dimension relates to the degree people are convinced about the importance of individual actions or collaboration, and the second one relates to the degree people are convinced about the freedom they have to act (Gough, 2002). On the basis of these variables, four archetypes are distinguished: the hierarchical, the individualistic, the egalitarian and the fatalistic.

A *hierarchical interpretation* of the environment refers to little freedom of action and a strong emphasis on collective action as the best strategy to find a solution for sustainability challenges. The natural environment is considered a complex system which is strongly regulated by (natural) laws; these people are confident in science, which is – according to them- able to unravel this complex system of (natural) rules and laws. As a consequence, this vision supposes behavioural rules, which lead automatically to pro-environmental behaviour when they are respected by the citizens.

The *individualistic interpretation* emphasises the importance of the freedom of action and advocates an individualistic attitude when confronted with sustainability challenges. For these people, the laws of the free market also apply to environmental matters; nature is considered in the first place, as a source which allows people to survive. The free market regulates the relationship between humans and the environment.

The *egalitarian interpretation* attaches much importance to the individual freedom with which people have to act, and their focus on collec-

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2   Adapted from: *Competencies for ESD (Education for* Sustainable Development) teachers . *A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 19-20.

Chapter 1 - The educational challenge in the complex society

tive responsibility to find solutions for sustainability challenges. Local participative structures and organisations are therefore extremely important to reach their goals. They consider the natural equilibrium as very delicate, and believe that it can be disturbed very easily by human action. According to the egalitarian interpretation, principles of justice and equity are strongly linked to pro-environmental behaviour.

Finally, some people interpret sustainability challenges in a *fatalist way*; they believe that the influence of the common citizen to change the existing situation is extremely small. Furthermore, sustainability challenges are not of first priority for these people.

Jackson and Michaelis (2003) use the same *cultural theory* to classify consumer behaviour with respect to the ongoing debate about *sustainable consumption.*

The interpretations people make of their environment are socially influenced and can change from situation to situation, even within a short time span.

The *cultural theory* shows that people make interpretations of issues of sustainable development in different ways, and consequently there will be many different ways to find solutions. This diversity is the basis of the current *pluriform society* in which different visions with respect to Sustainable Development are present.

1.1.3   Reflexive modernisation and sub-politics[3]

Starting from his theory of *reflexive modernisation*, Beck draws the conclusion that in the period of the new modernity political institutions become conscious of the uncertainty and the lack of scientific knowledge, which means that decision making today is always connected to a certain degree of uncertainty (Lijmbach et alii, 2000).

Besides this uncertainty, the new modern society is characterised by the absence of common norms and values which can be directional for decision making. This pluralism of norms and values results in people holding different interpretations on issues of Sustainable Development which leads to different solutions being proposed and to a range of diverse coalitions which support these different solutions.

Beck calls this phenomenon *sub-politics* and it is strongly connected to

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3   From*: Competencies for ESD (Education for* Sustainable Development) teachers . *A framework to integrate ESD in the curriculum of teacher training institutes, 2008*, pp. 20-21.

the disappearance of the monopoly of scientific knowledge as the main guide to finding solutions for sustainability challenges. The new societal structures have been shaped bottom-up as illustrated by the emergence of several organisations, characterised by flexible and dynamic structures and goals. These organisations are usually able to offer different solutions to those proposed by traditional bureaucratic institutions (Elmose & Roth, 2005). Each day new examples of sub-politics emerge. The most famous example is the response to globalisation, were so-called activists have reacted by creating trans-national sub-politics of their own, with multiissue agendas and diverse action repertoires as defining elements.

The theory of reflexive modernisation contends that western industrial societies have entered a second, reflexive phase of modernity. While first modernity has modernised tradition, second modernity modernises modernity itself.

> **The topics of the paragraph are developed in the hypertext**
> **ESD: sociological and pedagogical aspects**

1.1.4   Educational challenges in the complex society[4]

Societies generally expect educational systems to prepare young people for their future professional life and/or continued studies. The educational system is seen as having a socialising role and is expected to contribute to preparing young people to take up their responsibilities and roles in helping to shape the complex society in which we all now live.

It is because of the latter reason that, by the mid sixties and early seventies, the so-called *adjectival* educations – such as environmental education, health education, citizenship, peace education etc. – were introduced into the curriculum of many educational systems. However, the risk society requires competences from their citizens which will markedly differ from the competences citizens needed about three decades ago. The introduction of issues of Sustainable Development in the curriculum of both primary and secondary education is therefore strongly recommended by several international organisations, such as UNESCO and UNECE.

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4   Adapted from: *Competencies for ESD (Education for* Sustainable Development) teachers. *A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, p. 21.

Above, we described issues of Sustainable Development as complex, because of the tight connections between social, economic, ecological and cultural aspects, but also because many proposed solutions, may lead to new (global) risks.

This implies that education for Sustainable Development requires at least a holistic approach, rather than the reductionist approach which is common in traditional educational systems. Indeed, a reductionist approach can often be the origin of these problems. It follows that, if we desire a consensus rather than a (usually messy) compromise, then sustainability challenges need to be approached at a systemic level (Sterling, 2001; Tilbury et alii, 2005; Stoltenberg, 2009; Tilbury 2011).

1.2.   THE ROLE OF EDUCATION

1.2.1   What Education to orient oneself in the risk society?[5]

Shifts in the curricula are often the result of radical social changes or new societal challenges, which are considered as very important by the decision makers. Very often education is used by policy makers as an *instrument* to induce behavioural changes into a socially desirable direction. The diversity of adjectival educations can be largely explained in this way. Therefore it is not surprising that some people think about introducing a new adjectival education, often called *Education for Sustainable Development (ESD)*.

Most researchers who are involved with ESD hold that an instrumental vision on ESD by definition cannot be reconciled with the definition of education. In any case there is a strong consensus that schools are not organisations that can be used for solving societal problems (Jensen & Schnack, 1997; Scott, 2002).

According to Scott (2002), ESD should encourage schools to stimulate their pupils to reflect on their own lifestyle regarding sustainability issues. It implies that they should be able to reflect on the concept of Sustainable Development with respect to decisions they take in the context of their own life.

Lijmbach et alii (2000) consider the role of education as an instrument for the development of autonomously thinking people. They strongly emphasise, together with other researchers (Rauch, 2004) a critical re-

5   From*: Competencies for ESD (Education for* Sustainable Development) teachers *. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 22-23.

flection of the different visions on Sustainable Development and even on the desirability of Sustainable Development.

Lijmbach et alii (2004) consider education as *political life formation (lebenspolitieke vorming)*, aimed at bridging the gap between the way social institutions and organisations adapt to the present social and scientific complexity, changes and uncertainties and the way individual citizens deal with it.

This means that education – in general – should aim to help the student to (Lijmbach et alii, 2000):

▶ Autonomously reflect on and gain insight in his/her own and someone else's situation, and the degree to which these situations are interconnected and how they are determined.
▶ Learn to critically value situations.
▶ Learn to reflect autonomously about acquiring insight about possibilities and limits of personal and collective responsibility.
▶ Learn to critically reflect on possibilities to change or to maintain situations.
▶ Learn to make personal and social choices and learn to take responsibility for the choices they make.

Using Klafki's definition of *Allgemeinbildung*, Elmose and Roth (2005) formulate three competences, specifically aimed to deal with living in a risk society:

▶ competences to understand and to change his/her own life conditions;
▶ competences to participate in collective decision making;
▶ competences to show solidarity with those who are unable to control their living conditions because of a diversity of reasons.

1.2.2   Education for Sustainable Development: a new "adjectival" education or a regulative idea?[6]

For some researchers, involved with curriculum development, the prominent position of Sustainable Development on many national and international agendas is a sufficient reason to introduce a new and distinct adjectival education in the educational system.

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6   Adapted from: *Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 23-24.

However, there are enough reasons not to do so. The most important reason is that Sustainable Development is a continuously evolving concept. Human relations with the environment are extremely complex and dynamic (Scott & Gough, 2003).

People and organisations learn each time they have to adapt to the changing environment, and the environment responds to the changes of human behaviour and the activities which follow from these changes.

Following Richard Norgaard, Scott and Gough (2003) this process is generally referred to as a co-evolution between the society and the environment.

There does not exist a package of knowledge and competences, that when properly applied, leads automatically to a sustainable society.

Rauch (2004) considers Sustainable Development as a *regulative idea*, which can be considered as an ideal people can strive for, but which inevitably can never be fully realised. Regulative ideas – such as justice, integrity etc. – serve as organisers to connect them with normative aspects, and therefore they are very useful as heuristic structures to reflect on. They give direction to research and learning processes and they can be seen as kinds of pre-concepts, without which no meaningful questions can be asked or problems can be identified.

Some authors consider Sustainable Development as a guide which is always present in the background and which gives direction when looking for solutions of sustainability issues (Kyburz-Graber, 2003).

Stoltenberg (Stoltenberg, 2002; 2009; Stoltenberg, Holz, 2011) considers Sustainable Development as a process of searching, learning and of shaping the future. Accordingly, education is part of Sustainable Development. The worldwide shared framework for Sustainable Development becomes the orientation for the decision about contents and methods of educational processes and the task of the educational system. The reflection about the aims and the values of sustainability (human dignity, preservation of nature as basis of life, justice under the perspective of one world) should always be part of this approach.

In this sense, Sustainable Development can be considered an *ethos* that for each citizen, teacher and pupil should always be present at the back of their minds, when taking decisions, at least when they are convinced about the desirability of a sustainable society.

Therefore, existing adjectival educations can be used as entrances to approach issues of Sustainable Development. Environmental education emphasises environmental problems, but if teachers have the intention to take the issue of Sustainable Development seriously, they will have to

link these problems to the economic, social, cultural and political aspects; they will see that environmental problems change their character when they are linked to all the dimensions of sustainability (Stoltenberg, 2009; Tamburini, 2012).

Some teachers already made the link between these aspects, when dealing with issues of environmental education, even before the concept of Sustainable Development was raised in education.

Thus, although we do not advocate an independent adjectival education for Sustainable Development, the approach we recommend does mean that a teacher who consciously wants to deal with sustainability issues in the classroom, needs specific knowledge, skills and competences.

Also new educational teaching and learning methods may facilitate ESD and in this way they can be used as a lever for educational innovations.

This is one of the major objectives of ENSI (Environmental and School Initiatives: **http://www.ensi.org/**), an international no-profit organisation which aims at introducing new educational methods and at stimulating new types of collaboration, as well as at developing the so called *dynamic qualities of learners*.

2.
COMPETENCES IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

It was shown in the previous chapter, how the complex society poses new challenges to education and how education should now focus primarily on skills development, rather than on the memorization of concepts. In the following it will be detailed the concept of competence in relation to the skills considered important in education for Sustainable Development.

2.1 THE CONCEPT OF COMPETENCE[1]

Since several years the term *competence* has been used in an inflationary way and without distinctive differentiation, not only within the working context or in connection to educational issues, but also in personal and societal everyday life.

The definition of what is hidden behind the term of competency proves to be enormously difficult, and moreover different terms are often used synonymously.

Rychen & Salganik (2003), editors of the final report of the OECD-project **"Defining and Selecting Key Competencies"** (DeSeCo: **http://www.oecd.org/edu/highereducationandadultlearning/definitionand-selectionofcompetenciesdeseco.htm**) who designed a conceptual framework for the definition and evaluation of key-competences, state: "In public discourse and sometimes also in specialized literature, there is a tendency to use terms such as skills, qualification, competence, and literacy either imprecisely or interchangeably, in order to describe what individuals must learn, know, or be able to do to succeed in school, at workplace, or in social life" (Rychen & Salganik 2003, p. 41).

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1   Adapted from: *Competencies for ESD (Education for* Sustainable Development) teachers . *A framework to integrate ESD in the curriculum of teacher training institutes,* pp. 39-41.

They specify the concept of competence as "the ability to successfully meet complex demands in a particular context through mobilization of psychosocial prerequisites (including both cognitive and non-cognitive aspects" (ibidem), and as a "complex action system encompassing cognitive skills, attitudes, and other non-cognitive components" (ibidem, p. 51).

Rychen and Salganik also point out the danger of reducing the competence concept to only one of its dimensions, as it often happens when assessing competences in school tests as well as in large-scale assessments, where it is traditionally restricted to cognitive components. Competent performance or effective action implies the mobilization of knowledge, cognitive and practical skills as well as social and behavior components such as abilities, emotions, and values and motivations. A competence – as a holistic notion – is therefore not reducible to its cognitive dimension (Rychen & Salganik, 2003).

According to Jacques Delors (1996) in the UNESCO-Report **"Learning: The treasure within"**, learning is based on the aspects: learning to know, learning to do, learning to live together, learning to be, as the four pillars in education for the 21st century.

Competencies are described as learnable but not teachable. This leads to the increasing relevance of the question of whether and how they may be acquired via learning programs (Weiner 2001, p.52f). There is a distinct connection between competency concepts, educational framework conditions, training of teachers and shaping of learning processes.

Competence-oriented educational concepts focus on output of the aspired educational processes whereas conventional syllabuses and didactic approaches focused on input, which meant contents and subjects, which pupils should study. The output approach on the other hand asks not what should be taught, but what should be learnt, what abilities for acting, which concepts and problem-solving strategies people should have acquired as a result of the learning process. The acquisition of competences is hardly comparable with learning as knowledge acquisition. Therefore it helps to focus on action competence and prevent the mere accumulation of "inert knowledge" (Weinert, 2001).

Competences do not exist *per se* but always relate to a certain desired output. One can focus on the functional approach when defining competencies: the result an individual achieves through an action, a choice or a way of behaving, in connection with the demands of the particular profession, social role or personal project (e.g. the ability to cooperate).

This demand-oriented approach has to be combined with and complemented by the definition of the internal structure of a competence, as "internal mental structures in the sense of abilities, dispositions, or resources embedded in the individual" (Rychen & Salganik 2003, p. 44).

This would include all knowledge, cognitive skills, practical skills, attitudes, emotions, values and ethics, and motivation. "Without research on internal structures, no barriers can be provided against the temptations and traps of mere *ability-to* expressions" argue Witt and Lehmann (2001, p. 5). The identification of the internal structure of a competence can help to define the prerequisites for gaining the competence, to create tasks and manuals for learning the competence, and identify necessary learning conditions.

In addition it is important to take into consideration the context dependency of a competence. Individuals do not act in a social vacuum, action always takes place in specific and various social and socio-cultural fields.

In the holistic and dynamic model of competence underlying the DeSeCo project, competencies are not regarded as existing independently of action and context. Instead, "they are conceptualised in relation to demands and actualised by actions (which implies intentions, reasons, and goals) taken by individuals in a particular situation" (Rychen & Salganik 2003, p. 47).

2.2 REFLECTING ON THE COMPETENCE CONCEPT[2]

When dealing with the concept of competence some problems have been encountered: the concept of competence has been used in different ways. In the Austrian discussion about education, competences were understood as key qualifications, social competences, 'soft skills', cross-curricular competences or 'dynamic skills' (Lassnigg, Mayer & Svecnik, 2001).

The concept of competence has often been confused with *qualification* or *standard*.

The OECD (2005) differentiates between three categories of competences:

▶ key competences for the *interactive use of tools*, such as knowledge, media and resources;
▶ the competences for *acting autonomously*;
▶ competences for *interacting within socially heterogeneous groups.*

The necessity to think and act in a reflective way is considered a central element in this competence. Reflexivity does not just mean the skill to act routinely when dealing with a particular situation, but also to deal

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2   Adapted from: *Competencies for ESD (Education for* Sustainable Development) teachers. *A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 35-37.

with changes, to learn from experiences, and to think and act critically (OECD, 2001).

In the UNESCO report *'Learning: the treasure within'* (UNSCO, 1996), Jacques Delors (1996) recognizes four pillars for education of 21st Century: learning to know, learning to do, learning to be and learning to live together. They partly correspond with the frequently used competence fields: domain competences, methodological competences, personal competences and social competences (Erpenbeck & Rosenstil, 2003).

De Haan (2001) introduced the concept of *Gestaltungskompetenzen* ('shaping competence') and made it a central concept of the BLK-21[3] programme in Germany. *Gestaltungskompetenz* refers to the skill of applying knowledge about Sustainable Development and recognizing problems about non-sustainable development. This means, being able to draw conclusions about ecological, economic and social developments and their mutual dependency, based on analyses of the present and studies about the future; and starting from these conclusions he/she should also be able to take decisions which he/she can bring into action politically, both as an individual and as a member of a community.

This concept takes into consideration the contributions to formal, non-formal and informal learning for the development of knowledge and competencies (Barth et alii, 2007).

Weinert (2001) is warning of two *assumptions*:
a) that a small set of key competences is sufficient and the gain of a broad knowledge becomes obsolete;
b) that the new skills can be used automatically on the *right* place. This refers to the problem of transfer: to which measure is it possible to transfer qualifications, acquired in one particular situation, to another situation?

A further problem relates to the focus on the individual who should acquire competences during his or her whole life time in order to exist in the neo-liberal labour and community model. This view tends to require a *shift of responsibility* to the individual. Structural aspects and particularly poor learners in the *mainstream* educational system and in the system of further education are not supported. Without changing the priorities on the systemic level of the educational system, the acquisition of certain competences, such as interdisciplinary thinking and teaching or skills such as communication and project management, remain an *ac-*

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3   BLK: Bünd-Länder Kommission (Bund-Länder Commission for Educational Planning and Research Promotion).

Chapter 2 - Competences in education for sustainable development

cidental side product of the educational system, instead of making them more central for all teachers and learners by changing the curricula and introducing new teaching principles or reinforcing already existing teaching principles.

Another problem arises out of the norm setting of the concept of competences. Even when curricula and teaching principles are reoriented from input to desired outputs, it does not tell anything about the actual practice of the teachers and learners.

As long as the educational culture – and in particular the *assessment* culture – does not change, the concept of competence will remain a modern meaningless phrase.

Furthermore, competences do not exist for themselves but always as a look to a wanted outcome.

Competences are also social constructs, which are based on values and ideological assumptions (Rychen & Salganik, 2003).

Defining competences is also an ethical and political assignment. A possible consequence may be that the competence oriented approach prescribes unintended or intended paradigms of the neo-liberal market and the Western community systems.

To avoid such interpretation Wals (2009; 2012) conceptualizes the development of competences as social learning.

2.3 COMPENTENCES IN EDUCATION FOR SUSTAINABLE DEVELOPMENT[4]

McKeown (2002) differentiates in her **ESD toolkit** between "knowledge, skills, perspectives, values, and issues". According to her, these components are to be taken into consideration when restating curricula in the sense of ESD.

As a basis for the competence model of CSCT is taken the extended definition of Franz E. Weinert, as it has been adopted by the DeSeCo Project (Weinert 2001, p. 27f; Rychen & Salganik 2003, p. 41f; Klieme et alii 2003, p. 21f); in the definition it is worth the connection of a demand oriented or functional approach with the internal structure of a competence, but also, that competences are context dependent.

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4   Adapted from: *Competencies for ESD (Education for* Sustainable Development) teachers. *A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 40-41.

"The theoretical construct of action competence comprehensively combines those intellectual abilities, content-specific knowledge, cognitive skills, domain-specific strategies, routines and subroutines, motivational tendencies, volitional control systems, personal value orientations, and social behaviours into a complex system" (Weinert 2001, p. 51).

For the formulation of competences in relation with ESD one has to be attentive not to focus only on personal abilities and motivations, but also on surrounding frame conditions. Supporting structures have to be created in which the competences can be used.

Since competencies are very complex and manifest themselves only in actions and behaviour in certain contexts, the application of competencies can only be observed and measured indirectly.

Besides, one must consider that a single competence may be realised differently, due to different support and thus inside another environment. Implications for the measurement of competences therefore are, that we must draw conclusions about the underlying competencies and the connected attributes indirectly.

Moreover, since competencies are supposed to prove themselves in a context-overlapping manner, they cannot be measured by single, isolated performances.

Evidence of competence can only be gathered by observation in varied situations (Rychen & Salganik, 2003, p. 48).

For ESD another facet of the notion of competence is crucial. ESD is a common social project. No single person can have all needed competences alone. The conception of collective competencies serves the demands of ESD far better.

According to the *strength model* (McKeown 2002) the different and various competences and strengths of individuals and disciplines should contribute to ESD and the UNESCO named *partnership and networks* as one of the seven strategies of the DESD (Decade of Education for Sustainable Development **http://www.desd.org/**).

Division of labour, distribution of resources and taking into account the dialectical relationship between the competencies of individuals and the structural and institutional characteristics of the context can meet the complex acquirements of Sustainable Development and of ESD.

2.4 COMPETENCES FOR TEACHERS AND TRAINERS[5]

In recent years there has been an ongoing discussion about output oriented models and about basic competences for teachers. The reason for this focal shift was the insufficient quality of teacher education. For example, Hascher & Altrichter (2002) describe teacher education in Austria as "a conglomerate of unconnected knowledge".

Some research projects about teacher education clearly show that teaching, which is the core business of the teacher, often receives much less attention compared to domain knowledge, such as biology, geography etc. The content of a course is often strongly influenced by the lecturer's preference and is not necessarily oriented towards the future praxis of the teacher student (see: Oelkers & Oser, 2000; Oser, 2002; Terhard, 2002). In recent debates about educational research, it is frequently reported that the message of professionalism about the core business of education insufficiently reaches the teacher student.

While there is a growing consensus about the meaning of learning competences as a prerequisite for educational quality, the integration of co-responsibility for school development and for further development of professionalism is a rather new phenomenon.

Krainer (2003) introduces four dimensions for professionalism – action and reflection, autonomy and networking – which help to grasp the actual trend for more team and project work, involvement of parents and the school environment, even as more cooperation with partner institutes and professional communication.

Also Stern and Streissler (2006) found in their empirical research project about professional development of Austrian teachers in the domain of natural sciences, that in the different areas of action of the teachers very different competences are needed. While in the classroom pedagogical, psychological and didactic skills are important, in the school and the community, teamwork, cooperation, school development and public affairs play an important role.

Reflection on the teacher's actions, conscious steering of his/her own professional development, 'reflection' about work attitude and reflection about the concept of education, are also features of teachers' professionalism.

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5   Adapted from: *Competencies for ESD (Education forSustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 34-35.

2.5 THE CSCT MODEL[6]
(Curriculum, Sustainable Development, Competences, Teacher training)

The CSCT Comenius project was developed in 2004 as a response to the call of the UNECE Ministers of the Environment in 2003 for including Education for Sustainable Development (ESD) in curricula from pre-school to higher and adult education.

The CSCT project worked out the hints of the international organisation ENSI (Environment and School Initiatives **http://www.ensi.org/**) which in 2002 developed the Comenius3 project SEED (School development through Environmental EDucation: **http://www.seed-eu.net/web-page.php**); the project aimed at identifying the implicit and explicit criteria inspired by values of Environmental Education, as used to guide, support or award Eco- Schools involved in incorporating principles and actions for sustainability in whole school plans. That research also involved identifying and documenting innovative case studies in this area. The results were published in the SEED/ENSI: *A Comparative Study on Eco-school Development Process* (Mogensen & Mayer, 2005). Stimulated by the comparative study, a proposal for Quality Criteria for ESD-schools was published subsequently under the title "Quality Criteria for ESD-Schools: Guidelines to enhance the quality of Education for Sustainable Development" (Breiting, Mayer, & Mogensen, 2005).

Encouraged by the results of the comparative study, they proposed the quality criteria published under the title "Quality Criteria for ESD-Schools: Guidelines to Enhance the Quality of Education for Sustainable Development" (Breiting, Mayer, & Mogensen, 2005).

In 2006 ENSI published 'Reflective practice in Teacher Education' (Kyburz-Graber, Hart, Posch, Robottom - Eds., 2006) whose conclusions showed how integrating ESD in school curricula needs redefining teaching training programmes.

The Comenius 2 CSCT project worked out a model for teacher training.

The model is represented by two triangles superimposed and staggered: the B*lue Triangle* represents the professional dimensions of the teacher and the R*ed Triangle* represents what are called overall skills for Education for Sustainable Development (see picture 2.1).

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6   Adapted from: *Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, p. 1.

Dynamic model for ESD competences in teacher education

Teacher in the society

Teaching

Reflecting Visioning

Overall competences

Values and Ethics

Action

Future orientation

Learning processes for SD

Emotions

Know-ledge

Local and global orientation

Systems-thinking

Teacher as an individual

Professional dimensions

Teacher in the educational institute

Networking
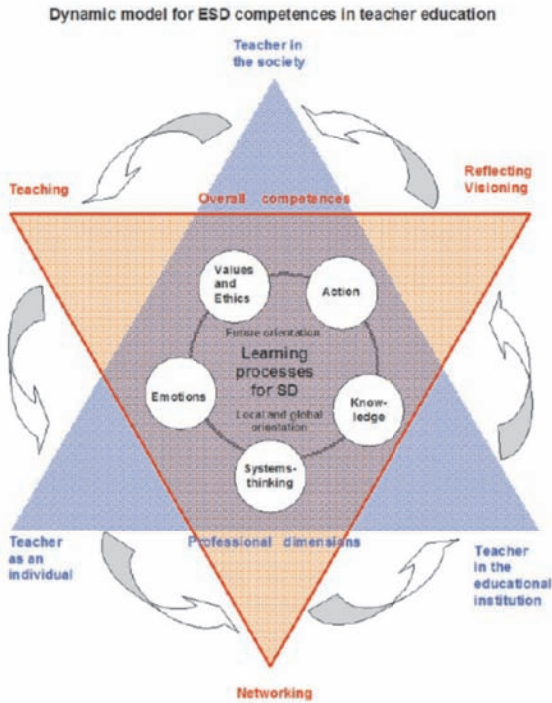
Picture 2.1: Dynamic model for ESD compentences in teacher education, from the Comenius project CSCT - (**C**urriculum, **S**ustainable development, **C**ompetences, **T**eacher training).

2.5.1   Blue Triangle: professional dimensions[7]

It is necessary to move beyond the idea of the teacher as an instructor. One rather has to envisage teachers as individuals who are in a dynamic relationship with their students, their colleagues and the wider society. It is within this dynamic relationship that we create the conditions that enable genuine learning to develop and progress in ESD.

This means that teachers are no longer simply the communicators of knowledge, but members of an institution, which has a collective focus

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7   From*: Competencies for ESD (Education for Sustainable Development) teachers . A frame-work to integrate ESD in the curriculum of teacher training institutes,* 2008, p. 27.

on the way all its members learn and develop, and all of those people are involved in the dynamics of a society that is seeking to confront the issues of sustainability.

For all these levels *teachers* need *specific competences,* which are explained with the *five domains* of the model (*Knowledge, Issues, Skills, Perspectives, Values*)*.*

In addition to these specific competences, *overall competencies* are needed.

Competences for communicating in an effective way and *organizational skills* are referred to in the blue triangle professional dimensions and even if they are not explicitly mentioned here, they have to be considered as belonging to the blue triangle.

2.5.2 Red Triangle: overall competencies for ESD[8]

There are three overall competencies:
▸ Teaching.
▸ Reflecting / visioning.
▸ Networking.

In ESD teachers have to gain the insight through *constructivism,* that acquiring competences is a self-steered and active process, which can be fostered but not created.

For example *Teaching,* the first competence, needs to promote more of a balanced dialogue between teachers and learners and between learners themselves. This means that the traditional tasks undertaken by teachers such as teaching, instructing and communicating will change as ESD develops. Besides the communication within the educational institution publication of projects and efforts are crucial (exhibitions, theatres, songs, cabaret books, public media, web-pages …) so that parents and the community are invited to take part in this school-process.

The second two competences have even greater emphasis in ESD, because ESD has to take into account future orientation as well as local and global orientation. *Visioning* and creating new perspectives are important tasks because the transformative role of education is a key issue in ESD.

Action will change as a product of *Reflecting* and *Visioning,* because such future action will take into account reflection on what has hap-

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8   Adapted from: *Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 27-28.

pened, and use this as a means to envision a transformation that will create new solutions and new ideas.

Action research is an effective tool to foster such reflection and visioning in order to improve teacher competencies.

ESD as a common concern has to be realized within an interdisciplinary team. No one can do ESD alone, it is a common effort and everyone brings his or her strengths and weaknesses to the project.

Networking with other partners in and out of school is also necessary in order to create a learning environment with an ongoing spiral containing visioning, planning, acting and reflecting. ESD concerns real life problems and issues and requires the creation of learning opportunities in society. Also with networking publishing competences are important (compare with the section on teaching).

Competences for communicating in an effective way and organizational skills are referred to in the blue triangle professional dimensions and not explicitly mentioned here.

2.5.3   How to read the model[9]

The relationship between the professional dimensions and the overall competencies refer to all the possible combinations. The two triangles should be regarded as twistable.

Opposite angles have the strongest relationship with each other.

Examples:
Ex. 1
▶ The teacher in the educational institution needs especially competences in teaching, communicating and mediating on various levels such as: with students, teacher colleagues, leadership and educational board.
▶ But this is not sufficient. To do ESD you need as an individual teacher to be able to create and formulate visions based on reflective activities.
Ex. 2
▶ The teacher and the educational institution are part of the society and there is always a given relation between the three. ESD requires openness, understanding and action, which are relying on competences such as networking, cooperating and publishing.

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9   From: *Competencies for ESD (Education for Sustainable Development) teachers . A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 28-29.

But also:

▸ The teacher has the competence of organizing and fostering networking while teaching through cooperation between classes and students of different levels.

2.5.4   The five domains of competencies[10]

In teaching and learning for ESD, all five domains (knowledge, systems thinking, emotions, ethics and values and action) have to be applied to each of the professional dimensions and they also relate to all overall competences.

Planning the teaching, reflecting the educational work, visioning the profile and performance of the school, looking for partners outside the school – it all needs a set of basic angles to consider for fostering a successful education for Sustainable Development.

For each of these perspectives a set of competences, which are crucial for effectively managing the process is needed.

Five competence- domains were identified, and each one must have a specific profile for ESD. Even though these domains may appear as separate elements in the graph, they interact intensively and are in reality inseparable. Therefore overlapping was inevitable.

By decision, the different competences were allocated to only one of the domains.

The model of competences is based on a theoretical background as well as on experiences of all participants of the project. Actually there are very few sources listing competences for teachers specifically. Exceptions are ENSI SEED QC, WWF Pathway and few others. Various sources in the literature dealing with ESD suggest the categories *Knowledge, Issues, Skills, Perspectives, Values* or similar (UNESCO Implementation Scheme, ESD toolkit, UNECE) which is another system of categories than our five domains.

The following short description introduces the reader to the five domains.

1. Knowledge
Specific features of knowledge for ESD are defined: conceptual, factual and action related knowledge.

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10   From: *Competencies for ESD (Education for Sustainable Development) teachers . A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 41-43.

Knowledge has to relate to time (past – present – future) as well as to space (local – global) and it is inter-, trans-, pluri- or cross-disciplinary constructed.

Knowledge is constructed by each individual and has developed with all the experiences in each life and thus one also has to take into account the social structure of knowledge.

The viability of our knowledge determines its quality. Today viability should be linked to responsibility for the nature will not be exploited any more (see ethics and values).

Critical thinking is indispensable.

2. Systems thinking

The complexity and interconnectedness of today's world asks for thinking in systems.

There is an increasingly shared view, that analytical thinking and reductionist thinking are not sufficient to envision a sustainable future or to solve the current problems. Several kinds of systems have to be studied and connected to get a complete overview.

Different kinds of systems are addressed: biological, geographical, ecological, political, economical, social, psychological ... including interrelationships in time and space.

It implies the awareness of being part of the living system Earth in space and time.

3. Emotions

Thinking, reflecting, valuing, taking decisions and acting are inseparably tied with emotions. Emotional competences are therefore indispensable for ESD-commitment and processes. Empathy and compassion play thereby a key role.

Feeling inter-connectedness with the world is basic for intrinsic motivation in ESD.

4. Ethics and Values

Norms, values, attitudes, beliefs and assumptions are guiding our perception, our thinking, our decisions and actions.

They also influence our feelings.

The main guiding principle of ESD is equity (social, intergenerational, gender, communities...).

Equality between man and nature is explicitly included only in some SD-concepts. The *Earthcharter* (**www.earthcharter.org**), officially recommended for ESD by the UNESCO is an exceptional example for a declaration of fundamental ethical principles for building a fair, sustainable, and peaceful global society for the 21st century.

5. Action

Action is the process, where all the competences of the other four domains merge to meaningful creations, allowing participation and networking of results in SD. Additional special practical skills, abilities and competences in the field of project management and cooperation are needed.

All four levels of action have to be considered for a successful ESD: individual, classroom/school, regional and global. Actions allow to experience conflicting interests, experience the change, to be involved (participation), learning from mistakes, experience synergies and success. All of them can increase motivation for further learning and continuing action.

Actions allow applying the solidarity developed through empathy and sympathy.

For each of these five domains the CSCT model developed competences on three different levels:

▸ The teacher as an individual – connected with reflection and visioning;
▸ The teacher in the educational institution – connected with teaching and communication;
▸ The teacher in the society – connected with cooperation and networking.

2.6 THE COMPETENCES IN THE VOCATIONAL EDUCATION AND TRAINING SYSTEM (VET) OF REGIONE TOSCANA
by *Raffaela Marchi*[11]

The path of the theme of skills in Europe has a significant history, both in terms of content and chronologically.

Europe began in 1989 to address the issue of certification of skills starting from the mechanisms of mutual recognition of certificates of competence in order to encourage the mobility of people, students and workers between member countries.

Since then a meaning of European human resources mobility has spread, that emphasizes not only and not so much physical and geographical mobility of people, but the readability and portability of skills possessed, which are considered capital in the EU within the distinctive framework of the European knowledge.

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11   Dr. Raffela Marchi, graduate in sociology, is expert and responsible for the certification of competences and evaluation processes according to the New Regional System (Regione Toscana) SRC. She deals with social research, social statistics and provides consulting for the planning of policies for training, education and job training and designs training actions for companies and public administrations.

Skills management is then recognized as a major factor upon which to invest in making the EU the "most competitive knowledge-based society and economy in the world."

Since the Lisbon Council, in particular, the link between strategic individuals' employability, lifelong learning, harmonious and sustainable economic development has been activated.

In this framework, the concept of competence is linked both to a dimension of the system – placing it at the center of the processes of innovation and integration between education and training systems – and to a personal dimension – which concerns the subjective process of acquiring skills in different contexts of formal, informal and non-formal learning.

The pursuit of these goals, however, assumes that competences are identified and evaluated and certified through objective criteria and agreed tools.

For this purpose, through three successive Directives (EEC Dirr. 89/48; D. EEC 92/51; D. EEC 99/42), the Union has come to define three basic principles:

▸ mutual trust between training and educational systems of member countries;
▸ recognition mechanisms interpreted in the most favorable manner to the person;
▸ Certificates of competence can be issued following an "appreciation of personal qualities, aptitudes or knowledge of the applicant by any authority, without prior training".

These documents enshrine the principle of capitalization and enhancement of competences of a person, in any way acquired, that must be validated and certified to create expendable credit.

These principles have been addressed in the first place in the White Paper on education and training *Teaching and Learning. Towards the Learning Society* in 1995, which states the importance of identifying, in all European countries, the "core competencies" and tools for acquiring, assessing, certifying them, focusing on the importance of "putting in place European process can compare and disseminate these definitions, methods, practices" (Delors ,1995, p. 57).

Looking at the main scientific contributions dealing with competences under different points of view, one finds some fundamental distinctions and interpretations.

In some contributions the term competence is synonymous with different capabilities in action, in others it is represented as a *general capacity of the individual, which allows to adequately face specific work demands*, and in others the need to establish a substantial difference between the use of the term in the singular or plural is dealt.

Of course, the diversity of meanings, the different connotations, including the introduction of new terms to express meanings overlap[12], but may represent a stimulus for the construction and dissemination of a greater awareness of the existence of different legitimate ways of understanding the concept of competence; ways that produce and require different analysis modes and 'treatments'.

In Italy, the approach developed by ISFOL[13] defines a competence as: "the set of resources – knowledge, skills, abilities, etc.. – a person must have to effectively address the inclusion in a work context, and in general to cope with their professional and personal development. "Competence is understood as a "relationship" between a subject and a specific situation and makes explicit reference to the work context. The jurisdiction is not obtainable from an exclusive analysis of the technical nature of work tasks and even the definition of an amount of abstract knowledge and skills possessed by a subject. It stems instead from the analysis of "the subject in action", by considering the type of resources that he works out and how he combines them to cope with situations and relationships within a professional context.

The steps that lead to the construction of a system of certification of competences of Regione Toscana are in line with the national and local guidelines.

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12   Consider, for example, the recent recommendations of the European Parliament and Council on key competences (2006) and EQF (2008), that (re) introduce the construct of learning outcomes, in some respects be considered an "alternative" to the term competence.

13   According to ISFOL "a competence consists of a mix of elements, some of which (e.g. knowledge, operational techniques) depend on the nature of work and can be identified analyzing tasks and activities carried out; others (e.g. motivation, communication skills, problem solving skills) depend on the personal characteristics of the worker and can be identified only through the analysis of the individual working behaviour and his/her ways to operate. The new competence model was structured into three categories (basic, technical, professional and cross competence) were identified and for each one different analysis procedures of professionalism have been identified. Basic competences are: requirements for the employability of people as citizens of Europe; the minimum knowledge or pre-condition for access to training and employment; an adequate level of awareness; the ability to cope with changing conditions and to update oneself constantly. In addition, basic competences include: knowledge and competences related to languages, computer science, economics, law, etc.. Cross-curricular competences, instead, refer to the working behaviour with regard to the ability to "interpret" (situations, tasks, issues, oneself), "build relationships" with others (people or things) to achieve goals, "face" (situations, tasks, problems). Technical and operational competences, finally, refer to specific knowledge and capabilities required to carry out professional activities in a particular occupational field.

Chapter 2 - Competences in education for sustainable development

The 'Sistema Regionale delle competenze nel quadro degli standard minimi nazionali' adopted by Resolution of the Board in April 2009, describes the main components of the system:

▸ a national framework of professional families, according to a branching tree of professional profiles;
▸ a national framework of minimum standards of competence, which the Regions may supplement with additional specifications designed to meet the regional economic and productive features;
▸ a transferable certification system that ensures the readability of the various national instruments adopted in different situations;
▸ reference to the Community framework on transparency.

Besides the Tuscan model describes in detail the implementation steps related at the regional level, needed to give substance to the guidelines described; it gives a scan time of the various stages of implementation, proposing procedures, devices and instruments for the entire process of recognition, validation and certification of competences (the subject of major experiments at the level of the region and of the individual provinces).

The choice of the Regione Toscana, consistent with the system viewpoint that characterizes the policies adopted in the area, is characterized by having focused attention on the definition of the frame of reference within which placing the specific tools that operate in different contexts.
Since 2002, the Regione Toscana has started a process of overall restructuring of its system of Life Long Learning (LLL), which will invest progressively all systems connected to it: those of education, vocational training, guidance and work.

With the approval of the new law of the Regione Toscana in the field of education, instruction, guidance, vocational training and labor, L. R. No. 32 of 26 July 2002, the Region has tried to regulate systematically the matters of education, vocational training and work, and to operate towards the integration of systems, from the perspective of institutional pluralism.
The regional law aims to guarantee Tuscan citizens the right to long life learning, the right to work and career development. The steady growth of individual skills is the result of the full and effective exercising of citizenship rights, and the existence of adequate levels of quality of social and professional life.

It is a system based on the concept of professional competence, a concept which came to constitute the 'tool' that can make interact and communicate effectively the education, training, guidance and employment services systems, as well as the enterprises system.

Competences (defined as the set of knowledge and skills characterizing the education and training curricula, as well as non-formal and informal experiences) are the common currency which links those systems and making work the labor market and the social system.

The new Tuscan system is also based on the principle – borrowed from the European Union's guidelines on the matter – of the equal dignity of learning acquired in *formal* and *non formal* contexts.

The integrated regional system of training, education and work is based on the recognition of the competences of individuals, classified and described in the *Register of Professionals*, in order to ensure visibility.

The standard repertoire defines competences and knowledge to be attained at the end of the training activities, also not aimed at the issue of qualifications or specializations, and the link with the national system of minimum standards of competence is also identified.

The fundamental fact of this new regulatory framework consists, on the one hand of the introduction of the concept of competence as a key element to which the training, education and employment systems are related, and on the other, by the radical redefinition of the instruments and of frameworks for the management of vocational training.

This is a breakthrough that changes the previous rules on certification systems, on the recognition of credits and qualifications, and consequently on the operating procedures for the management and scheduling of all activities related to the system of Life Long Learning.

In particular, the Executive Regulations of LR 32/2002, issued by the President of the Regional Council on 8 August 2003, identifies the system of certification of competences and recognition of credits as a tool to identify, classify and recognize the competences acquired through one language shared by all systems.

Further reference on this topic can be found in the document **The competences in the vocational, education and training system of Regione Toscana** (It).

PART II
THE TRAINING ACTION

THE CHARACTERISTICS OF THE TRAINING ACTION

3.
THE CHARACTERISTICS
OF THE TRAINING ACTION

3.1 AIMS

The training activity objective is to help build a response to the needs, in terms of education and training, for an approach to sustainable development and, therefore to the needs of teachers and trainers, the professionals who can meet this growing demand.

As for the school system, the reasons for the educational needs reside in the system of ministerial guidelines (MIUR, 2009).

As for the vocational training system, the reason for training arises from the demands of an approach to sustainable development, which is consequence to the spread of opportunities of employment and re-employment in the context of the so-called *green jobs* (UNEP 2009; EU 2012), and to the need for "[…] knowledge on [new] contexts and on [new] opportunities, […] a fundamental requirement for mobility so important in today's world of work ' (Bresciani, undated, p. 16).

An analogous requirement in terms of training on sustainable development also came from professionals involved in governance systems, as well as from entrepreneurs who see an opportunity in green economy business development; this opportunity is even more supported by the present changing in paradigms of development, due to the current economic crisis.

3.2 COMPETENCES AND GOALS

Taking note of the wide open debate on the definition and categorization of *competences*, for the definition of competence this work refers to competence as "the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in

professional and personal development" (**European Qualification Framework**, 2008).

This definition, in addition to being recognized in international contexts, agrees well with the terms of reference which have driven the NJ ESD COM project: the indications of the project CSCT (Sleur, 2008, p. 39; Rychen & Salganik, 2003, p. 41) and the indications of the Register of Professionals of Regione Toscana[1] together with those regarding the System of Education (Olmi, 2000; Boscolo, 1998; Bertonelli-Rhone, 2000) and in particular those of the School Forum AP (AP School Forum, 2010).

The *objective* of the training action is to enable teachers and trainers to develop competences for the design and delivery of training courses on sustainable development, for the final recipients (or second level): students and adults, either employed or not, and who access to the long-life learning systems.

The NJ ESD COM project has identified these competences to be consistent with the analysis of the CSCT project and has verified the possibility of their integration within Training and Education Italian systems.

As for vocational training, the work started from the identification of professionals operating within the training; in particular, professional profiles dealing with local development, education and environmental information, dissemination, planning and implementation of innovative systems, plant and resources: all profiles for which the need for integration of proposed skills appeared in an urgent manner.

To permit certification and usability of the competences developable through the proposed training, the project made reference to the Regione Toscana system; to enable a compatibility of skills identified in the system, these were identified according to the structure proposed by the Register of Professionals **(http://web.rete.toscana.it/RRFP**), in *knowledge* and *skills.*

In particular, as regards *knowledge*, the NJ ESD COM project identified:

▶ Legislation and technical regulations at local, national and international level (UN, EU, National State, Region) on Sustainable Development.
▶ The principles of the theoretical model of the four dimensions of sustainability (ecological, economic, social and cultural), knowledge to be

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1 See the term Units of Competence, "Unità di competenza", Glossary **http://web.rete.toscana.it/RRFP/pdf/Glossario.pdf**

Chapter 3 - The characteristics of the training action

used as a tool for analysis / evaluation and / or programming support for any action / process / product both tangible and intangible.

▶ The experiences of excellence within Sustainable Development, aimed at the identification of sensitive information for reproducible models.

▶ Techniques of conducting groups to educate and train successfully on environmental issues.

As regards *skills*, the following have been identified:

▶ Design and implement educational courses and spreading actions based on the indications of local, national and international documents on sustainable development.

▶ Apply the theoretical model of the four dimensions of sustainability (ecological, economic, social and cultural) in the analysis, evaluation and planning of actions, processes and sustainable products.

▶ Interact with the various stakeholders involved in environmental education (government agencies, schools, associations, etc.) ensuring the effective planning of training / information / education.

▶ Adapt the best practices developed in the context of sustainable development to the local situation.

The competences identified would make it possible to adapt to the demands of the labour market the working performance of those professionals who, at the moment, are identified as those which have greater relevance with the environment.

It is for this purpose that the NJ ESD COM project has started the procedure. to update some professional profiles, in collaboration with an expert from the Vocational Training Service of the Province of Grosseto.

> **Further reference on this topic, can be found in**
> **The competences in the vocational, education**
> **and training system of Regione Toscana (It)**

While the professionals currently identified in the present work are all classified at third level EQF, with a high degree of responsibility and autonomy, it would be desiderable that the additional knowledge and skills identified were proposed for profiles at other levels.

The proposal to upgrade the competences of professionals through a sustainable approach to development, although representing only a first step, could pave the way for the identification of a much larger number of professionals who would benefit from an update that integrates these new skills.

In fact, as pointed out from the research by CEDeFoP (CEDeFoP, 2010a, p. 2), the "ecological" skills, in the near future, are likely to become common to all the professionals at every level and degree of responsibility, skills assimilable to those defined as threshold skills (Pecorini, 2009).

Finally, to permit certification and usability of the competences developable through the proposed training within the Education System, the project obtained for it the accreditation both at the regional and national level[2].

3.3 TARGET GROUPS

The project is aimed at trainers, first level target group, with the purpose of developing competences in designing and delivering training courses for final users, or second level target group, belonging to three kinds of users:

▶ Teachers and students;
▶ Officials and Public Administrators;
▶ Entrepreneurs.

The target groups for whom the training action was designed and tested are therefore teachers and trainers who in turn will carry out training activities in: Education and Training, Public Administration and the Entrepreneurial systems.

The decision to form through the same training action professionals working in the three systems has the Triple helix model as its foundation.

The Triple helix is an approach to read innovative systems, which was developed in the United States in the nineties. It identifies the three components of society, represented by education, production and governance, as the driving forces behind the processes of innovation and change.

Since 1996 several international conferences have promoted the Triple helix model, in order to develop the study of interactions between academic, industrial and institutional systems, as a means to promote technological innovation and economic growth.

Beyond the theoretical level, the model of the Triple helix is now the basis of the development policies of many European countries and regions worldwide.

The proposition of the Triple helix model as a guide in the selection of target groups arises from the fact that this model characterizes now, and increasingly, the design of strategies and global economic policies.

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2   It was submitted to the General Directorate for the school, MIUR, a request for recognition of individual training courses for the school staff, according to **Regulation No. 90 of 12.01.2003** (Art. 5).

And therefore it is desirable that this model becomes part of the *forma mentis* of those who are involved in training on sustainable development, and that it could facilitate the display of the simultaneous presence of all three systems and their relationship and role as a lever in processes of change.

3.4 CONTEXT AND CONTENT

The decision to dedicate the first few chapters to a reflection on the challenge of education in the complex society and on the role of the trainer, was considered important to provide a framework of socio-historical context, in which education on Sustainable Development operates. The effectiveness of a training action on development issues cannot be left aside from a global dimension.

This consideration also allows to better understand the methodological choices proposed by the NJ ESD COM project, such as competence based approach and methodologies for active. and cooperative learning.

The complexity of the approach to Sustainable Development increasingly requires building relationships between the components of society, from the first step of sharing a common language.

The contents proposed in the training action have therefore a twofold purpose: to allow for an analysis of the social context in which the educational activity is developed (**chapter 1**) and to share concepts and basic terminology regarding Sustainable Development.

The need to clarify the fundamental concepts derives from a specific request, made at several levels during the preparatory meetings with target groups.

Nowadays one talks at length about Sustainable Development, but the speed with which this debate has been enriched and developed did not allow a clear acquisition of the concept and its implications.

The manual develops therefore in a separate section (**part II b**) the history and foundations of the concept of Sustainable Development, illustrating the main stages and international documents that have accompanied its evolution.

Therefore, the teacher will have an outline of the referring contents which, while not exhausting all the topics from the vast literature available today, will be the basis for directing further investigation.

3.5 TEACHING AND LEARNING METHODOLOGY

The teaching methodologies suggested and used in the training action are the result of a choice that has interpreted the guidelines of MIUR

(MIUR, 2009) and of the study group of the CSCT project(Sleur, 2008), identifying in the cooperative approach (**paragraph 6.2.2.**), and in the principles of active learning (**paragraph 6.2.1**), the most responsive to the fulfilment.

3.6 THE TRAINING TOOLS

The educational tools used were constructed by following the methodologies of active learning and cooperative approach to teaching. Alongside familiar tools, such as the Jig Saw, the Dispute, Corners, the project has proposed the use of two innovative tools:

The Square of Sustainability (**paragraph 7.2**), tested and installed by the project partner Institute for Integrative Studies (INFIS) of the University of Leuphana, Lueneburg and the Triple helix model (**paragraph 7.3**), developed as a training tool.

3.7 EVALUATION

In the NJ ESD COM project proposal competences are identified by referring to the system of training and Register of Professionals of Regione Toscana, which defines them through *knowledge* and *skills*.

In the evaluation process knowledge is assessed through ongoing self-evaluation questionnaires; skills are assessed through observation grids that refer to specific indicators to interpret the behaviour displayed during the activities and in particular during the production of the project work.

The evaluation of the project work through self and hetero assessment constitutes the final stage of the evaluation process.

3.8 THE TRAINING ACTION FRAMEWORK

The training action programme is developed in sections, according to a modular structure **(chapter 9)** so as to respond to the specific needs of the recipients, who may then request a study of different aspects of Sustainable Development; for example the social aspects rather than the environmental ones, the teaching methods rather than the basic content or the use of logical tools.

The training action, common for teachers and trainers, can be differentiated at the time of delivery to the three types of final users.

While the context of learning that characterizes the world of education allows and requires the development of a comprehensive base knowledge, training for workers, instead, necessarily has a different char-

acterization. Training in this case must meet specific cognitive needs, develop knowledge and skills to interface properly with the changing economic and production system and to address actual issues.

The project has met these needs by providing education / dissemination seminars focused on the analyses of issues of governance and of economy and production, according to the paradigms of sustainability.

The topics requested were sustainable tourism, successful companies in the green economy, enterprise networks in innovation, best practices in public administration, waste treatment and energy efficiency.

The themes identified in collaboration with the target groups based on their specific needs were addressed by discussing the aspects and contents related to sustainability, in collaboration with sector experts and under the guidance of trainers specialising in active and cooperative learning.

3.9 BEST PRACTICES

The project has identified a set of best practices, selected and identified according to the three types of target final users, to allow the trainer to find real examples that can be used to study different aspects of sustainability.

The collection of best practices offers in addition the opportunity of contact with innovative realities, necessary for the construction of networks and dissemination of knowledge.

Learning materials used and usable as case studies in the training activities are available in the Appendix and listed in the printed version.

PART IIb
THE CONTENTS, A COMMON LANGUAGE

4.
SUSTAINABLE DEVELOPMENT[1]

The Austrian film director Hubert Sauper describes in his film *"Darwin's Nightmare"* in a dramatic way how a non-sustainable process is deteriorating the region around Lake Victoria in many ways. The whole process started above all with the introduction of the Nile-perch (*Lates niloticus*) in Lake Victoria and the exploitation through foreign companies. A complex system of a broad variety of factors interrelate with each other and are leading to the ecological, economical and social catastrophe in this region. The film provided a typical example of what is referred to today as a 'sustainability challenge'.

Fortunately there are also a growing number of international examples how to deal with such challenges in a sound way.

Taking an example from a completely different reality, car-sharing co-operation is a system for the management of mobility. In Switzerland this bottom up-project started with small initiatives and developed to a nationwide organization.

Advantages are visible in several domains:
- Ecology: reduction of grey energy of car-production, lower land use by parking lots and garages, availability of cars at numerous location, basically on railway-stations, you can use the train for larger distance.
- Economy: low costs for moderate users, creation of new jobs.
- Social and Cultural: lower maintenance time, proliferation of the basic idea of sharing and how a society can organize this, less space for parking leaves areas to children to play.

This example shows how initiatives of small groups can initiate innovation. Similar processes have been started by activities promoted by schools and public administrations.

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1 Adapted from: *Competencies for ESD (Education for* Sustainable Development*) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, p. 14.

4.1   WHAT IS SUSTAINABLE DEVELOPMENT ABOUT?[2]

This chapter will try to explain the meaning of Sustainable Development and describe its most remarkable features.

One of the key features of the last decade has been the growing awareness of the process of globalisation. While only 13 articles about this topic were published between 1980 and 1984, the number of papers that refer to the same topic today, are almost uncountable (Dicken, 2003).

Globalisation is manifesting itself on several levels: economic, ecologic, social and cultural. It is also becoming clearer to scientists and policy-makers that these levels are strongly interconnected and are extremely complex. Globalisation offers many new opportunities but also creates new and often unexpected challenges and problems. Furthermore, the impact for future generations may be very large but also very hard to estimate.

The most famous problem considered from a global perspective is *global warming*. This problem has a clear ecological impact, but it also has significant economic implications. For instance, policy makers are now searching for alternatives to fossil fuel and they are considering options as diverse as nuclear energy and biodiesel.

Both these options, however, will lead to new challenges: nuclear energy produces nuclear waste in the present and for future generations and centralizes economic power.

On the other hand, the increasing use of biodiesel may inspire many farmers to switch from growing plants which are used for food, to plants which produce oil that can be used as a fuel. Today, we feel the first effects as a dramatic rise of the food prices.

Global climate change can serve as a prototype of the study of sustainability problems. It is characterized by a high degree of complexity, expressed by a strong interrelationship between ecological, social, cultural and economic dimensions, which have important consequences for future generations; furthermore there is the uncertainty about the routes that should be followed to find a solution.

4.2   HISTORY OF SUSTAINABLE DEVELOPMENT

The theme of Sustainable Development has been in the spotlight for at least twenty years, since 1992, on the famous Earth Summit, held in Rio de Janeiro.

2   From*: Competencies for ESD (Education for Sustainable Development) teachers . A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 14-15.

Prior to this historic meeting, however, two other initiatives had already started the basic stages.

▸ 1972, the study *'Limits to Growth'*, promoted by the Club of Rome (**www.clubofrome.org**) end enlivened by the Italian manager Aurelio Peccei in collaboration with MIT in Boston;

▸ 1987: the document *'Our Common Future'*, developed by the World Commission on Environment and Development (WCED).

In 1972 the Club of Rome shocked the world with the report *'Limits to Growth'*.

The main conclusion of this report was as follows: *"If economic development continues-as-we-know it, society will run out of non renewable resources before the year 2072, with the result likely to cause a rather sudden and uncontrollable decline in both the population and in industrial capacity."*

The report also argued that a fragmented approach to solving individual problems would not be successful. This report received much criticism, mainly because the predicted environmental disasters were not visible yet.

Nowadays a completely different approach that allows to re-evaluate internationally the character and the innovative contents of this study is developing.

In 1987 the World Commission on Environment and Development (WCED) presented the report *'Our Common Future'* to the UN General Assembly. This report is best known as the Brundtland Report, named after the Committee chairman and former Prime Minister of Norway, Gro Harlem Brundtland.

The objective of the Global Commission was to identify concrete ways to address environmental and development problems of the world.

The Report developed according to three general objectives:

1. to review the critical environmental and development issues and to formulate realistic proposals to address them;
2. to propose new forms of international cooperation on these issues, in order to better target policies and events to the necessary changes;
3. to raise levels of awareness and commitment in the actions of individuals, voluntary organizations, businesses, Institutions and Governments.

The report proposes a definition of *'Sustainable Development'* that is still used today:

> *"Development that meets present needs without compromising the ability of future generations to meet their own needs'*

The topics of the paragraph are developed in the hypertext Sustainable Development: Definition and Documents, slides 4-7.

4.3 MAIN SUSTAINABLE DEVELOPMENT NATIONAL AND INTERNATIONAL DOCUMENTS

Over the years, records, studies, protocols and agreements on the subject have proliferated; the most important international meetings which have worked out the reference documents, are listed below:

- Rio   - 1992
- Johannesburg   - 2002
- Copenhagen   - 2009
- Cancun   - 2010
- Durban   - 2011
- Rio + 20   - 2012

At the Italian national level must be mentioned:

- **Accordo interministeriale MATTM-MIUR** (2008) (Inter Ministerial Statement, Ministry of Environment, Land and Sea – Ministry of Education – Ministry of University and Research)
- **Linee Guida per L'Educazione Ambientale ed allo Sviluppo Sostenibile EASS** (2009) (Guidelines for Environmental Education and Sustainable Development); indications for its introduction in school curricula through training teachers and activation of educational initiatives.

> **The topics of the paragraph are developed in the hypertext**
> **Sustainable Development: Definition and Documents**

4.4 FEATURES OF THE SUSTAINABILITY CHALLENGES[3]

Sustainability issues are complex because social, economic, cultural and ecologic aspects are strongly interwoven. Simple predictions on the basis of linear causal relationships are therefore very rare.

The following example may illustrate this.
People become more and more convinced about the fact that within few decades we will run out of fossil fuels, which will undoubtedly pose

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3 Adapted from: *Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, pp. 17-18.

enormous problems for the economic growth of many both developing and developed countries, and will also impact on future generations. Consequently, there is a growing research activity, searching for alternative energy resources, especially for the transport sector where fuel is of vital importance.

Some plants that produce oil-bearing seeds can be used to produce a substitute for fossil fuel. The advantages are quite clear: theoretically it forms an unlimited source as it depends on solar energy, and it is CO_2-neutral, which is in line with the Kyoto protocol. However, though at first sight this 'solution' might look very promising, it is rapidly becoming obvious that it leads to very unsustainable consequences, too. Considering the economic importance of these fuels, it seems clear that big multinational corporations will invest heavily in this sector. Growing plants requires large surfaces of land, which are less available in industrialised countries, but are richly present in developing countries. Many policy makers expect therefore that particularly large areas of untouched natural reserves – such as the Amazon area – will be sacrificed to be used to grow maize or oil producing plants. Local populations, which strongly depend for their living conditions on the local biodiversity, will be the first victims of these developments. Furthermore, whilst the multinational corporations will make significant profits from such operations, the local populations will only benefit slightly, if at all, from the conversion of their original natural environment into large agricultural areas.

Evidence to this effect are already in southeast Asia, especially in Indonesia, where huge areas of rainforest have been turned into oil palm plantations

This example illustrates another feature of sustainability issues, that is the uncertainty that policy makers meet when taking decisions with respect to them. After all, the ways to unsustainable solutions are usually well known, the ways to sustainable development however are covered with many uncertainties.

Many solutions, which at first sight, look very promising, bear many risks both for the present and the future generations.

Therefore, Sustainable Development involves, by definition, a continuous learning process.

5.
THE DIMENSIONS OF SUSTAINABLE DEVELOPMENT

5.1 FROM PILLARS TO DIMENSIONS OF SUSTAINABILITY

The concept of Sustainable Development has broadened and deepened over the years through numerous debates and international studies that have proposed different theoretical models.

Since the 1995 Copenhagen ONU World Summit for Social Development and starting from the 1997 Amsterdam Treaty of the European Union, a new concept developed, better known as the Model of the Three Pillars of Sustainability, which states that sustainability is not limited solely to the natural heritage bequeathed to future generations, but also involves economic and social ones; in this sense, Sustainable Development is founded on three pillars, respectively, ecological, economic and social development. Falling short of even one of the three columns, the architecture of sustainability will ultimately collapse (see Bader, 2008).

According to this model, every action, process and / or human product can be analyzed through a reading frame that identifies the aspects related to the three pillars:

- Environmental.
- Economic.
- Socio – Cultural.

Culture is gradually emerging out of the realm of social sustainability and being recognized as having a separate, distinct, and integral role in Sustainable Development. Within the community development field, culture is defined broadly as being "the whole complex of distinctive spiritual, material, intellectual and emotional features that characterize a society and / or social group. It includes not only the arts and letters, but also models of life, the fundamental rights of the human being, value systems, traditions and beliefs" (UNESCO, 1995, p. 22).

Cultural sustainability can be defined as "the ability to retain cultural identity, and to allow change to be guided in ways that are consistent

with the cultural values of a people" (Sustainable Development Research Institute, 1998, p. 1).

In his book 'The Myth of progress towards a sustainable future', Wessels (2006) states that there are three laws referred to in speaking of sustainability: the law of limits to growth, the second law of thermodynamics and the law of self -organization in complex systems. He explains how these laws help to think in a linear mode, thus it is simplistic as it takes no account of how all the parts of a complex system interact with each other, with interactions that cannot be predicted exactly.

Wessels notes that what is lost with this vision of the world's paradigm is the consideration that the whole can be much more than the sum of its parts. This statement is important for the inclusion of culture as the fourth pillar of sustainability. Although the theme of the importance of culture in sustainability has never been disputed, it is only in recent years that culture has not been discussed as part of one of the other three pillars, but recognizing its central and distinct role.

More recent studies and investigations, stressing the importance of the *cultural aspects,* work them out *in a specific fourth macro area* (see: Duxbury & Gillette ,2007; Hawkes, 2011; Nurse, 2006; Stoltenberg , 2009; Throsby, 2008; Stoltenberg,Holz, 2011).

Meanwhile many initiatives of the UNESCO include the cultural dimension in the discussion of Sustainable Development (**UNESCO, 2005**), in order to stress the necessity of negotiations between the different interests of social fields of action and stakeholders, Stoltenberg, Michelsen (1999), Stoltenberg (2009), Holz, Stoltenberg (2011) developed the model of the four dimensions, ecological, economical, social and cultural.
The approach of pillars suggests in fact a balance model, whilst the four dimensions approach allows to analyze unsustainable development, conflicts, synergies and solutions under the perspective of the values of Sustainable Development.

The addition of a fourth dimension that represents culture forms the basis for a holistic[1] approach to sustainability. Cultural sustainability is identified with what is being done to preserve the cultural elements of society,

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1   Holistic: Holism (from a Greek word meaning whole, entire), is the idea that natural systems and their properties, should be viewed as wholes, not as collections of parts. This often includes the view that systems somehow function as wholes and that their functioning cannot be fully understood solely in terms of their component parts. (*adapted from:* **http://wikipedia.org/wiki/Holistic**).

tangible and intangible, and that allow the promotion of other aspects of sustainability, environmental, economic and social development.

Werbach (2011), in an interesting short video, illustrates the meaning of cultural sustainability in practice, stressing that this should focus on meeting the needs of a community, dealing with issues allowing protection and preservation of the cultural identities, defined as the ways in which groups of individuals interact, expressing their identity characterized by ideas, beliefs and traditions .

In the same way as some animal species, cultural diversity is now in great danger, of "extinction" and from everywhere come the calls and actions for its protection.

Based on the considerations outlined, this paper proposes the use of an approach to sustainability through the analysis of the *Four Dimensions*.
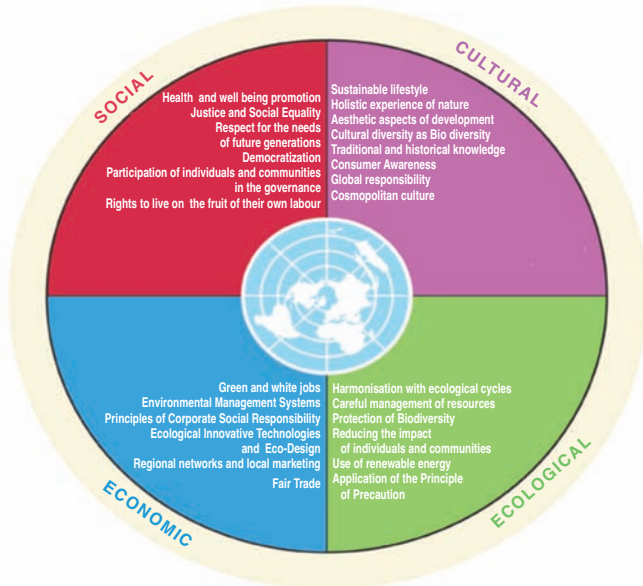
Picture 5.1: The key points of the Four Dimensions of Sustainability

5.2 ENVIRONMENTAL ASPECTS

> Our planet is at stake.
> On this matter we must be more careful,
> because if this rope breaks down,
> there will not be another.
>
> José Manuel Barroso
> European Commission President
> (Second Term 2010-2014)

The environmental aspects of sustainability are those that first sparked international debate.

Despite numerous scientific studies and international documents highlighting the fundamental value of the natural environment as a condition for socio-cultural and economic development, there is still little awareness of how the alteration of the natural biological balances may affect our own lives.

Similarly, the relationship between human activities and their impact on the environmental balance, is still not much perceived.

The following sections will investigate these three aspects.

5.2.1   The limit of Resources

There are several classifications of *natural resources*; the most relevant to environmental economics is the distinction between renewable and non renewable resources.

They are called *renewable*, the resources whose stock is naturally replenished – as with the groundwater aquifers – continually. The rate of recovery, or the rate and extent with which the stock is reconstituted, is different for each resource and is influenced by external conditions. Eg. an aquifer can replenish itself in longer or shorter time, depending on the characteristics of the geomorphology of the soil or on the climatic conditions.

This means that the stock of renewable resources remains constant if the drawing rate of the resource is equal to its rate of recovery, but if the harvest rate is higher than that, we will have a depletion of the stock.

Non renewable resources are those whose stock is not reconstitutable, in a time scale of human activities usage. This means that the use of these resources, leads to a depletion of the stock; the depletion time depends solely on the rate of withdrawal of the resource. An example: the oil reserves on Earth are not reconstitutable, so sooner or later we will run out of stocks. The moment when this will happen, depends on

how many resources we decide to use today, and how many to save to use tomorrow (see TIME, *The truth about oil*, 9th April 2012).

To properly manage the natural resources - ie keeping the stocks - it is therefore necessary that the withdrawals may be made in a conscious manner, taking into account the scarcity of resources. For this to happen, one must have an indicator of scarcity, which signals to consumers the level of efficient consumption.

Numerous studies in recent years point to a growing shortage of many important resources such as water, land for agricultural use, raw materials such as metals and rare earth, fossil fuels, minerals for agricultural and industrial use.

Many studies also show the relationship between resource scarcity and implications in terms of wars and conflicts, as outlined in the study **Resource Scarcity, Climate Change and the Risk of Violent Conflict** (Evans, 2010)

A global overview with regard to the progressive loss of natural resources and raw materials is prepared annually by the Global Footprint Network that invokes this theme in the so-called Earth Overshoot Day (**http://www.footprintnetwork.org/en/index.php/GFN/page/earth_overshoot_day/**).

According to these studies, the day when the Earth runs out of resources available for that year "retreats" progressively: in 1987 it was December 31, in 2011 it was September 27 (**http://www.footprintnetwork.org/press/EODay_Media_Backgrounder_2011.pdf**).

Regarding the state of global water resources and land for food, the FAO, since 2011, began publishing an annual **report** SOLAW: State Of Land and Water report (**http://www.fao.org/nr/solaw/en/**).

The report paints a picture of a world that is facing a growing imbalance between **demand and availability of land and water resources**, both locally and worldwide.

The widespread degradation and increasing scarcity of land and water resources are putting at risk a large number of key systems of food production around the world, posing a serious threat to the possibility of being able to feed a world population that is expected to reach 9 billion people by 2050.

The SOLAW report points out that although in the last 50 years there was a dramatic increase in world agricultural production, "on too many occasions these improvements were accompanied by resource management practices that have degraded land and water ecosystems from which food production depends on the same".

To date a large number of these ecosystems, "are at risk of a gradual

deterioration of their capacity, due to the combined effect of excessive use of population pressure and unsustainable agricultural practices and the space given to competing uses" (for example, land use for photo-voltaic systems or for the production of biofuels).

No region is immune: ecosystems at risk are found all over the world, from the Andes mountains to the steppes of Central Asia, the Murray-Darling river basin to the centre of the United States

Between 1961 and 2009, the world's cultivated land area expanded by 12% and global agricultural production grew by 150%, thanks to a re-markable increase in yields of major crops.

The FAO estimates that by 2050, constant population and income growth will demand an increase of 70% in global food production. That means one billion tons of cereals and 200 million tons of farm products more to produce every year.

One of the "alarm signals" launched from SOLAW is the fact that the number of areas which have almost reached the limits of their production capacity is increasing rapidly.

As over four-fifths of that production improvement will take place mostly on lands already under cultivation at present, it is essential that intensification is made sustainable through an efficient use of water re-sources and soil.

The report analyzes a number of options to overcome constraints and to improve the management of resources in areas of high risk. A change in institutional arrangements and policies must be combined with greater access to technology. More investments, access to new funding mecha-nisms, international assistance and cooperation development will help to overcome these constraints.

The SOLAW report presents numerous examples of different strate-gies adopted in different parts of the world which have proved success-ful, making those options available for potential replicability elsewhere.

The FAO in 2011 elaborated a **compendium of guidelines** for sustain-able intensification of agricultural "Savings and growth: a new paradigm for agriculture". Well synthetize in the **flyer**, and presented in the video (**www.fao.org/ag/save-and-grow/index_en.html**).

Among the various critical points highlighted is that the majority of irrigation systems throughout the world are operated well below their potential. A strategy that combines improved management of these sys-tems, investment in local technical knowledge and modern technology, more training and skills development, will improve efficiency in water consumption.

In addition, innovative agricultural practices such as conservation agriculture, agro-forestry practices, integrated systems of crop / livestock and irrigation / aquaculture could help to increase production in an efficient way to combat food insecurity and poverty, limiting the impact on ecosystems.

Regarding the status of global raw materials in November 2008 the European Commission adopted the European Commission's review of the Raw Materials Initiative. It proposes an integrated strategy to address the challenges relating to access to essential non-energy raw materials (Raw Materials Initiative Strategy document: **http://ec.europa.eu/enterprise/policies/raw-materials/resource-efficiency-recycling/index_en.htm**).

Many of the commitments of the document have been implemented successfully in the '*2020 European Flagship Initiative on Resource Efficiency*'.

Over the last few years, the commodity markets have shown an increase in volatility and price changes without precedent. On all the major commodity markets, including energy, metals and minerals, food products, the price increased sharply in 2007 reaching a peak in 2008, had a sharp decline in the second half of 2008 and had once again an upward trend since the summer of 2009.

The availability of essential raw materials is of fundamental importance for the whole range of industries in the production of vehicles and mobile phones to the construction and paper industries, just to name a few. The increase of export restrictions by countries of supply, the rise of protectionism driven by the global financial crisis and the scarcity of rare earths and other minerals, it also creates the risk of triggering highly complex conflicts, that the responses of international organizations might not be able to manage.

The problem is so pressing that, following the proposals on the "Resource Efficiency", since 2011, the Annual European Raw Materials Conference was established (**http://www.eu-ems.com/summary.asp?event_id=68&page_id=474&/**), which meets annually with the aim to identify what measures can be implemented to ensure a stable and inexpensive supply of essential commodities, keeping within the EU's commitment to sustainability.

In the Annual European Raw Materials Conference 2012, among the various topics discussed in depth was that of transposition of the indications of the Raw Materials Initiative (**http://www.eu-ems.com/ summary.asp?event_id=106&page_id=793&/**) to increase recycling, substitution and efficiency in the use of raw materials.

Another key theme was the reflection of what are the appropriate steps to ensure that you can create growth and industrial competitiveness through the creation of a 'resource efficient economy'.

The Commission identified a list of 14 economically important raw materials that are subject to a higher risk of interruption (**http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm**) and set out to update the data every three years.

Among the reasons for emphasis on the risk of unavailability of resources, are given the low level of political and economic stability of the supplier country, and the low substitutability and low recycling rates of the commodity itself.

The containment of the problem certainly requires it to be covered in the same way as innovative research along the entire production chain, including all the stages, the extraction, transformation, sustainable, eco-design, recycling, materials substitution , the efficiency of resources and land use planning.

In line with these objectives, the European Technology Platform on Sustainable Mineral Resources was established (ETP SMR: European Technology Platform on Sustainable Mineral Resources: http://etpsmr.org/) which has among its key objectives the development of techniques for sustainable and innovative extracting and processing, the adoption of technologies that allow the reuse, recovery and recycling as well as the application of new products and the dissemination of best practices.

For further details, see the publication of the Strategic Research Agenda that provides an overview of the priority areas of research on the topic **http://etpsmr.org/index.php?option=com_content&view=article&id=14&Itemid=13**

A strong call to increase efficiency in using resources inspired the plan: Europe 2020 A resource-efficient Europe - Flagship initiative of the Europe 2020 Strategy (**http://ec.europa.eu/resource-efficient-europe/**) which stresses the need to develop new products and services and find new ways to reduce inputs of pollutants, reduce waste, improve stock management of resources, change consumption patterns, optimize production processes, management methods and business and improving logistics.

This will help to stimulate technological innovation, promote employment in the expanding area of 'green technologies', bringing great economic opportunities in terms of growth and employment.

Using resources more efficiently will contribute at the same time to achieve many of the objectives of the EU in tackling climate change.

Having a clear vision of where Europe should be in 2050 may provide a clear path for companies and investors (see EU, 2011).

5.2.2   The reduction of Biodiversity

Biodiversity is the totality of all living organisms, ecosystems, animals, plants and microorganisms that dwell in them, but also the genes of these species and the constraints that exist between them.

So biodiversity is the diversity of life, Nature in all its forms.

(Secretariat of the Convention on Biological Diversity (2000). *Sustaining life on Earth. How the Convention on Biological Diversity promotes nature and human well-being*).

Biodiversity is analyzed according to four tiers:

1. Ecosystems diversity (natural environments such as water, forests, grasslands)
2. Species diversity (animals, plants, fungi, microorganisms)
3. Gene diversity (races or varieties of wild and domestic species).
4. Functional diversity (the interactions are conducted within and between the three levels).

Biodiversity is an asset to our planet because it is the basis of balance and stability and provides the ability to adapt to change.

Balance and adaptability increase together with the degree of diversification.

There exists no species which can survive without its relationship with other species; the diversity of species and therefore the complexity of their relationships is the only guarantee for the preservation in the future of the planet, as we know it.

During the last few centuries, farming and then industry marked an impressive development. At the same time there was also an unprecedented increase in population and this heavily modified the balance of our planet.

The UN estimates that the rate of biodiversity loss worldwide has accelerated in recent years and it is estimated that about 200 species of plants or animals disappear per day; it is estimated that one third of the approximately 1.75 million known plant and animal species are threatened.

The reasons are manifold:

▸ Anthropogenic climate changes
▸ Desertification
▸ Deforestation and fires
▸ The intensive use of land
▸ Water and air pollution
▸ Increasing urbanization and infrastructure

- ▸ The use of invasive technologies and pollutants
- ▸ Population growth and mass tourism
- ▸ The introduction of alien species and GMOs
- ▸ Intensive and extensive agriculture
- ▸ Fishing, hunting and illegal trafficking.

The moral, cultural and economical need to protect the biodiversity of the planet was formalized through the Convention on Biological Diversity (CBD: Convention on Biological Diversity: **www.cbd.int**), signed in 1992 under the United Nations Conference on the Environment in Rio de Janeiro (UNCED - United Nations Conference on Environment and Development, **www.un.org/geninfo/bp/enviro.html**).

In 2002, during the World Summit on Sustainable Development in Johannesburg, the Heads of State agreed on the need to reduce biodiversity loss by 2010: the objective, defined *Countdown 2010*, was supported by a broad alliance of parties, both public and private.

This objective was strongly reaffirmed in numerous international meetings, with the highest membership in 2005 during the UN Summit in New York.

The 'International Union for Conservation of Nature (IUCN - International Union for Conservation of Nature: **www.iucn.org**) and the UN on this occasion declared 2010 as International Year of Biodiversity, and from 2010 to 2020 Decade of Biodiversity. (**http://www.cbd.int/2011-2020/**).

In October 2010 at the Nagoya Summit (COP10 of CBD: **www.cbd.int/cop10/**) it was noted that the targets set in previous international summits were not achieved and the rate of biodiversity loss had further increased.

Through new efforts 193 countries have reached a positive agreement on an ambitious global strategy to combat biodiversity loss, and have launched a package of measures to ensure that the ecosystems of the planet continue to support human welfare in the future. The EU, unlike in the past, presented a united and effective front and spoke with one voice.

Italy, too, submitted to the Nagoya Summit an important tool to ensure effective integration between the development objectives of the country and protect its priceless heritage of biodiversity: the **National Strategy for Biodiversity** (la Strategia Nazionale per la Biodiversità); the Strategy has resulted from consultation between the Ministry of Environment, Regions and Autonomous Provinces of Trento and Bolzano, with the agreement (Repertoire n. 181/CSR) expressed by the Permanent Conference for Relations between State, Regions and Autonomous Provinces, in the session of October 7, 2010.

Raising awareness and educating the public about the values of bio-

diversity are integral parts of all agreements and national and international treaties (Adomssent, Stoltenberg, 2011).

5.2.3   The Climate Change

The issue of climate change, for many years relegated to only a scientific and academic interest, is now at the centre of public debate.

Climate in scientific terms is defined as the average state of weather within a given time scale (at least 30 years) and it is influenced by multiple variables, such as: interaction with astronomical objects, changes in Earth's orbit, endogenous and exogenous Earth dynamics, the composition of the mix of atmospheric gases and human activity.

The term climate change indicates a change of one or more environmental and climatic parameters at different spatial and historical / temporal scales; among the most investigated are temperature of oceans and atmosphere, precipitations, distribution and development of plants and animals .

Notably, human activity affects quantity and quality of atmospheric gases; among them, the so-called *greenhouse gases* are essential for the survival of human beings and other millions of living beings, since they determine something called *greenhouse effect* by making it possible to hold a certain amount of heat that made the earth habitable during its history.
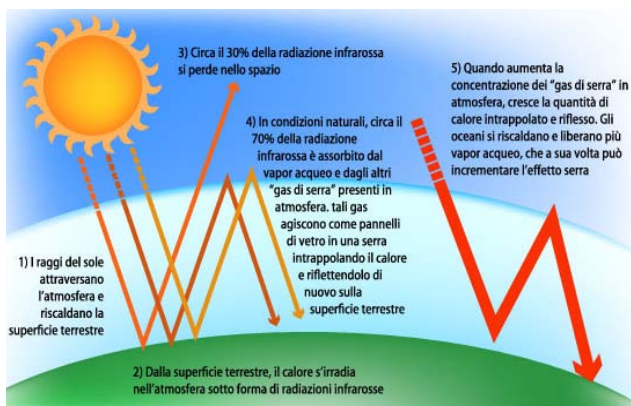
Picture 5.2: The Green Haus Effect, from:
http://galilei2d.altervista.org/wordpress/?p=1675

However, an excessive amount of such heat results in an increase in average temperatures, with a consequent strong impact on the stability of the natural equilibrium.

Climate change is generally attributed to natural causes, but the data for the past 150 years have been interpreted by a considerable part of the scientific community as an expression of a high incidence of human action.

A century and a half of industrialization alongside a great reduction of forests and some extensive and intensive farming methods have released into the atmosphere huge quantities of greenhouse gases.

And these amounts continue to grow with the growth of populations, economies and certain standards of consumption.

The United Nations committed the research on the subject to an intergovernmental group of experts (IPCC - Intergovernmental Panel on Climate Change: **www.ipcc.ch**), and it became one of the main international bodies for the assessment of climate change.

The IPCC was established by the United Nations Environment Programme (**http://www.unep.org/**) and the World Meteorological Organization to provide an overview on the current state of knowledge about climate change and its potential environmental and socio-economic impact.

The first IPCC report which highlighted the correlation between the anthropogenic emissions of greenhouse gases and likely climate change, formed the scientific basis for the negotiations of the Nations Framework Convention on Climate Change in 1992 (UNFCCC: **http://unfccc.int/2860.php**).

Within the UNFCCC the Conference of Parties (better known as COP) meets every year, representing the body of the Government of the Convention.

The first Conference of Parties (COP 1) was held in Berlin (1995).

A turning point for politics of climate change was occasioned by the COP 3 held in Kyoto (1997) with the adoption of the **Kyoto Protocol**. It stipulates that industrialized countries reduce, over the period 2008-2012, emissions of greenhouse gases by 5% worldwide, compared to the base year 1990.

In 2011 they met for COP 17 in Cancun, where they finally reached an agreement which made the protocol signature legally binding.

It is a common notion of the need to act decisively and quickly. In this regard there are many programs and initiatives that suggest and support ways to reduce the greenhouse impact. They are both international and local initiatives, the latter small and punctual, but equally important.

As an example being the movement of European Municipalities that have signed the Covenant of Mayors (COM – Covenant Of Mayors: **www.pattodeisindaci.eu/index_it.html**) and the involvement of cities defined as Green Capitals (**http://ec.europa.eu/environment/europeangreen-capital/index_en.htm**) or Smart Cities (**http://www.smart-cities.eu/**).

Most international studies got to the conclusion that, at this stage, we would have great success if the global average temperature did not rise more than 2 ˚C.

And this is why the International Community has come to promote, alongside initiatives for *Reduction* and *Mitigation* of Emissions, initiatives of *Adaptation* to Climate Change.

Adapting to global warming is a response to climate change which aims to reduce the vulnerability of human and natural systems to the effects of climate change itself (see UNFCCC, 2010).

In fact, even if we can stabilize emissions, climate change is now primed and its effects will last much longer; adaptation is therefore essential (see Farber, Daniel, 2007).

Adapting to climate change is particularly important in developing countries since they are expected to be the ones who have to bear the brunt of the effects (see Cole, 2008).

In this regard, it is important to remark the role of *International Co-operation* to grow in a sustainable manner together with developing countries or emerging economies.

> **The topics of the paragraph are developed in the hypertexts: Climatic Change and Sustainable Development: Definition and Documents - slides 8 - 26**

5.3   ECONOMICAL ASPECTS

We are not the developed world; we have become the over developed world.
Economic growth in a world where some regions are under developed is fundamentally contrary to the social, moral, organizational and scientific growth of humanity

In this moment of history we are faced with a terribly difficult decision.

We are asked to slow down the economic and technological progress,
or at least give it a direction different from before.

Man is asked, by all future generations of the Earth,
to share his good fortune with the less fortunate,
not with a spirit of charity, but in a spirit of necessity.

Man is asked to worry today about the organic growth of the total
global system
Can Man, in good conscience, say no?

(Mesarovic M., Pestel E., 1972)

Economic sustainability is a theme present in debates on Sustainable Development since the early days and the concept of *Green economy* has been the focus of debate for several years.

5.3.1 The Green economy

This term refers to a theoretical model of economic development that stems from an econometric analysis of the economic system, which in addition to the benefits (increased gross domestic product) of a certain regime of production takes into account the environmental impact, ie potential environmental damage caused by the entire cycle of raw materials processing and by their treatment as waste. (Life Cycle Assessment).

In line with the four dimensions of sustainability, however, they no longer consider only the environmental impacts, although of primary importance, but also the social and cultural.

The UN Environment Programme (UNEP United Nation Environmental Program) (**http://www.unep.org/**) deals with those issues since its establishment, and a lot of information can be downloaded from the interesting site dedicated to the Green economy: **http://www.unep.org/greeneconomy** /.

The UN Environment Programme (UNEP: http://www.unep.org/) has proposed a *Global Green New Deal* that could encourage governments to support the gradual transformation to a greener economy, ie ecological (**http://www.unep.org/pdf/ A_Global_Green_New_Deal_Policy_Brief.pdf** UNEP, 22nd October 2008).

In 2008, UNEP prepared a document which proposed a **Global Green New Deal** aimed at encouraging governments to support the gradual transformation towards a more sustainable economy.

According to the UNEP, the Green Economy is to be understood: "that setting of economy that offers the possibility to increase the welfare of human beings and social equity, while significantly reducing environmental

risks and ecological threats. Put more simply, the Green economy can be thought of as a low intensity of GHG emissions, with a high efficiency in using resources and putting an emphasis on social inclusiveness" **http://www.unep.org/greeneconomy/AboutGEI/WhatisGEI/tabid/29784/% 20Default.aspx).**

More recently, during the important meeting in Rio + 20 (**http://www.uncsd2012.org/**) which was held in Brazil in June 2012, 20 years after the famous Rio Earth Summit of 1992 (http://www.earthsummit.info/), UNEP has raised the idea of publishing the comprehensive report **"Towards a Green Economy"** that wants to be a substantial contribution to the two issues of Rio +20: *green economy* and *governance* for sustainable development, presented in 2011 in Nairobi and attended by over one hundred ministers.

The Report (UNEP, 2011a), underlines how, nations are faced by a profoundly changed world, a sound rethinking of the approach to the economy is required. The importance of policy making in this direction is supported by the document:

Towards a Green economy, Pathways to Sustainable Development and poverty eradication. A Sythesis for Policy makers (UNEP, 2011b), which incorporates the Report.

The proposals of the Report refers to a world where the talk is no longer just about a threat, but people are beginning to face scarcity of water and productive land, a world facing climate change, extreme weather and scarcity of natural resources. In this scenario, the Green economy can provide a sustainable response, that the *brown economy* has failed to give.

The Green economy, however, notes the Report, should not be seen as an alternative to Sustainable Development, but rather as a tool to achieve it at regional, national and global levels, and so boost the implementation of Agenda 21.

According to UNEP we should invest 2% of global GDP in 10 key areas of the green economy to overcome the present economic model, based on waste and resources not easily sustainable.

To launch the Green economy and defeat poverty, the Report identifies certain areas upon which invest about 1300 billion dollars by 2050: agriculture, construction, energy, fisheries, forestry, industry, energy efficiency, tourism, transport, waste and water management.

The transition to the new economy could lead not only to bring back the jobs lost by the current system, but even to create new ones, helping to boost GDP per capita.

It would be sufficient to redistribute what has been invested in the non-sustainable sector, such as fossil fuels, to achieve the objectives of

the UN; the greenhouse gas emissions would be reduced by one third, helping to counteract the effects of climate change.

In addition, there is the possibility of bringing wealth to under developed countries who earn their livelihoods from natural heritage, thereby reducing poverty. The Report also identifies advantages in terms of cost savings: investing 25% of world GDP in energy efficiency and renewable energy, primary energy demand could be reduced by 9% in 2020, up to 40% in 2050, saving the costs of power generation of 760 billion dollars per year by mid-century.

Alongside the UNEP, the OECD over the last few years has been very active in supporting *green growth. Green Growth* is the name in fact, of a series of initiatives promoted to support this view.

At Rio + 20, a handbook for politicians was published (Towards Green Growth) and a guide to the use of new indicators that can help to measure progress (Monitoring Progress).

http://www.oecd.org/greengrowth/towardsgreengrowthmonitoringprogress-oecdindicators.htm

Especially effective for clarity and directness of the message is the video that discloses these initiatives.

http://www.youtube.com/watch?feature=player_embedded&v=m9AS6KT7a5Y#

An analysis of the potential of the Green Economy is proposed by Ronchi, E. (2010) , in his article ***Development Tools in the Green Economy***, which identifies 5 areas of activity to be leveraged:

a) *Green economy* considered as an economic theory, and thus an address and not just a variant of the traditional economy, able to "foster a new vision and support it with theoretical and technical tools" (Ronchi, 2010);

b) *Green Management*, considered as necessary Green Governance by administrators, both in the public and private sector. According to Ronchi " it has become widespread, the awareness of the need for new policies, administrative, management and control skills " (ibidem).

c) *Green Company*: "A third factor, essential for the Green economy, is the existence of a network of Green Companies: companies that produce goods and services with high ecological value, which are conducted and managed by the criteria of ecological sustainability" (ibidem).

d) *Green Life Style*: for years it has become central in the international debate on these issues, to consider the lifestyle of everyone. And now it is in place, "the challenge to determine whether at least the

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current level of welfare can be maintained in future generations. Our very concept of wellbeing is changing towards a more sober and better quality" (ibidem).

e) *Green Technology*: "In general, we expect the knowledge economy to promote greater eco-efficiency: the chance to produce more and better with less consumption of natural resources and less pollution" (ibid.).

As pointed out by Ronchi, the development of the Green economy involves a major change in consumers' trends. Therefore great importance have the actions aimed at developing greater awareness and responsibility.

More information about **Italian and European Green Economy Best Pratices** and the **Corporate Social Responsibility** is developed in Appendix.

> For further study about the terms and issues dealt and the most recent discussions see hypertext: **Green Economy Intro**

> For an overview of the Italian situation, please consult the hypertext **Italian Green Revolution**

The attention to social inclusion is a key element of the paradigm of sustainability, for whose promotion operate many NGOs, engaged in involving in the change culturally and socially disadvantaged categories.

Green for all is an example (**http://www.greenforall.org/**), established in the USA in 2007 that strives to promote sustainable and inclusive growth. It is very interesting the video **http://www.youtube.com/watch?v=i2wV035S3Hg&feature=related** that proposes these issues to young people and culturally disadvantaged groups, through the use of plain language, practical examples and hip hop!

5.3.2 Beyond GDP...

The same international bodies involved in the proposition of models and tools for Sustainable Development that generally refer to GDP as growth rate, have opened in recent years and have enabled discussion boards and working groups with the aim of identifying indices growth to also consider issues not included in GDP.

This movement is known as Beyond GDP (**http://www.oecdbetterlifeindex.org/2012/05/the-better-life-index/**).

In the 60s Robert Kennedy proposed a critical view of GDP (Speech at the University of Kansas, March 18, 1968) and since then there have been some attempts to develop new indices for calculating the welfare and development of a nation (**www.youtube.com/watch?v=iLw-WLlM9aw**).

Among the most recent are one of the Stiglitz, Sen, Fitoussi Commission, appointed in 2008 by French President Nicolas Sarkozy for the definition of *gross domestic wellbeing* GDP and the one promoted in Great Britain by Prime Minister David Cameron in 2010, who developed the *General Wellbeing Index*.

On the occasion of Rio +20 it has also been presented the IWI (Integrated Wealth Index: **www.unep.org/pdf/IWR_2012.pdf**) and the OECD presented its new index for measuring well-being, called **'Better Life Index' .** (BLI), which is based on a long list of indicators, grouped into eleven thematic groups.

> "Around the world - said Angel Gurria, Secretary General of OECD - many people asked to go beyond GDP. This indicator is aimed at them and has tremendous potential to help us offer better policies for a better life."

The eleven areas explored by the OECD are housing, income, employment, civic participation, education, environment, governance, health, safety and work / life balance, a mix of parameters that wants to take into account both the material well-being, the quality of life, the real and perceived, the environmental sustainability and the personal satisfaction.

The thirty-four OECD member countries have been analyzed in the light of the Better Life Index and the analysis is summarized and displayed through a digital dashboard which is a very interesting tool, even in terms of training tool, since it permits nations to be placed, customizing the weighted mix of the eleven areas. **(http://www.oecdbetterlifeindex.org/).**

For example, considering the degree of satisfaction with respect to the quality of one's life, it is possible to find out that the average of satisfied people reaches 59%.

The Canadians (91%) and the Danes (90%) are the most satisfied with the quality of their lives, while the index of satisfaction is lower in Estonia (24%), Slovakia (27%) and Turkey (28%).

Italy is located a bit below the OECD average (54%), along with other European countries such as Spain (49%), France (51%), Germany (56%).

It is particularly interesting to note the Bhutanese experience, by beginning the debate in the '70s, the concept of Gross National Happiness Index (GNH I) **(http://www.grossnationalhappiness.com/)** got to include the article n.9, which reads: "the State must commit to promote condi-

tions allowing the achievement of Gross National Happiness" in the new Constitution of 2008.[2]

5.3.3 Green jobs: labour and employment issues

There are many analyses and studies on the employment prospects related to the Green economy.

The European Commission (**EU Commission, 2012**) defines *Green jobs* as *"all the jobs and professions related to the environment or that are created, redefined or replacing others (in terms of skill sets and competences, working methods and update the profiles in environmental terms) during the transition process towards a more green / sustainable"* (idem, p. 4).

UNEP defines *Green jobs* as,

> *"those occupations in agriculture, manufacturing, construction, installation and maintenance, as well as scientific and technical professions, administrative and related to services, which contribute substantially to preserve and restore the quality of the environment. More specifically, but not exclusively, it refers to works that help protect and restore ecosystems and biodiversity, reduce energy use, water and materials through strategies of high efficiency and consumption savings. These are jobs that help to "decarbonize" the economy and minimize or even to eliminate for future generations all forms of waste and pollution"* (idem, p. 4).

The possibility of a shift towards the Green economy requires the identification and development of skills and competences needed for green jobs.

These issues are addressed in the new strategy of the European Union (EU) for sustainable growth and for creating jobs, called Europe 2020 (http://ec.europa.eu/europe2020/index_it.htm), which places innovation and sustainable growth in the heart of the plan for boosting competitiveness.

A recent **study** by CeDeFop (CEDEFOP, 2010a), highlights what those skills are.

The Cedefop study on the skills for Green jobs[3], which is part of a

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2   Art. 9 Butan Constitution: "The State shall strive to promote those conditions that will enable the pursuit of Gross National Happiness".

3   With regard to this matter, Great Britain will be the venue of a Conference promoted by the Minister of State For Further Education, Skills and LifeLong Learning in November 2012: **http://www.greenskills4greenjobs.co.uk/**

larger **study** conducted together with the International Labour Organization (ILO, 2010), examines the skills needed to develop low-carbon economy in six Member States (Denmark, Germany, Estonia, Spain, France and United Kingdom). The study shows that the boundaries between the low-carbon emissions jobs and those jobs who are not, are becoming thinner and thinner. The perception that this is a new ecological work or existing work with new elements, varies between the six Member States. For example, in Estonia, the energy certifier can be considered one of the new green jobs, nonetheless in Germany it can be seen as a change of responsibilities of a certifier, who is a well established professional.

Business Europe (**http://www.businesseurope.eu/Content/Default.-asp?PageID=571**), publishing **Greening the Economy** also argues (Business Europe, 2010) that there is no clear definition of green jobs and that the distinction between ecological sectors and more traditional sectors is artificial; the CEDEFOP report also shows that many of the skills needed to work in low-carbon emissions can be found in existing occupations.

To develop a low-carbon economy, a balanced mix of generic skills (e.g. autonomy and communication), general ecological skills (such as reducing waste and improving energy efficiency and renewable resources) and updating of existing skills, is by far more important than the availability of *specific ecological skills* (see figure 5.3).
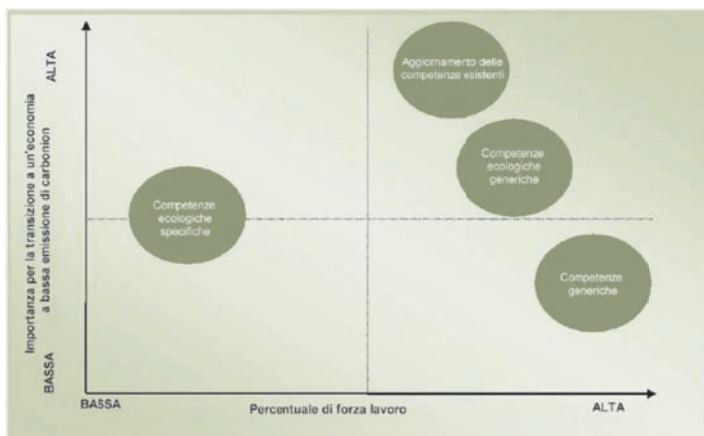
Picture 5.3
Competences requirements for a low-carbon economy (CEDEFOP, 2010)

The CEDeFoP report underlines how for a turning point in the economy towards its higher sustainability, particularly important are the skills defined as generic *ecological*, since they involve large sections of society and labour.

Updating existing skills through the acquisition of a basic approach to sustainability has a wide and thorough impact allowing the development of a widespread culture upon which to build the change.

The generic *ecological* skills are those that are developed from a basic culture of sustainability and can be acquired through training actions such as the ones proposed by the NJ ESD COM project.

In reference to what CEDeFoP defines as *specific ecological skills*, it is worth mentioning the increase in employment shown by the **study** European Wind Energy Association (EWEA, 2012).

The study underlines, in 2010, a direct employment related to wind energy systems in Europe around 135,000 units and an indirect employment of 102,000 units, with an increase of 31% compared to 2007.

The creation of a large number of jobs, in addition to the ones generated by the renewable energy industry, is detected in activities of refurbishing and rebuilding the real estate with more efficient criteria.

As it emerged from the conference organized in 2012 by Federcasa and the Foundation for Sustainable Development, in Italy it has been foreseen the creation of 30 000 new jobs over the next 10 years, with investments amounting to 17.5 billion, through starting the "market" of rebuilding with more efficient energy saving criteria, for both public and private real estate (from: **www.fondazionesvilupposostenibile.org/dtl-1020-Edilizia%3A_da_riqualificazioni_energetiche_patrimonio_immobiliare_30.000_occupati_e_investimenti_di_17%2C5_mld?cid=25972**).

The interest to the skills related to green jobs is strong and growing as evidenced by deepening the theme ***Green & White Jobs: the contribution of Leonardo da Vinci Programme in Multilateral Projects Transfer of Innovation*** developed within the activities executive plans of the National Agency LLP, Leonardo da Vinci Sectoral Programme, 2010 (Villante, 2010).

The report provides a thematic reading of the projects funded under the Leonardo da Vinci sectoral programme, aimed at achieving, in an explicit and focused way, the European and national strategies for the economic revival based on the new sectors; such new sectors have a large potential for employment development, particularly satisfying in consideration of the results obtained in this period of severe economic and employment crisis.

5.4 SOCIAL ASPECTS

The theme of Social development, although it has always been included among the pillars of sustainability, has gained more and more importance over time.
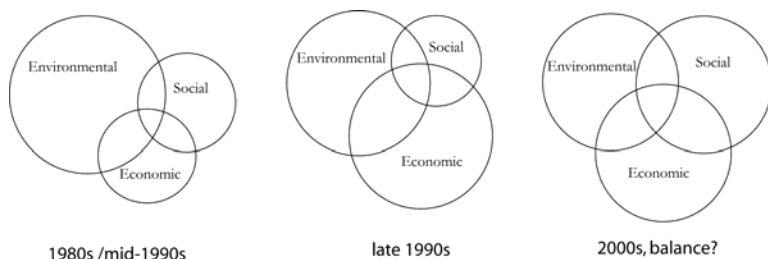
Picture 5.4: *The role of the Social sustainability*, from: Colantonio, 2009, p. 4

The concept of *social sustainability* provides still different interpretations; among them, particularly clear is the one proposed by the ICCR, which outlines it as *the realization of fundamental equal rights* such as defined by the **Universal Declaration of Human Rights**, by the **International Covenant on Economic, Social and Cultural Rights** and by the **International Covenant on Civil and Political Rights**.

This perspective includes all actions, social, economic and environmental conditions that protect and improve not only natural resources but also human resources that will be able to ensure a quality of life similar and better than ours.

This means the protection of the right to development, health, water and food, education, participation in cultural life, equity between genders and between different; it also means the protection of indigenous rights, freedom from discrimination , freedom of association, the continuous improvement of living conditions and the right to participate in decisions that affect the well being of individuals and communities.

The debate on the issue of socially sustainable development is rooted in the nineties, when the big summits on development debated, analyzed and defined action plans on all aspects of the issue: Development and Childhood, New York 1990, the Environment and Development, Rio 1992, Human Rights and the Right to Development, Vienna 1993, the World Conference on Population and Development, Cairo 1994 and the 1995 Copenhagen Summit on Social Development (WSSD: World Summit on Social Development, **http://www.un.org/esa/socdev/wssd/text-version/index.**

html), in which the social issues were declined with a focus on the fight against poverty, unemployment and social exclusion in the Copenhagen Declaration on Social Development.

More summits followed: in 1995 the Beijing Summit on Women and Development, the following year the one on Human Settlements in Istanbul, and finally in Rome on Agricultural Development and Food.

In 2000 a turning point came: at the Millennium General Assembly of the United Nations, 189 member states found, for the first time in the history of international politics, a joint agreement on such a vast and complex question. As part of the drawn up document, the *Millennium Declaration*, the focus was on eight goals, tangible, clear and measurable, the *Millennium Development Goals* (MDGs), to be reached by the predetermined deadline: 2015.

The objectives, listed below, have become a reference system, a universally recognized standard and above all, a goal shared by all peoples of the world.

Goal 1 *Eradicate extreme poverty and hunger in the world.*
The goal is to halve between 1990 and 2015 the proportion of people whose income is less than $ 1 a day and halving by 2015 the proportion of people who suffer from hunger.

Goal 2 *Achieve universal primary education.*
The lack of education deprives a person of his/her potential and deprives society of the foundations of Sustainable Development. Education has indeed a crucial role in order to improve health, nutrition and productivity.

The goal is to ensure that, by 2015, children everywhere, boys and girls, are able to complete primary education.

Goal 3 *Promote gender equality and empower women.*
Women have an enormous influence on the welfare of families and societies. However, their potential is not fully realized because of social norms and economic and legal barriers that discriminate them.

The goal is to eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels of education by 2015.

Goal 4 *Reduce child mortality.*
Data from the UNDP Annual Report show that each year more than 10 million children die of diseases that are preventable and treatable.

The goal is to reduce by two thirds, between 1990 and 2015, the mortality rate of children under five years of age.

Goal 5 *Improve maternal health.*
Each year more than half a million women die from causes related to

pregnancy or childbirth and these deaths occur in sub-Saharan Africa at a rate 100 times higher than they are in the rich OECD countries.

The goal is to reduce by three quarters, between 1990 and 2015, the maternal mortality rate

Goal 6 *Combat HIV / AIDS, tuberculosis, malaria and other diseases.*
Today, worldwide, around 42 million people have contracted HIV / AIDS of which 39 million live in poor countries.

The goal by 2015 is to have halted and reversed the trend.

Goal 7 *Ensure environmental sustainability.*
The UNDP Report data indicates that soil degradation is a problem that affects nearly 2 billion hectares of land, damaging the livelihood of at least 1 billion people living on the planet.

The goal is to integrate the principles of Sustainable Development into country policies and in international programs and stop the destruction of environmental resources.

Goal 8 *Develop a global partnership for development.*
The Millennium Development Goals (MDGs) recognize explicitly that poverty can be eliminated only through a "global partnership for development", which sees all countries committed to each other with respect to specific responsibilities.

The UNDP Report data show that since the beginning of the 21st century, the nations that can financially support international cooperation have never been so rich. Nevertheless, the financial support nowadays is less than it used to be in the early sixties. The paradox is that 26 of the 31 poorest countries at the moment receive only 7.6% of total international aid: less than they received in 1990 (11.9%).

The goal that by 2015 the 189 member states have pledged to carry out is the adoption of a series of development projects, mainly in four areas: cooperation for development, foreign debt, international trade and transfer of technology.

Over the last ten years, data relating to the significant increase in enrollment in primary school children and girls and reducing the total number of children under five who die each year from malaria and other preventable diseases, confirm the validity of the joint support action of the Millennium Goals.

Despite these advances, however, critical data emerge as shown by the 2007 Annual Inter-Agency and Expert Group (IAEG: **http://mdgs.un.org/unsd/mdg/Host.aspx?Content=IAEG.htm**, working group established under the United Nations to monitor the process of realization of the MDGs), including:

▸ the trend in the number of individuals whose income is less than a dollar a day, which until 2005 had declined by almost 200 million, is again increasing and extreme poverty is striking even those countries that, before the crisis, had a good economic performance; - unemployment that affects the major industrialized countries, makes its effects felt even in poor countries because of the dismissal of many migrant workers, the closure of factories that produce for exports and lower remittances;

▸ international cooperation shows a standstill and major donors decreased their support and are no longer in line with the agreed spending targets of 0.7% of GDP by 2015.

The United Nations, on the basis of the dramatic situation, constantly renewed appeals to Governments in order not to diminish the social aid and investment.

What is threatened is "stability and fairness" of social, economic and financial relationships, as well expressed by the *Special Commission*, established in 2008 by the President of the United Nations General Assembly and chaired by Nobel Laureate Joseph Stiglitz, (UN, 2009).

The Commission refers to the G192, that is to say to all the UN member countries: only the enlarged and shared reform proposal, in fact, can result in a real and profound change. The G8 in fact represents only 13% of the world's population.

While reaffirming the strong and vital actions coordinated by all states, nations and governments, no less important is the involvement and actions of every individual.

It is in this context that various campaigns have been launched.

Since 2002, thousands of organizations, NGOs, trade unions, youth groups, schools, local governments and, through them, millions of men, women and children, have demonstrated, signed petitions and promoted initiatives to support the Goals.

To the campaign *Stand Up* launched by the UN in 2002 (**http://standagainstpoverty.org/suap/**), others followed, such as the campaign from the world of sport, *Team for Poverty* (**http://www.youtube.com/watch?v=qfxJoat5PMQ**) and EUGAD (2012 EUGAD - EU for Global Development Agenda) started by the network of European citizens (**http://www.eugad.eu/**).

The overwhelming participation in these initiatives highlights the awareness of how the MDGs have been perceived as a challenge and a goal: a challenge because they require a radical change in the economic and social model, a goal because, if they were achieved, they would allow the whole Humanity to gain a better life and would ensure the future of the Planet.

5.5   CULTURAL ASPECTS

> *"Development divorced from its human or cultural context is development without a soul"* Our Creative Diversity, 1995.

During the 1980s, while the debate on environmental and ecological sustainability continued, there was a change in the way of thinking about economy and development. The vision that placed the economic growth at the centre of development (growth of real GDP per capita), was complemented by broader conceptions, that considered welfare centered on the human being (human-centered) rather than only on goods and services (commodity-centered).

The indicators considered relevant to assess the levels of development in different countries have been expanded by introducing, next to the ones that valued the material earnings, indicators that reflect other aspects such as the nutrition levels of the population, the health status, the literacy levels, the access to education and the environmental quality.

This paradigm shift has been accelerated by the publication, since 1991, of the Annual Reports on Human Development (**http://www.undp.org/content/undp/en/home/librarypage/hdr.html**) by the UN-UNDP (United Nation Development Program).

The important role of culture in this changing landscape has been put into focus by the UN World Commission on Culture and Development (WCCD, known as the Perez de Cuellar Commission: **http://unesdoc.unesco.org/images/0009/000957/095724eo.pdf**), which in 1995 published the report **'Our Creative Diversity'** (see WCCD,1996, Margolin, 1995, UNESCO, 1995).

The Commission has emphasized the cultural dimensions which are essential for a development paradigm centered on the human being and proposed to bring culture to the centre of the stage.

UNESCO has also further developed the proposal in the context of the two editions of *'Cultures of the World Report'* (UNESCO,1998; idem 2000), published in 1998 and 2000.

Setting the WCCD on the centrality of culture attracted further attention during the International Conference on Cultural Policies for Development, held in Stockholm in 1998 (**http://portal.unesco.org /culture/en/ev.php-URL_ID=18717&URL_DO=DO_TOPIC&URL_SECTION=201.html**), at which representatives of 150 governments decided to make cultural policy one of the key elements of the strategy of development.

It was suggested that governments recognize the cultural policies as "one of the key elements for endogenous and sustainable development", as indicated in the ***Action Plan on Cultural Policies for Develop-***

ment (UNESCO, 1998). For a deeper knowledge of this topic, the complete **Report** is available.

However, despite the apparent unanimity with which these meetings have been held, progress towards their implementation has proved slow in most countries.

Actually, although the concepts of economic and environmental sustainability were now included in policy-making in many areas, the cultural aspect has remained weak.

Within this framework, the UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions was established in 2005: **http://portal.unesco.org/en/ev.php-URL_ID=31038&URL_DO=DO_TOPIC&URL_SECTION=201.html**.

The Convention specifically included Articles 2 and Articles 13, which focused attention on the need to place the cultural dimension on the same level of the economic, environmental and social dimensions, by adopting a holistic view of the development process:

> ***Article 2 Par. 6 — Principle of sustainable development:*** *Cultural diversity is a rich asset for individuals and societies. The protection, promotion and maintenance of cultural diversity are an essential requirement for Sustainable Development for the benefit of present and future generations.*

> ***Article 13 – Integration of culture in sustainable development:*** *Parties shall endeavour to integrate culture in their development policies at all levels for the creation of conditions conducive to Sustainable Development and, within this framework, foster aspects relating to the protection and promotion of the diversity of cultural expressions.*

> (UNESCO, 2005).

Although progress in the first decade of the twenty-first century has been crucial for understanding the central role of culture, to date there is no agreed model indicating and describing in what manner it is possible to include culture in Sustainable Development processes.

The realization of the difficulty in putting into practice the indications of the Convention is the basis of the subsequent reflections of one of the members of the Committee of Experts for the drafting of the UN Convention on Cultural Diversity. (Experts Committee (2003-04) UNESCO **www.unesco.org/new/en/culture/themes/cultural-diversity/diversity-of-cultural-expressions/the-convention/what-is-the-convention/**), Thornby (2008). He stresses that the effectiveness of actions can only be achieved through the development of a coordinated package of measures, which are the product of the synergistic collaboration of a wide range of instru-

ments of government and agencies concerned with economic, social and cultural development and they differ from country to country because of cultural differences.

In each country it will be crucial that attention must be paid to the needs of creative and artistic organizations and the creation of a strong political position with regard to the conservation of the cultural heritage, both tangible and intangible.

There must be planned long-term investment in infrastructure for production and cultural use, and enhancement of *capacity building* at the local level, so that decision-making process and resource allocation for culture can be delegated, as far as possible, at this level.

It is finally suggested that greater opportunity for the introduction of culture in the political agenda for development lies in the ability to demonstrate how the cultural industries can contribute to sustainable development; those results thanks to the contribution that the artistic and cultural productions, dissemination and participation give to the labour market, to the cultural growth and to the social cohesion in communities.

There are a growing number of proposals to identify areas in which to focus attention in cultural aspects of development.

As for the Education system, for the German-speaking nations in Europe there is an elaboration on the cultural dimension as part of a holistic approach of Education for Sustainable Development (Holz, 2012; Holz, Muraca, 2010; Holz, Stoltenberg, 2011).

Here is the proposal from the Creative City Network of Canada (**www.creativecity.ca**) with the 10 key themes, through which to decline the cultural sustainability:

1. *The culture of sustainability*
   To be able to effect cultural change in which individuals and societies are oriented with respect to the economic, social and environmental issues, the culture of sustainability is reflected in the actions that promote a change of behavior and in consumption patterns, through a more aware lifestyle.

2. *Globalization and cultural diversity*
   It is a widespread perception that, under globalization, individual communities are at risk of losing their cultural identity, traditions and languages. Therefore measures of protection and preservation of cultural diversity are important.

3. *Heritage conservation*
   The search for cultural sustainability in this area focuses on three main areas:

3a. *Preservation of cultural heritage, places, practices and infrastructure* in order to preserve and recognize the history of a place and its tangible and intangible attributes.

3b. *Promotion of cultural tourism.* Tourism and regional economic development sustainable in the long term, allow future generations to benefit from the preserved tangible and intangible cultural heritage.

3c. *Renovation and reuse of historic buildings for the construction of cultural centres.* The reuse of existing spaces promotes Sustainable Development and a sense of belonging within the community.

4. *Sense of belonging.*
   As culture contributes to the construction of a sense of belonging in the communities and towns, the importance of heritage and symbols and the role of arts are recognized. Indeed, they may contribute to the creative resolution of conflicts between social, environmental and economic developments, helping to explore and develop multiple perspectives.

5. *Local knowledge and traditional practices.*
   Since the link to the culture and traditions of the past is maintained through the celebration of one's history and transmission of one's cultural values to future generations, cultural sustainability is also expressed through the historical memory and the protection of indigenous knowledge.

6. Cultural development of communities
   The active role of cultural promoters, organizations and local residents in decision-making process, as well as taking responsibility for their own identity and resources of their communities are the foundation for a basic cultural development of the Community.

7. *The Arts, Education and Youth*
   Arts are seen both as instruments of development and of communication within communities and schools, as they increase the effectiveness of teaching, research, policy and actions that support sustainability and cultural development.
   Arts offer opportunities for collective action and allow young people more active involvement in public policy processes. Involving young people in educational programmes on cultural, social, environmental and economic sustainability forms, can help to provide them with a more optimistic and sustainable view on the future.

8. *Sustainable design*
   The eco-design that uses recycled materials in a sustainable way, is acquiring a growing influence in urban and rural development planning, from a sustainable point of view.

9. *Planning*
   Urban design that deals with sustainable communities, recognizes the importance of the cultural capital, so that the cultural, environmental, economic dimensions and social sustainability are integrated.

10. *Cultural policy and local government*
    Cultural and sustainable development policies share the same goal of improving the quality of life for community residents. The multidisciplinary nature of Sustainable Development therefore requires that policies for sustainability transcend the cultural boundaries and integrate culture with other policy areas.

For a deeper study on cultural sustainability an interesting document is available on line: **http://www.cultureandcommunities.ca/downloads/WP1-Culture-Sustainability.pdf**

> **For a consideration on activities to support the cultural dimension of development, refer to the hypertext IBA Arts Hamburg, about Hamburg administration initiatives 2007-2013**

6.
TEACHING AND LEARNING METHODOLOGY

6.1 TEACHING COMPETENCES[1]

As showed in chapter 2, the competence concept has been object to discussion for a long time. Particularly, the switch from input to output orientation, with the aim to measure educational gains has been discussed.

Educational planning of contents and methods (input) by the teachers for the learners cannot be done anymore without stating which learning goals are to be aimed, which competences (output) the learner should acquire and how these goals and competences can be reached.

This shift of paradigm is strongly related to the new "economic thinking" by the educational policy-makers, which gave origin to the ranking of schools and universities and to the audit and certification culture.

Two important examples, which confirm this trend, are the PISA[2] and TIMSS[3] comparative studies.

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1 Adapted from: *Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes,* 2008, p. 34-37.
2 The **Programme for International Student Assessment** (better known by the acronym **PISA**) is an international study sponsored by the OECD and founded with the purpose of evaluating every three years the level of education of adolescents (around 15 years of age) of major industrialized countries.
3 The survey -**TIMSS** Advanced 2008 (**Trends in International Mathematics and Science Study**) is an international project sustained by IEA (International Association for Evaluation of Educational Achievement) aimed at evaluating the performance of students, for the last year of schooling (class V in Italian secondary school, about 18 years), for specializations in mathematics and physics.

6.2 TEACHING METHODOLOGIES

The complex work of recognition and analysis conducted by the project CSCT has outlined what are the characteristics that describe the profile of a teacher so as to be able to effectively foster the process of skills development that is more responsive to the complexity of contemporary reality.

So that the professional profile of a teacher outlined above can actually be expressed in the educational process, it is necessary that the teaching activities are focused on the use of appropriate teaching methodologies and tools.

In this framework, the NJ ESD COM project has identified Active Learning and Cooperative Learning as the most suitable approaches for achieving that aim.

The suggested training tools and methodologies allow to develop in the trainees competences in social, communicative, cognitive, and emotional domains.

These transversal competences are suggested by the major scholars as basic competences also for the Education for Sustainable Development and can be developed through:

▶ *Cooperative and Active Learning*
▶ *Critical Thinking*
▶ *Creative Thinking*
▶ *Decision making*
▶ *Problem solving.*

6.2.1 Active Learning

Active Learning refers to a type of learning that sees the students in a position of responsibility and architects of their own learning.

In this type of education the students, in addition to watching and listening to the teacher, are personally involved in activities to elaborate and deepen the content, activities that help them learn.

There are various methods that are more or less structured by the principles of Active Learning, among the most popular: *laboratory education* (operational method), *experimental research* (investigation method), *action research* (heuristic-participatory) and *mastery learning* (individualized approach to master the learning).

Even the Cooperative Learning methods (**paragraph 6.2.2**) are based on the principles of Active Learning.

The theoretical assumption that inspires these various teaching methods is that people learn better (more easily, with greater motivation and greater persistence) when they can implement practical skills and participate actively in the construction of their knowledge, when they can subject to adjustment and personal invention what the teacher offers.

This theoretical assumption emerges as a results of numerous scientific researches together with philosophical and pedagogical considerations.

The precursor of this contemporary approach may be considered John Dewey, who since the early 1900s introduced various concepts in line with the *educational activism*.

Dewey applies to education and schooling his philosophy, based on the importance of experience. In school, he believes, experience should not be imposed by the teacher, but should be born by the natural interests of pupils and the task of educators is to accommodate these interests in order to develop their sense of sociability.

Dewey believed that school is a social institution that represents current life. Inside school there should be daily activities for the child to share the habits of family life and assure adequate social integration.

Industrialization, following Dewey, dismissed young men from the experiences of participation in the labour process, so school has the task of introducing work as an educational factor in order to ensure an active and social life, learning by doing real things.

▸ School is defined as *active* (from hence educational activism) since a child who gets in touch with the difficulties arising in the world, tries to act upon it and tries to react to the consequences that derive from his actions. So the child implements his strategies, processes conjectures to verify or falsify his hypothesis.
▸ The Dewey School is also known as *progressive* because the activity that takes place within it, requires progressive development. School must represent for the child a place of life: a social life that must be developed in stages, starting from the experience gained within the family and in the social environment in which he lives.

Next to Dewey's ideas, there are also the studies by the Swiss psychologist Jean Piaget. The amount of work of this important scholar is impressive. Here it is enough to point out that all the studies and experiments he conducted on how individuals learn, in the various *development stages*, led to the conclusion that our mind is not an empty vessel to be filled with content, but the seat of intense cognitive activities that give shape(*construct*) to the environmental inputs.

This happens mainly through two mechanisms: *assimilation* and *accommodation*.

Piaget considers the mind as a network of concepts and rules for using these concepts, (learned logic laws). Using the network idea, one can say that the process of *assimilation* leads to the addition of a new node in the network without changing the network structure. There are, on the other hand, concepts in this mechanism which are so revolutionary for the individual learning process, that the learner cannot simply add a node (new concept) to his/her own network, but he/she has to modify it to create "space" for the new concept . This is the process of *accommodation*.

Jean Piaget focused many of his experimental studies on how the individual learns in various stages of his life (from newborn to infant and from child to adolescent and adult), so his contribution to *developmental psychology* was very important. He was interested in how the use of intelligence (cognition) in various stages of human life can be differentiated, so that he is considered one of the pioneers of the psychological approach called *cognitivism.*

Since the 50s, mainly as a result of studies of the American psychologist George Kelly, the "pure" cognitive approach begins to veer towards a variation called *cognitive constructivism.*

As part of the constructivist epistemology matrix, doubts were raised about the possibility that knowledge can be totally "objective", as a total knowledge that represents an external order independent from the observer; actually, the same direct observation of phenomena is no longer considered as a source of objective knowledge

This approach is very important in order to account for the fact that not all humans have the same vision of things and that therefore special attention is required to the negotiation of concepts and to the management of conflicts that may arise within a working group.

Besides, the definition of the principles of Active Learning, draws on the results of studies of many other leading scientists, among whom the most relevant are Kurt Lewin, Erik Erikson, Carl Rogers, Lev S. Vygotsky.

Since the early 90s, the American psychologist Jerome Liss, has been disseminating the principles and practice of Active Learning through his volumes 'La Comunicazione Ecologica' (1992) and 'Apprendimento Attivo' (2000), very popular among Italian teachers and trainers.

In his view, "Active Learning requires several changes in how the teacher organizes the lesson. In particular, the teacher should first give a short presentation (preferably with presentations visually supported by posters or slides), followed by questions asked to students or followed by working in small groups. Thereafter, the student must participate actively, both answering questions from the teacher in the class, and collaborating with other students in small groups. In this way, the student feels involved, motivated and remembers what has been said. Here is the positive impact of Active Learning" (Liss, 2000, p.12).

The active approach to learning is particularly important in Environmental and Sustainable Development Education, since it implies a change in the behavior of individuals.

Liss argues that "an old study by Kurt Lewin in 1946, illustrated this principle: when people hear a speech, they understand the concepts but do not change their actions. Instead, when people discuss actively with each other (active method), not only do they understand the concepts but, more importantly, they change their behavior. Why? The memory of behavior is remembered better than the memory of an idea. Another example: one remembers after five years without practice how to drive a car, one does the automatic and correct movements when returning in the driver's seat. But one does not remember the lessons of the school textbook" (Liss, 2000, p. 47).

An effective synthesis on Active Learning is available on video (**http://wwwyoutube.com/watch?v=UsDI6hDx5uI**).

6.2.2 Cooperative Learning
by *Claudia Matini*[4]

What is Cooperative Learning

Cooperative Learning (CL) is an approach to education that places learners at the centre of learning, taking accountability for their own journey of knowledge acquisition. It is expressed in a wide range of teaching techniques that use small study groups as a pivot of individual learning, following careful planning of how work must be done within it.

Differences between Cooperative Learning, group dynamics and traditional teamwork

Among the major misconceptions about what Cooperative Learning is, there often comes the idea that it is just another way to bring in *group dynamics* within schools, or present under "new clothes" traditional

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4   Dr. Claudia Matini has been adults trainer since 1995, when she graduated in educational psychology at the Salesian Pontifical University in Rome with Mario Comoglio, one of the greatest Italian experts in Cooperative Learning. Since 2001 she has collaborated with Scintille.it on these issues, and also with many other Italian training companies. (Conform, Euform.it, Ass.For.SEO, SEGMA), dealing with design and delivery training actions.

work groups that work alongside the traditional way of leading lessons. Because these biases may limit the understanding of what really is the cooperative approach, we begin to define the characteristics of the CL by first defining what it is not.

CL is not identified with group dynamics. Sometimes educators who encounter cooperative learning for the first time, object almost automatically, saying that it is another way to bring group dynamics into school and therefore it is unable to understand and effectively address the complexities of life in the classroom and the problems that the teacher must solve every day. This misconception probably comes when the word "group" in relation to learning is heard.

Let us consider the relationship between CL and group dynamics.

Among the possible definitions of group dynamics, the most popular are two: the first identifies with the term "a process of awareness, group experiences, unstructured discussions that should lead to mutual understanding and openness in a total pluralistic environment", the second defines it as "a social science that studies the nature of groups, the laws of their development, relations between individuals and groups, the mutual relations between groups and their organizations" (Scilligo, 1971, p.7).

In both cases it is evident that the cooperative method cannot identify with the group dynamic: despite having in common with this (as it is defined in the first case), the ability to focus on interpersonal contact and openness to others, the cooperative method is instead defined as a "strategy (...) that integrates the interaction and communication in the classroom with the content study process (Sharan, 1998, p. 27); these can be used by the teacher for a wide variety of educational objectives, in which the care for social relations is designed to optimize the effectiveness of interactions with respect to studying and learning. The distinction between Cooperative Learning and the second definition of group dynamics is obvious and does not seem to need further explanation.

The relationship between Cooperative Learning and group dynamics is somewhat a type of derivation: some knowledge about the groups that developed from the social sciences have been applied to the school context and teaching. For example, the choice of positive interdependence as a key feature of cooperative working groups comes from the studies by Lewin and Deutsch, relevant authors of social psychology (Comoglio, 1996, p. 58-60).

CL is not traditional school group work. Some teachers imagine that cooperative teamwork consists of forming small groups of students, in giving them a task and then waiting for this task to be achieved; so they are sure that they have already had the experience of cooperative work, often with little satisfaction.

The key differentiator between traditional and cooperative teamwork is the way in which cooperation is stimulated. This term is associated with the idea of mutual aid, cooperation, respect for each other: if in the traditional teamwork the behaviour of these positive interactions are suggested by the teacher and left to the goodwill and the natural disposition of the students, in the organization of the lesson in cooperative terms the competences for positive interactions are explicitly taught, through explanations, simulations and shared reflections (Johnson, Johnson, Holubec, 1996). This aspect is not the only differentiator: actually, the only elements common to the two modes of group work are the physical proximity of a number of people who have a common goal and the duration in time of the learning experience.

The characteristics of Cooperative Learning

Many authors deal with Cooperative Learning, each one focusing more or less on some variables, related for instance to planning, to monitoring and evaluating or to the explicit teaching of social skills.

For all authors, however, there are some essential elements. Let us then define Cooperative Learning through a brief description of its essential characteristics, that are:

▶ positive interdependence
▶ individual and group accountability
▶ direct teaching of social skills
▶ simultaneous interaction and promotional interaction face to face
▶ individual and group monitoring and evaluation.

1. POSITIVE INTERDIPENDENCE

All the most important authors emphasize the relevance of *positive interdependence*, that is the kind of mutual bond between the members of the group relative to a common goal.

From a theoretical point of view, studies on social interdependence date back to the 40s, when Kurt Lewin firstly, and Morton Deutsch afterwards, identified in the mutual bond between the individual members with respect to a common goal the essence of a group.

Positive interdependence can be structured by the teacher in different ways:

▶ *Goals interdependence,* that is achievable setting learning goals that the individual can only reach through cooperation with others. The presence of a common goal that cannot be achieved individually, compels the group members to interact, to exchange information,

to control each other (Johnson, Johnson & Holubec, 1996; Sharan, 1998; Kagan, 2000);

▶ *Task interdependence,* that requires the activation of complex learning tasks, requiring the activation of multiple skills, not necessarily academic, held even by those who do not succeed at school or are not highly regarded by their schoolmates. This promotes pupils' awareness of their companions as special resources, useful for the achievement of the group goal, so everyone's ability plays an indispensable part for each other. Cohen sees this as one of the steps that the teacher must take to build a positive learning environment in which, the limitations exercised by the status differences between students are balanced (Cohen, 2002);

▶ *Materials interdependence* is obtained by assigning materials to the members so that it is necessary the sharing, the exchange and the comparison. The interdependence arises automatically, making each member responsible for a portion of material to be learned. In *Jigsaw*, for example, this division is the cornerstone of the method (Aronson, 1978.)

▶ *Role interdependence* is fostered by assigning complementary roles. Roles are implemented through specific behaviors related to both the operational aspects and the relational aspects[5], (Johnson, Johnson & Holubec, 1996; Kagan, 2000).

▶ *Rewards interdependence* It is very effective to give shared rewards, e.g. give an extra point if all members of the group achieve a high mark in an oral exam. The idea of the group reward is a typical way of Cooperative Learning, the *Student Team Learning* by Robert Slavin, which will be described further on (Slavin, 1987).

2. INDIVIDUAL AND GROUP ACCOUNTABILITY

Common objections to group work emphasize the difficulty in identifying the contribution of each person to the final product. The detection of personal work is important to ascertain who needs more help, to check an individual's improvement, but also to prevent that some avoid working, relying on the efforts of others. Experience teaches us how it often happens that, in working groups, some members are very committed, but others leave the load of the task to the more motivated (the pheno-

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5   Operational aspects: what is needed to carry out the task assigned to the group; e.g. if the task is to produce a written summary of a passage, the possible roles can be: one reads, another summarizes orally, the third summarizes in writing;
relational aspects: what must be done to maintain good relations within the group; e.g. encourage those who remain silent, calm tempers in case of conflict, praise a good intervention, etc..

menon of "free ride"). This attitude has at least two disadvantages: first, the teacher is unable to assess the individual contribution, and secondly, the lack of learning experience had by the less involved student, with subsequent failure to acquire knowledge and to make experience of relationships with classmates.

A constant feature in the different modes of Cooperative Learning is the ability to make each group member *individually accountable* for his / her work.

The cooperative approach offers some strategies for the organization of teamwork that can overcome this drawback; here are some examples.

After working in pairs on a topic, groups of four people are formed, which in turn, each student must report what he/she heard from his/her partner to the rest of the group (structure "Interview in three steps" of Kagan, 2000).

At the end of the work in group, an individual test is assigned to each student (Slavin, 1987).

One student is sorted out who reports for the entire group (structure "numbered heads together" of Kagan, 2000).

These are just some examples of work organization that can identify the individual contribution and thus stimulate active participation and involvement in the group by any member.

3. DIRECT TEACHING OF SOCIAL SKILLS

To work in a team one must have some *interpersonal and teamwork skills*: the group members need to be able to support, help, encourage and praise each other for their efforts in learning, they must be capable to organize the work in group, take on roles, be able to communicate effectively, etc.

When they implement these behaviors, cognitive activities result that maximize the results: to explain each other's content, to deepen concepts, test their own knowledge by asking questions to others, link what has been learnt to previous knowledge.

These activities increase when there is positive interaction between them. They allow to know one another personally and professionally, and to identify the most problematic students (who generally remain silent).

To promote these positive interactions, the group must be small (2-4 members), heterogeneous and, according to some authors, the skills needed to interact effectively should be provided directly to students. These *social skills* should be taught explicitly, and the kids motivated to use them, at the same level of the academic skills (Johnson, Johnson & Holubec, 1996; Kagan, 2000).

The need to verify the level of interpersonal skills possessed by the

children and provide them through direct teaching are not ideas shared by all authors. Some, like Slavin, argue that the need to interact effectively, given some constraints on structural organization of group work, will be sufficient enough to allow good interaction between the individuals (Slavin, 1987).

4. SIMULTANEOUS INTERACTION AND PROMOTIONAL INTERACTION FACE TO FACE

Small group work allows the creation of more or less high *simultaneous interaction*, depending on the number of students active in the same unit of time in a context of positive interdependence (Kagan, 2000).

If the teacher asks a question to the class and calls a student to answer, then another, in one unit of time only the teacher can talk, and the student in the following (the simultaneous interaction is "nil", it is rather a sequential interaction, i.e. the interventions are carried out one after the other). If the teacher asks the question and then asks that one student answers in each group of 4, he gets a simultaneous interaction "medium high", because at least one person from each group is active in the same unit of time. Finally, the teacher can organize the activity by asking students to work in pairs to respond, ensuring a "high" simultaneous interaction, because half of the class is active in the same unit of time.

Since active participation is a factor that promotes individual learning, it can be inferred that the greater the number of students involved in an activity, the greater will be the number of people that will be able to get a good level of learning.

For this reason, one should avoid forming groups with more than four people.

Regarding the *promotional interaction face to face*, this is supported by the teacher through the creation of a communicative context that facilitates direct contact between students, that is the physical proximity, eye contact and the ability to study the same material.

5. INDIVIDUAL AND GROUP MONITORING AND EVALUATION / GROUP PROCESSING

Most authors emphasize the effectiveness (to reach high levels of learning), of the activation of processes of in progress monitoring and final review, both upon the product and upon the organizational and relational processes. This is very important to allow to highlight the responsibilities and the contributions of the individual and the group (also obtained through written tests, questionnaires, queries). This aims at reinforcing the behaviors and social, cognitive, metacognitive and emotional processes, functional to the performance.

Cooperative learning therefore provides both individual and group evaluation.

Recently, many authors have particularly emphasized the importance of group processing.

> "Groups need specific time to discuss how well they are achieving their goals and maintaining effective working relationships among members. Instructors structure group processing by assigning tasks as (a) list at least three member actions that helped the group be successful and (b) list one action that could be added to make the group even more successful tomorrow." (Johnson et alii, 2006).

Ways of application of Cooperative learning

Within this educational movement that emphasizes the group as an opportunity for learning and personal growth, there are multiple modes of application.

Among the most successful authors, whose teaching methods are supported by a considerable amount of research, we find Roger and David Johnson, Robert Slavin, Spencer and Miguel Kagan, Yael and Shlomo Sharan.

Below is a brief description of the teaching techniques they have developed, taken from the fundamental text by Comoglio and Cardoso, (1996).

1. Johnson & Johnson: Learning together and controversy

The first method of Cooperative Learning was created in the United States in the 70s and grew rapidly in schools as a proposal for lesson organization but also for school organization. The major exponents are the brothers David and Roger Johnson. They have developed a method of conducting the class called *Learning Together* and also an educational technique, the so called *controversy*.

Learning Together

Learning Together is characterized by formal and informal learning *structures*.

The *informal structures* allow students to work cooperatively in small groups for short periods of time (from few minutes to one lesson) and can be used even within a traditionally organized lesson. These procedu-

res allow to achieve multiple learning goals (such as the revision of content, the activation of previous knowledge as preparation for the explanation of a new topic, using rules, etc..). The starting point is the explanation, around which one can organize various types of group work, that include several principles of Cooperative Learning (such as positive interdependence and individual accountability).

The *formal structures* of Learning Together require the teacher to plan and organize for long periods activities (from a lesson to several weeks).

They are:
- *Cooperative Learning Together*, in which the activity is organized for groups that work cooperatively all the time;
- *Individualistic Learning Together*, which includes parts of individual work, embedded in a context of cooperation;
- *Competitive Learning Together***,** in which group activities have a cooperative part and a part in which groups compete to earn scores, following very specific strategies.

These structures require the teacher to take a set of decisions regarding the choice of content, the criteria for forming groups, the set of the classroom, the evaluation mode, etc.. and the performance of a series of actions distributed over four stages (before the lesson, the beginning of the lesson, during the lesson and after it), in order to teach social skills useful to work, to communicate tasks and methods of evaluation, to observe the progress of group work, etc. (see Comoglio and Cardoso, 1996, p. 238-257).

The controversy
The controversy is an academic technique by which small groups arrive at a deep understanding of content through a study process that works first by antithesis and then by synthesis. It is organized in five stages, in which students work in heterogeneous groups; first in pairs, then in groups of four, they prepare a perspective to discuss, comparing and building together an integrated summary of opposite points of view. This technique is based on the idea of cognitive and interpersonal conflict as a source of enrichment and deepening of knowledge. In controversy the direct teaching of constructive conflict management skills is an integral part (Johnson & Johnson, 1992).

2. Robert Slavin: Student Team Learning

An absolutely original element, in the set of learning structures of various complexity, designed by Slavin and collaborators, is the very accurate eva-

luation system, that rewards individual improvements compared to previous tests, and offers everyone the opportunity to succeed contributing to the success of the group, without being evaluated under a single criterion predetermined by the teacher and valid for all (Slavin, 1995).

2.1 Jigsaw II
Jigsaw (Aronson et alii, 1978) is a technique useful for all school subjects involving careful planning in the allocation of materials and how to work within the group. It is organized in five stages in which students work first to become experts on one part of the subject, then to teach their material to the companions of their reference group.

The variation introduced by Slavin in Jigsaw II concerns mainly the methods of evaluation.

2.2 STAD E TGT
The *STAD (Student Teams Achievement Divisions)* is useful for many school subjects. It is a complex technique with several stages: the teacher's explanation, group work with the materials prepared by the teacher and individual and group assessment with an original system that rewards individual improvement.

The *TGT (Teams-Games-Tournament)*, similar to STAD, introduces a stage of competition between groups, with each member of a team competing with peers of the same level in order to earn scores for their group.

2.3 TAI and CIRC
Team Assisted Individualization (TAI) and *Cooperative Integrated Reading and Composition (CIRC)* are teaching techniques that integrate cooperative with individualized learning.

TAI is a programme for teaching and learning mathematics with the intention of setting the teacher free from some material tasks assigned to students instead, in order to enable the teacher to focus on the tasks of teaching and promoting the integration of disabled students.

The CIRC is a programme for teaching reading and writing in primary grades.

Both programmes have in common the use of learning groups and individual work, diversified according to the skills of the students. They were developed by the *Johns Hopkins Team Learning Project* of Slavin.

3. Kagan & Kagan: the Structural Approach

Kagan and collaborators have developed a wide variety of techniques based on the assumption that what kids do in the classroom affects what

they learn at a social, cognitive and academic level; the ways in which pupils interact are different and they do not all bring in the same results.

Since in the classroom there are many possible interactions, understanding what results are produced by specific sequences of interaction, and this is essential to structure the lesson effectively.

The researchers then studied the possible interactions developing structures (ie sequences of behavior), varied according to educational and social goals that one wants to achieve, thus providing a highly structured way of working in the classroom. This does not mean that the teacher is obliged to always act in a certain way, but rather that once the teacher has the theoretical foundations of the approach and knows the "elements" that make up learning structures, so he/she can build his/her own lesson using the single "elements" like "pieces of Lego", to be assembled according to the needs of the moment.

Every activity undertaken in the classroom is disassembled into small units of behaviour, called "elements". An element is made up of an *actor,* that is, one who displays a behaviour, an *action* (e.g. read, write, etc.) and, sometimes but not always, by a *recipient*. For example, *the teacher explains to the class* is an element: the teacher is the actor, explaining is the action and the class is the recipient.

The "elements" can be limitless and are adopted under the objective to be achieved. They may be considered individually, as well as be arranged so as to form "complex sequences" of behaviors. In this case they take the name of *structures*. Since the "elements" are many, multiple structures can be produced.

Kagan considers it useful to classify the structures that he proposes under the function they perform (team building, class building, acquisition and consolidation of content, development of thinking skills, information sharing, communication in the group) (Kagan, 2000).

When different structures are combined in sequences what one gets is a *lesson*, that is given in a *set of activities* (i.e. structures with a content) placed in sequence to achieve learning goals.

4. Sharan & Sharan: Group Investigation

Group Investigation (GI) is a Cooperative Learning method in which students work in small groups and share responsibility in the choice of content and of the learning process. GI is structured as a scientific investigation based on the students' curiosity to know.

According to GI, a work can be divided into 6 stages: the teacher presents a topic to spark interest in students, who will then dig into the material following a methodology of scientific enquiry, i.e., asking questions, trying to find suitable sources for the answers, organizing the

findings in order to integrate the various knowledge, and present it in an interesting and clear way to the rest of the class. To achieve this ultimate goal, students will plan their activities, will take decisions in various stages of work, they will question each other and will interact helping each other.

This work is preceded by a period of careful planning by the teacher.

An effective synthesis on Cooperative Learning is available on video: **www.youtube.com/watch?v=iFn4H-5faE8**

> **To further explore Cooperative Learning see the hypertext Cooperative Learning**

6.2.3 Strategic competences for ESD

We have stressed so far the characteristics of Active Learning and Cooperative Learning. Below are concisely showed some of the skills that are considered strategic for Education for Sustainable Development and which can be developed using the approaches of AL and CL.

6.2.3.1 Critical thinking

Critical thinking is a kind of thought characterized by mental processes of discernment, analysis, and evaluation. It includes processes of reflection on content areas both tangible and intangible, aiming at forming a solid judgment that reconciles scientific evidence with common sense.

Critical thinking gathers information from observation, experience and reasoning,; the subsequent communication tries to go beyond the bias of the single person: its core features are: clarity, accuracy, precision and evidence.

Having a critical attitude towards data and information, is of particular importance in contemporary complex society where everybody is "bombed" by news and updates. Knowing what to give relevance, which sources are authoritative and which are not, how to submit to critical thinking the subjects read on the internet, listened to the radio, or watched on television, is a vital competence to avoid being trapped in a shapeless mass of unverified information.

Critical thinking can be developed in multiple ways, using the logical tools of scientific thought and practice exercises like the *controversy*, which was discussed in the section on Cooperative Learning.

6.2.3.2 Creative thinking

We have already had occasion to stress how the importance of culture, of artistic and creative thinking is recognized in many documents and international conferences.

The Nobel prize winner economist Amartya Sen defines development as "the ability of human expansion", i.e. the enhancement of people's ability to conduct the kind of life they want, including their access to resources and to cultural participation.

In addition to the importance and dignity that art and culture play in themselves, the quoted documents recognize their importance gained by the opportunity and they offer to see things from new perspectives and alternative ways. The functionality to meet the challenges of the complex society and of development which must be more and more sustainable, are therefore stressed.

In recent decades, however, as well as art, culture and artistic thinking, creative thinking and creativity are set at the core of debates.

The act of creation has long been perceived as an exclusive attribute of divinity: Catullus, Dante, Leonardo in fact, would never have called themselves creative.

Man had in his hands the powers of invention, genius, and since 1700, progress and innovation. The word creativity came into the Italian lexicon only in the 1950s.

The ancient Greeks identified creativity with poetic ability, so did Ralph Waldo Emerson, the most famous philosopher of creativity, in his essay "The Poet".

But what is creativity?

For many years, even in academic circles, it has been interpreted as the set of skills that lead to the creation of an artistic product (a poem, a novel, a sculpture, a film).

The idea of creativity as a human mental attitude, was born in the twentieth century. The first studies on the subject date back to the twenties; in some fields such as mathematics, for example, creativity seems to grow better at a young age, in others, such as literature, music and visual arts, the development continues throughout one's life.

Among the many definitions of creativity that have been coined, one must note for its simplicity and precision, the one provided by the mathematician Henri Poincaré: "*Creativity is combining existing elements with new connections, which are useful.*"

Rubini (1980) defines creativity as the ability to produce what is new, through new combinations of ideas, to face the situations of life in diffe-

rent ways. For Sternberg (2006) creativity is the ability to go beyond the rules, to solve badly structured problems.

However, utility and novelty are not sufficient. A major factor is also the presence of an audience: the successful creative person is one who gives the others a different perspective to look at the world, and creativity is realized in the process of interaction with others.

It is just this approach that led to studies on creativity in various areas and roles held by individuals, not only among artists and intellectuals. One can find much more creativity in a housewife who, with a few proper tools and wire, is able to repair an appliance at home, than in a brilliant mannered painter who can copy or reproduce a work of art perfectly, thanks to a great technique, but not necessarily thanks to creativity.

Studies on creative thinking have been trying for years to shed light on the issue.

Teaching and training have been dealing with the subject more and more, there are indeed many projects or study programmes aimed at developing creativity for all ages and in all areas.

At a methodological level, there are various techniques and exercises that allow to train some aspects of creative thinking, including:

▸ *Brainstorming*, Alex Osborn
▸ *Lateral thinking and techniques of the Six Hats*, Edward de Bono
▸ *TRIZ*, Genrich Altshuller
▸ *Bisociation*, Arthur Koestler
▸ *The mental map*, Tony Buzan
▸ *The PAPSA method*, Hubert Jaoui.

The task of teaching competences is also to integrate these techniques to develop in students the skills of creative thinking, so useful to imagine new solutions and new answers to the complex challenges of sustainability.

Quoting Albert Einstein, one can state that:

"Rarely, problems can be solved with the same mindset that produced them", thus one needs a look that is "other", a different perspective, in whose construction creative thinking can be of great help.

6.2.3.3 Decision making

The decision is the choice to accomplish an action among several alternatives considered (options), by an individual or group (decision maker). In the process leading to the decision, there are two moments:
▸ *the deliberation*, in which the decision maker takes into account the various options and assesses the reasons for and against each one;

▸ *the choice*, namely the selection of an option among the ones considered, depending on the outcome of the assessment.

As one can speak properly about a decision, it is necessary that the decision maker has in front of him/her a number of options: a compulsory choice, in absence of alternatives, is not a decision. Decision is an essential element of freedom: a free action is one that can be chosen.

The decision process is being studied in a variety of disciplines: philosophy, logic, mathematics, statistics, psychology, sociology, economics, political science, etc. The approach to the study of decisions can, with some approximation, be divided into *descriptive* and *normative*. Those who adopt a descriptive approach seek to discover how effectively decisions are made in different contexts; instead, those who adopt a normative approach, seek to identify the way in which decisions should be taken with reference to ideal "rational decision makers".

6.2.3.4 Problem solving

Problem solving is an activity of thought that a body or an artificial intelligence device puts in place to achieve a desired state from a given condition.
Problem solving indicates exactly *the set of processes for analyzing, addressing and solving problem situations positively.*

It should be noted that problem solving is only a part of what is the whole process of solving a real problem: the latter also includes the so-called processes of problem finding (identifying the problem) and problem shaping (definition of the problem).
Many people in fact have not developed the ability to recognize problem situations or, on the contrary, perceive problem situations everywhere.
So it is important first to identify and second to shape the possible problem to be faced.

A problematic situation can be defined as such, only if it involves all of the following 4 aspects:

▸ An initial situation
▸ A final situation (different from the initial)
▸ The need, will or obligation to switch from one to the other
▸ A multitude of possibilities or no evidence of possibility to switch from one to the other.

To this identifying phase follows the shaping one, in which one can be helped by graphically and schematically representing the 4 aspects.

The next step is the activation of strategies for the solution, the so called Problem Solving Strategies. Some of these are useful for enabling knowledge and lateral and creative thinking to generate ideas and possible solutions (using techniques such as Brain Storming), when that kind of problem seems to show no evidence of solutions.

Whereas the transition from the initial to the final desired position shows too many ways to be solved, so one is facing the problem of choosing the most appropriate way, there will be cognitive and critical analysis techniques in the decision-making to lead to a selection of possible solutions.

The processes of Problem Solving are very productive, especially when applied in small working groups.

> **To further explore the techniques of problems solving see Cooperative Learning slides: 20, 21, 22**

In conclusion it can be seen that all the competences related to the various approaches and techniques discussed (active learning, cooperative learning, critical thinking, creative thinking, problem solving, decision making), are closely interrelated and mutually reinforced by their joint and coordinated use.

7.
THE TRAINING TOOLS
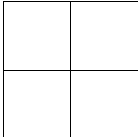
7.1 THE TRAINING TOOLS

The training action of the NJ ESD COM project proposes the use of thinking tools, content grids or educational mediators, used to develop competences that are functional to the analysis of the sustainability of an action, process or product.

When dealing with educational training tools or mediators, one refers to the graphical display of logical mental operations (Famiglietti); these tools can be divided into three categories:

▶ those that apply mainly to the mental operations of arranging data in *spatial contexts*: graphs (oriented), tree graph, Venn diagram, reflective relationships, similarities and differences relationships or sagittal diagram, generalizing relationships, two-column chart, organization chart, interaction matrix, square matrix, multi-column chart, statistical representations;
▶ those that apply mainly to the mental operations of arranging data in *temporal contexts*: multi-column chart, statistical representations, decision block flowchart, linear flow diagrams, strict time order relationships, discontinuous order relationships, Gantt chart (much used for organizational contexts);
▶ those that apply mainly to the mental operations of arranging data in context of *simple and complex relationships*: double entry chart, fishbone or Ishikawa diagram, R.A.RE.CO sequence and conceptual maps.

Name	How the mental operation task data is arranged	Functions	Characteristics	Graphical representation
Tree graph	Analysis and Hierarchisation	Highlight hierarchical relationships and belonging	Reading top-down and viceversa. Horizontal reading of nodes having the same hierarchy value	
Venn diagram	Inclusion and exclusion	Represent the belonging, the included and the intersections		
Organisational chart	Analysis and Hierarchisation	Represent an immediate visual and functional hierarchical relationships between elements of a dynamic set	Highlight the hierarchy and to allow a horizontal reading of the elements that are at the same hierarchical level (such as the tree graph)	
Double entry (or multiple) chart	Analysis and relationships: decomplexification	Make immediately clear the relationship between two individual data sets which are also complex and, simultaneously, to allow a global reading of the phenomenon	To relate two sets to represent or read a phenomenon	

Picture 7.1: *Some Training tools*

Logical-educational tools use indicators to analyze the context and help to build organized knowledge (or *meaningful learning,* as defined by Novak, 1998) by expressing it in a graphical view.

Knowledge is the more significant, the greater is the awareness in the use of these tools.

Among the logical-educational tools, conceptual maps graphically describe the hierarchical organization of concepts linked by connections, by labels that explicit their meaning relationships. These relationships can be logical, argumentative, causal or chronological in nature etc. (Emiliani, 1997).

Conceptual maps were proposed as a teaching tool by Novak and Gowin (1984), based on theories of *meaningful learning* of Ausubel (1968) and the renewed interest in the processes of learning caused by the arising of cognitive theories.

Among the aspects that best characterize the cognitive thought is definitely the search for tools capable of representing knowledge.

The graphical representation of knowledge through the creation of conceptual maps makes explicit the organization supporting the development of conceptual connections between nodes.

The use of such instruments, further developable into sub-schemes, has as its purpose to lead the interpretation of actions, processes, products and in the development of hypothesis and analysis upon them.

The spatial organization of the relationships depicted graphically, offers the possibility to observe multiple connections simultaneously, discovering new relationships and solutions.

An important value is the fact that the diagrams can be easily processed and shared in a group, allowing to express one's conceptual network, making it explicit graphically, facilitating the exchange and co-construction with the group.

The approach to development sustainability often poses problems defined as complex tasks: "A task assumes the nature of a complex problem when the exact properties of an initial state, final state and the obstacles are unknown and change dynamically during the solution process.

Group work is extremely functional for the solution of a complex task. A complex task involves open solutions; requires the use of multiple intellectual abilities; promotes higher order thinking processes and the use of multiple sensory channels and multimedia tools. A complex task relates to an issue, it is open to multiple outcomes, and requires a plurality of skills. A complex task cannot be worked out individually.

In this perspective, the learning group becomes an environment rich in diverse intellectual resources. Effective learning consists of active learning and of the enhancement of a large number of skills." (Gentile, 2001, p. 16)

Like conceptual maps, the models proposed in the NJ ESD COM project have shown useful tools for cooperative learning, as they can be built by learning groups, and they served as a socializing function and a function for sharing meanings (Novak, Gowin, 1984).

"The problems [in fact] never occur as already 'given'. They must be constructed and defined in their outlines starting from complex and confused materials, inevitably interpreted subjectively and burdened with deep emotional issues and values" (Varani, 2004).

"The resource of highest value in adult education is the experience of the learner, and adults need self-management" (Linderman, 1926, p. 6-7), the commitment of the trainer is expressed therefore in the construction of a path of co-research: the use of the proposed educational tools contributes to the construction of such a path.

In this sense the use of two logical analysis schemes is suggested:

The *Square of sustainability* and the *Triple helix model*, used in training actions.

7.2 THE SQUARE OF SUSTAINABILITY[1]

What types of knowledge will provide access to Education for Sustainable Development?

Today "knowledge" means an active, independent and constructive process of knowledge.

Attention is directed not only to which social and cultural contents are relevant to know the world, but also to the way one suits such contents to make them usable.

In order for the cognitive process to be successful, it needs to be meaningful to the learner, who, in turn, must be able to experience that his/her knowledge is also important in interpersonal relationships. Hence we can infer that "knowledge" implies much more than just the mere knowledge of the object: the object of knowledge must be extended to more systemic knowledge, that is correlated with contexts, functions and processes.

Besides, it is necessary to know why one must care about a certain thing, what one can get and also what is allowed to do or not do with one's knowledge. The systemic knowledge must also be closely linked to the development of value systems, to ethical guidelines, to immediate experiences that bring into play feelings and emotions.

To manage one's knowledge it is necessary to know the processes that lead to its construction, in short, to have methodological expertise and experiences on how to apply one's knowledge.

1   The paragraph is adapted from: the contribution "Educazione alla sostenibilità" Stoltenberg, INFIS Leuphana Universitaet, venue Agenda 21 Conference S.Marino 23 September 2009; Stoltenberg, 2005; idem, 2009a; idem, 2009b; idem, 2009c; Stoltenberg, Thielebein-Pohl, 2011.

Knowledge consists, in brief, of the interrelations of:

1. *contextual knowledge* derives from paying attention to connective learning and to the context of knowledge. It answers the question: *What meaning has this piece of knowledge within this specific context?*
2. *'orientative' knowledge* relates to the management of knowledge itself, thus implying ethical guidelines, evaluations, criteria for managing the object of knowledge. It answers the question: *What ethical sense has this piece of knowledge in relation to one's values?*
3. *operational knowledge* includes both the routines of everyday action and the complex and theoretical action, it also refers to steps, tools, methods that are consistent with the knowledge of the object. It answers the question: *What operational steps guide the use of a given piece of knowledge?*

Therefore it is appropriate for learning in all fields should have complex issues as its starting point. To cope with complexity, one can then make use of scientific knowledge of various academic disciplines, or of experts in the 'practical' world, or even look at other cultures.

This approach requires a radical change in thinking by educational institutions, that normally just transmit a canon of specific knowledge, but also by businesses.

In fact, this way of thinking can also help open something new in any type of organization, developing the ability to formulate complex problems together, and to merge the best of all knowledge in the problem solving process, to operate in favor of Sustainable Development (one cannot imagine what and how many types of knowledge are present in all organizations).

There are several tools, that are useful to manage such complexity: the INFIS Institute from Leuphana Universitaet suggests the use of the *Square of sustainability*:

Economic Dimension	Ecological Dimension
- Economics of care - Eco-Management - Closed cycle Economics - Environmental Management Systems - Ecologival and Innovative Technologies - Eco – Design (Life Cycle Assessment, Duration of use, Ease of disposal, the Aesthetic aspects) - "The truth" Ecological and Social Prices - Principles of Ecological Responsibility - Regional networks and local marketing - Fair Trade	Careful management of resources - Respect for regeneration time - Protection of Biodiversity - Harmonisaton with ecological cycles - Reducing the impact of individuals and communites (reduction of Greenhouse emissions and pollutants in the air, land, water) - Use of renewable energy - Application of the Principle of Precaution
Social Dimension	**Cultural Dimension**
- Health Promotion - Well being promotion - Equality of rights to draw on resources and achieve development - Justice and Social Equality - Respect for the needs of future generations - Democratization - Participation of individuals and communities in the management / decision making for the public good-Promotion of networks of individuals and communities - Rigths to keep the fruit of their labour	- Ethical certainty - Sustainable lifestyle - Holistic experience of nature - aesthetic aspects of development - Cultural diversity as Bio diversity - Traditional knowledge -Knowledge of history as an element of identity and learning from past mistake Culture time - Management culture of time and things - Consumer Awareness - Local public dimension - International exchanges - Global responsibility - Cosmopoilitan culture

Picture 7.2: *The Square of sustainability (Stoltenberg 2009c)*

The Square refers to the different dimensions of social action to be analyzed from the perspective of Sustainable Development.

The square, not only focuses on the key players, but also highlights the conflicts between the logic of various dimensions, moreover it defines the areas of action.

Thanks to this model one can ask: How can one achieve the goal of improving soil conditions from a sustainable point of view? What must occur in the different dimensions of social action?

The negotiation between different locations, within the limits defined by the ethical assumptions of Sustainable Development as an ideal orientation, may well be a further step on the road that brings us closer to sustainability (Stoltenberg, 2005; idem, 2009a; idem 2009b; idem, 2009c; Stoltenberg, Thielebein-Pohl, 2011).

7.3 THE TRIPLE HELIX MODEL

The *Triple helix model,* an innovative approach to reading developed in the U.S. in the 90s, focuses on the vision of driving the processes of innovation and change given by the synergic action of the three components of society: education, production and governance.

The NJ ESD COM project proposes the Triple helix model as a training tool.

The NJ ESD COM project proposed and tested the Triple helix model by using it as an educational tool to guide a logical approach that can stimulate reasoning, mental associations, a "habit of mind" that will facilitate the continued display of the simultaneous presence of all three systems and their relationship and role as levers for change processes.

The Triple helix model, developed in the late nineties by Loet Leydesdorff and Henry Etzkowitz, defined as the engine of innovation, consisting of three components, industry, academia and research and the system of government.
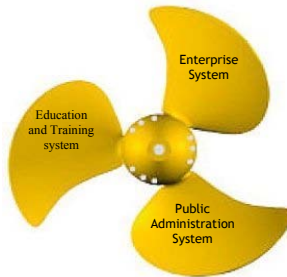
Picture 7.3: *The Triple helix model*

Henry Etzkowitz is a scholar internationally renowned who deals with issues related to innovation, PhD in Sociology, professor at Stanford University and at present President of the Triple helix association, is co-foun-

der of the Triple helix International Conference Series and a member of the Media Research and 6CP - Six Countries Programme.

Loet Leydesdorff, Dutch sociologist, graduated in chemistry, PhD in Sociology and Philosophy, and Senior Lecturer in Cybernetics at the University of Amsterdam, is well known for his work in the sociology of communication and innovation.

The triple helix is expressed through a spiral model that captures multiple reciprocal relationships at different stages of the process of capitalization of knowledge.

There are three dimensions of interaction that are taken into consideration:

▸ The first dimension of the model concerns the internal transformation of each element of the helix through the development of ties in the same area, such as building strategic alliances between companies or taking a common commitment to economic development by universities.
▸ The second is represented by the superposition of a helix with respect to the other, as happened when the US federal government promulgated 'the Bayh-Dole Act of 1980 [an act regulating the intellectual property]: the activities of the transfer of technology circulated more widely, creating, within universities, some relevant professional skills linked with the transfer of technology.
▸ The third dimension is the creation of a new overlay of trilateral networks and organizations, created specifically for the purpose of developing new ideas and formats for high tech development (Etskowitz, 2001).

Since 1996 with the Amsterdam Conference, several international conferences on the triple helix model have been promoted, in order to develop the study of interactions between academic, industrial and institutional systems, as a means to promote technological innovation and economic growth.

The conferences have developed over the years various issues, investigating ways and areas of application of the model, as can be seen below:

1996   Triple Helix I, Amsterdam, January 1996
       Main theme: "A Triple Helix of University-Industry-Government Relations".
1998   Triple Helix II, Purchase, New York, January 1998
       Main theme: "The Future Location of Research".
2000   Triple Helix III, Rio de Janeiro, April 2000
       Main theme: "The Endless Transition" (Relationship of science, in-

dustry, and government and their role in creating the conditions for future innovation. Special focus on the contribution of research to job creation and social wealth)

2002   Triple Helix IV, Copenhagen, Denmark and Lund, Sweden, November 2002
        Main theme: "Breaking Boundaries and Building Bridges?"
        www.triplehelix.dk

2005   Triple Helix V, Turin, May 2005
        Main theme: "The Capitalization of Knowledge: Cognitive, Economic, Social and Cultural Aspects" **www.triplehelix5.com**

2007   Triple Helix VI, Singapore, May 2007
        Main theme: "Emerging Models for the Entrepreneurial University: Regional Diversities or Global Convergence"
        www.nus.edu.sg/nec/TripleHelix6

2009   Triple Helix VII, Glasgow, June 2009
        Main theme: "The role of Triple Helix in the Global Agenda of Innovation, Competitiveness and Sustainability"
        www.triple-helix-7.org

2010   Triple Helix VIII, Madrid, October 2010
        Main theme: "Triple Helix in the Development of Cities of Knowledge, Expanding Communities and Connecting Regions"
        www.triplehelix8.org

2011   Triple Helix IX, California, July 2011
        Main theme: "Silicon Valley: Global Model or Unique Anomaly?"
        www.triplehelixconference.org

2012   The X Triple Helix International Conference, Bandung Indonesia, August 2012
        Main theme: "Emerging Triple Helix Models for Developing Countries: from Conceptualisation to Implementation"
        http://www.th2012.org/index.php/en

In the proposed theoretical framework of the last conference, we read:

> "Innovation is the spirit of doing things better and in a more sustainableway." Some of the issues faced, the cultural aspects of innovation, social innovation, innovation in the creative industries, socio-economic development and the triple helix, the creation of new knowledge, innovation and economic development, highlight once again how the approach to sustainable development permeates today's international debates at every level.

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In addition to the theoretical level, the Triple helix model is the basis of current development policies of many European countries and worldwide regions.

An example is the Baltic Euroregion (ERB) **www.eurobalt.org** , established in February 1998 in the South East of the Baltic Sea as the first Euro region and composed of some regions of Denmark, Latvia, Lithuania, Poland, Russia and Sweden and recognized as an example of well established and strong political cooperation.

The Baltic Euroregion has based its development on a cross-border network of links between countries, which facilitated the promotion of political dialogue and reforms for Sustainable Development in all points of view, economic, social and environmental.

Since its establishment , ERB has also pursued the goal of promoting development by strengthening ties and cooperation at the local communities level; this policy has led to a strengthening of local democracy and participation of civil society, with cooperation that actively involve both the local and regional authorities, public and private sectors and Non Governmental Organizations (NGO).

The same geographic area presents another example of development based on the paradigms of the triple helix, applied to the entire Øresund region at a transnational level.

There are in fact two nations, Denmark and Sweden, which implement the guidelines of the model, with involvement and coordination over a very broad range of subjects, as evidenced by the data of the Øresund TripleHelix Model [**6e HT Øresund TripleHelixRegion**].

In this case, a double triple helix is developed, multiplying the interactions between institutions, universities and companies at intra and inter-national levels.

The levers of the system are driven by 'Øresund University and consisting of a trans-national network of 12 university centres.

Øresund University has made coordination and collaboration its strength, coming to be recognized as the fourth research centre in Europe for number of scientific publications and allowing the Øresund re-

gion to rank in the seventh place with regard to High Tech industry and to *knowledge economy services.*

One expression of this synergy in triple helix is represented by the Medicon Valley, a health network that includes 3 regions , 12 universities, 32 hospitals, 300 biomedical technology companies and has produced 40,000 jobs.

The *RegioStars* recognition award was granted in 2008 to this region by the European Commission, on the basis of the elements above. It was a region which had the greatest support to Sustainable Development and to the knowledge-based economy.

The Triple helix model is also developed and applied successfully at the local level, as evidenced by the recent history of the city of Malmö [**6a HT Malmö introduction**].

The model is so effective that the city promotes it in a structured way, as evidenced by the organization CleanTech [**6b Malmö Cleantech HT**].

This organization, funded entirely by the municipality, deals with developing business services in collaboration with the municipality and research centres, to ensure that the city appears attractive for investment from young people and enterprises that produce through clean technologies (*clean tech*), creating opportunities for promotion and networking.

The Triple helix model is so widely used as a theoretical model for its policies and programmes aimed at encouraging innovation, that today sees an extension of coverage in all geographical scales of decision making, as evidenced in the case of a study published by Rodrigues and Melo 2012 (Rodrigues, Melo, 2012), and it demonstrates a sound conceptual basis for policy development also at the local level, as confirmed by the case of the city of Norrköping, Sweden (Svensson, Klofsten, Etkowitz, 2011).

The formation of districts and clusters[2] is one of the features of the experiences reported.

The push for clustering characterizes the content of the European Commission Communication 'Putting knowledge into practice: A broad-based innovation strategy for the EU (EU COM, 2006), where the importance of cooperation is listed as a competitive advantage for firms: "in a view that puts pressing demands for sustainable solutions, the road and the tool for building effective responses are common action and innovation" (idem, p. 2).

Clusters as structures that contribute to reducing the gap between

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2   By the term cluster, which in English means group, in this context assumes the meaning of district.

business, research and resources, bring knowledge faster to the market, improve productivity, attract investments, promote research, strengthen the industrial base and develop specific products and services becoming a source of skills development

Another aspect strongly emphasized is the central role of education and training as levers for change: "education represents that strong system that, promoting talent and creativity from an early age, creates the precondition on which innovation can be based" (idem, p. 4).

These indications have been expressed in the definition of European programmes for regional development policies for the period 2007-2013, and in which the preferred approach was based on innovative regional clusters, not only in developed urban centres but also in the poorest or rural regions.

In fact, it is at the regional level that many companies, especially small and medium-sized, can more easily interact with each other and with the training and technological expertise centres. This makes proximity a key factor in the innovation process and increases the effectiveness of innovation policy that corresponds to the regional and local needs (idem, p 8).

An example of the approach of the triple helix has also been implemented in Italy and is represented by the *Elica* project (**http://projecte-lica.com/**).

ELICA is the name of a project that, between 2012 and 2015, will develop connections between innovative Italian and Dutch companies, operating in high tech, design and agribusiness sectors, and develops in close collaboration with Brainport Industries, Eindhoven, NL, with the Dutch top sector HTMS (High Tech Systems and Materials) and is officially supported by the Italian Embassy in the Netherlands and the Dutch Embassy in Italy.

The project is developed and administered through a joint action by entrepreneurs, researchers and practitioners of economic development in the Italian districts, the Italian-Dutch Economic Cooperation and communication in the fields of high-tech, design and agribusiness, and actively oriented to interconnect clusters and innovative businesses.

The name "Elica" emphasizes the acceleration of innovation and business opportunities enjoyed by those involved in the project, acceleration made possible by the close cooperation between companies, governments, academic institutions, and research institutions, and the sharing of information and knowledge between these subjects.

In the Italian school system, an opportunity to operate according to the organizational model of the triple helix is offered by the creation of the Technical Scientific Committees, CTS. The establishment of the CTS

is a novelty at the Italian national level, and starts from two official documents: the *Regolamento di riordino degli Istituti Tecnici* Decreto Presidente della Repubblica n.87 Marzo 2010,) and the Protocollo d'intesa signed by the Ministry for Education and Confindustria (National Industry Association) for the revival and development of technical education (the potential of this Committee is outlined in the **Guide** document.

Using the Triple helix model as a teaching tool comes from the consideration that now characterizes this approach and more and more design strategies and global economic policies, and it can and must become part of the mindset of those who are approaching Sustainable Development.

7.4   USING THE TRAINING TOOLS

The proposed instruments have many potential uses; the analysis of the *tasks of reality*[3], the type of students, the educational objectives and the trainer's creativity lead each time in deciding the choice of the instruments to use.

Particularly effective is the integrated use of both tools, the Square of sustainability and the Triple helix, which, when applied on the same reality task, allow to highlight different aspects. Using the Square reveals the contents of the four dimensions of sustainability respect to the object of analysis, their mutual relationships, the strengths and weaknesses; the usage of the Triple helix detects the actors of development, with and through which, one can promote action for change.

> **An example of the integrated use of the two training tools is reported in the hypertext Cittadella dello Studente System, Grosseto**

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3   The term "task of reality" refers to tasks whose execution must be carried out in real or realistic situations.

8.
VALIDATION AND EVALUATION

8.1 VALIDATION AND EVALUATION: REFERENCE CONCEPTS

The issues related to the evaluation and validation in the NJ ESD COM project have been addressed in the course of the work of the International and Local Scientific and Technical Committee.

In particular, in the early stages of the project the meaning of the concepts of validation and evaluation were shared.

Validation means *a scientific process, typically statistical in nature, which leads to consistent statements (also known as scientifically provable, verifiable, or better, falsifiable) about the compliance or non-compliance of a given tool (used in training, in evaluation, or otherwise) with respect to objectives that it aims explicitly at achieving.*

By extension, the term is also used in reference to the result of this process, if the result is positive: in this case one can state that the instrument is valid.

In operational terms, the validation results in answers to the following question: if one says that a given tool is useful for achieving a stated goal, how can one verify that it is actually being used?

For example, if one says that a questionnaire (evaluation tool) is useful to verify the knowledge of a particular topic, such as the four dimen-

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1   **Falsifiability** (closely linked with the German term *Fälschungsmöglichkeit,* more correctly translated as "falsifiability") is the criterion formulated by Karl Popper to demarcate the scope of controllable theories , which belongs to science, from the theories that cannot be controlled, that Popper himself identifies with metaphysics. The concept of popperian falsifiability (which defines a criterion for a scientific fact) is clearly opposed to the neo-positivist verifiability, even if both aim at defining a sense criterion (only inductively verifiable assertions are significant, that is they say something; the so called metaphysics assertions, which are not inductively verifiable, are not significant). A clear example of pseudo-science is astrology, which cannot be subjected to a screening of falsifiability.

sions of sustainability (stated goal), how can one verify that it is actually 'good', that it meets this goal?

Validation can be either *quantitative* or *qualitative*.

In the first case the tool must be subjected to a statistical analysis that can provide information about its reliability and validity, respectively:

▶ The internal consistency of the instrument using questions that refer uniquely to the subject of the "measurement";
▶ The ability of a set of questions, or items as these are usually called, to provide an objective measurement for what the set of questions were designed.

This type of validation is activated in cases where it is necessary to construct the standardized tools that can be used on different samples, related to the same statistical universe of reference. The validation of the tool is reliable if performed on numerically significant statistical samples.

Returning to the example above, one might say that one must make a quantitative validation if one wants to create a scale for assessing the knowledge level of the four dimensions of sustainability that can be used in the whole Italian Education System. In order to do so, one must validate the questionnaire on a numerically large sample of teachers and that is this sample is statistically representative of the universe of reference, that is all Italian teachers.

These validation methods, which use statistical procedures such as factor analysis, Rasch models and structural equation models, require a large sample size and always a fair number of questions that make up the scale (a minimum of ten individuals per item).

In the case of a qualitative validation, the tool is not subjected to statistical analysis, but to a series of assessments made by experts who express their opinions on the fairness between the objectives of the measurement tools used, the contents of those instruments and the results achieved with them.

The validation processes for the NJ ESD COM project were qualitative, being able to draw on recommendations of the specialists (teaching, Sustainable Development, training, evaluation, validation and monitoring) that made up the International Technical Project Committee (CTSI) .

The number of participants in the experimental phase of the training action, already expected in the design phase, would not have been sufficient to ensure significance of the data and therefore the possibility of a quantitative validation.

Evaluation, in the context of this project, is represented by "all activities related to each other and useful to make an argued judgement" (Bezzi, 2010).

Processes and results of the evaluation may be submitted, to ensure validity and reliability, to validation processes, and to studies and reflections defined by 'docimologia', the discipline of assessment.

"Evaluation and evaluative research should not be confused with monitoring, auditing, benchmarking, and certification" (Bezzi, 2010), that are however its key "partners".

Docimologia is a branch of educational science that can be placed among the experimental techniques involved in the study of evaluation systems of verification tests, where evaluation is a focal point, because a score or mark is no longer understood in a strictly numerically setting.

Docimologia has the purpose to find objective assessment methods, using various types of tests, such as both structured and unstructured tests.

Structured tests provide a means for verification and for the measurement of knowledge. They normally consist of closed-response tests in which one must choose the exact one, among several answers, or in which one must rate the accuracy of a statement.

Among the main types of questions (items) these are the most frequent:

1. Multiple choice questions
2. True / False questions
3. Matching exercises
4. Completion exercises
5. Logical sequencing.
6. Asked to rate (scoring a given statement).

Unstructured tests are those that provide stimuli and require open ended responses, such as in an oral test, an essay, a maths problem, a Latin translation or the drafting of a project.

They allow the evaluation of complex mental processes and skills, such as the ability to communicate one's thought in a logical way, grasp the essentials of a topic, express creativity and critical thinking, show the ability to freely use one's imagination, or to find solutions.

Their effectiveness is reinforced by their integration with structured tests.

In the course of the training action conducted within the NJ ESD COM project, both structured and unstructured tests were used.

8.2 COMPETENCES EVALUATION IN THE TRAINING ACTION

The methods and tools of evaluation proposed in the NJ ESD COM training action were chosen in accordance with the characteristics of the content covered and with the methodological choices characterizing the teaching.

The choice of appropriate evaluation tools has been addressed through various stages of discussion within the meetings between the members of the International and Local Scientific Committees.

Competences assessment and evaluation is a much debated issue, on which some suggestions in **Chapter 2** have been offered.

Based on the ideas proposed by various researchers, the major points leading the NJ ESD COM project are summarized as follows:

a) competences are observable only when acted in real or realistic contexts: (Rychen & Salganik, 2003);
b) competences depend on the context in which they are expressed (ibidem);
c) to assess competences it is not enough to use the functional approach (what they are used for) but one also needs the structural approach (how they are made up, what is their structure) (Witt and Lehmann, 2001);
d) for several studies, competences are structured by *knowledge* and *skills* (ISFOL, 1994);
e) Regione Toscana defines competences following this approach (Regione Toscana, 2009, *Delibera di attuazione della Legge R. 32/2002: Sistema delle competenze nel sistema formativo regionale)*
f) To evaluate competences it is necessary to build real or realistic situations in which skills can be acted out (Brunello, Capone et alii, 2011; Sarchielli, Napoleone, 2007);
g) competences in action are observed through grids showing the main elements of competence (knowledge and skills), involving the learner (ibidem);
h) It has been shown that greater effectiveness of evaluation occurs when the learner is directly involved in the assessment of his/her level of learning (Comoglio, Cardoso, 1996; Comoglio, 1998);
i) pondering that some competences are expressed only in group work, it is necessary to provide both individual assessment and group assessment (Johnson & Johnson, 1994).

A further point to think about is the individual assessment.
In Cooperative Learning, many of the proposed exercises are group exercises. How can one grasp the potential of group work and assess at the same time the contribution of the student?

In this regard, considerations from Comoglio (Comoglio, Cardoso, 1996; Comoglio, 1998) and Pavan (2010) are very important. According to them, the monitoring, assessment and evaluation of individual learning, occurred in the group, are central points of Cooperative Learning.

Assessment is the collection of data necessary to make a judgment, while evaluation is a value judgment made on the basis of available data.

One can assess without evaluating, but it is not possible to evaluate without previous assessment. Johnson D.W. and Johnson R.T. (1994) suggest some rules to assess and evaluate.

1. The process of assessment and evaluation must take place in the context of learning groups, while ensuring the evaluation of the individual, it has a greater effect if the operation is performed in groups;
2. one should monitor and check constantly and systematically, as learners need a continuous and individual feedback;
3. learners must be directly involved in the assessment of their level of learning: in preparing the tests, in using test results to set new goals and to correct mistakes, in feeling proud and satisfied for the achieved results;
4. for an effective evaluation, it is appropriate to use a system based on objective criteria that compare the progress of the individual to his/her own previous level of achievement, more than his/her level in relation to schoolmates;
5. it is good practice to use different assessment methods:
   a. those based on *performance* focussing on outcomes, on what students have learned, and that can be shaped as essays, projects, videos, tests, researches and handcrafts;
   b. those of *total quality* focussing on the processes of learning, on how students have learned and that can be carried out through the compilation of diagrams or tables of observation procedures by the teacher and/or by the students themselves;
   c. those of *authentic assessment* requiring students to use procedures, skills or competences in a real or realistic context, and that are feasible, for example, by conducting an experiment, writing a newspaper article for school or simulating oral presentation at a conference.

The NJ ESD COM project has chosen to define the responsibilities according to the structure proposed by the system used by Regione Toscana, in the Directory of Professional Figures, that declines them as being formed by knowledge and abilities.

In particular, as regards *knowledge*, the NJ ESD COM project identified:

▶ Legislation and technical regulations at local, national and international level (UN, EU, National State, Region) on Sustainable Development
▶ The principles of the theoretical model of the four dimensions of sustainability (ecological, economic, social and cultural), knowledge to be used as a tool for analysis / evaluation and / or programming support for any action / process / product both tangible and intangible.
▶ The experiences of excellence within Sustainable Development, aimed at the identification of sensitive information for reproducible models;
▶ Techniques of conducting groups to educate and train successfully on environmental issues.

As regards *capabilities*, the following have been identified:

▶ Design and implement educational courses and spreading actions based on the indications of local, national and international documents on sustainable development;
▶ Apply the theoretical model of the four dimensions of sustainability (ecological, economic, social and cultural) in the analysis, evaluation and planning of actions, processes and sustainable products;
▶ Interact with the various stakeholders involved in environmental education (government agencies, schools, associations, etc.) ensuring the effective planning of training / information / education;
▶ Adapt the best practices developed in the context of sustainable development to the local situation.

The need to evaluate multiple aspects of learning has supported the decision to use a set of tools, and combining their use so as to adequately detect knowledge and capabilities.

A useful support to the choice have been taken from Sarchielli (Sarchielli, 2011), who gives suggestions about matching tools with their effectiveness to recognise the elements of the competence, which is well summarized in the following table:

		ELEMENTS OF THE COMPETENCE					
		Knowledge	Technical capabilities	Relationship capabilities	Organizational capabilities	Complex capabilities	Personal resources
Type of tools	Objective tests	● (yellow)				● (blue)	
	Technical practical tools	● (blue)	● (yellow)		● (green)	● (blue)	● (blue)
	Oral tests	● (blue)		● (yellow)		● (blue)	● (green)
	Case analysis	● (green)			● (blue)	● (yellow)	
	Simulations	● (blue)	● (yellow)	● (blue)	● (green)	● (blue)	● (green)
	Role plays			● (yellow)			● (yellow)
	Individual exercises	● (blue)	● (blue)		● (blue)	● (green)	● (green)
	Group exercises		● (blue)	● (green)	● (green)	● (blue)	● (blue)
	Project works	● (blue)	● (blue)		● (blue)	● (yellow)	● (blue)

Legenda

○ (yellow) = full and direct consistency
● (green) = indirect consistency (especially when integrated with other tools)
● (blue) = possible consistency (only if designed for this use)

Table 8.1: *The choice of evaluating tools on the basis of the elements of the competence (Sarchielli, 2011)*

8.3 THE EVALUATION TOOLS

The training activity of the ESD NJ COM project, articulated in a course consisting of modules, has provided more opportunities for assessment: initial, ongoing and final.

The evaluation tools used in the training courses were of three types:

a) self-assessment questionnaires
b) observation grids
c) evaluation grids

a) Self-Assessment Questionnaires SAQ
They are used for testing knowledge.
Reflecting on the elements of novelty in terms of educational content introduced by the course with respect to prior knowledge and how they are relevant to the business professional, It is proposed that the questionnaire be completed individually at the end of each module (e.g. **SAQ 4**).

b) Observation Grids OG

They are used for the recognition of capabilities, which are identified through appropriate indicators that express their presence.

The use of the grid features some moments of the group exercises, the compilation of which is entrusted to the students and is intra-or inter-group according to the skills of those being observed.

The observations and subsequent sharing is of primary importance in terms of training.
One of the moments of observation, for example, focuses on the way in which the tasks and activities in the course are achieved (e.g. **OG1**).

c) Evaluation Grids of the Documentation (**EG D**)

They are used in the analysis phase of the documents (e.g. **EG PW**), made up, in this case in the form of project work and results from each group and starting from the preliminary stages of the work.

The project work synthesizes and expresses the content and skills developed in previous phases. A shared analysis of the group documents represents a key training point in that it is a stage in the evaluation process by the teacher.

The integration of information gathered through the group-work observation grids and evaluation of the documents comprises the synthesis that allows the identification of competence.

Examples of grids follow:

▶ SAQ 4, Self-Assessment Questionnaire 4 (Social and Cultural Aspects of sustainability);
▶ OG 1, Observation Grid (communicative skills);
▶ EG PW, Evaluation Grid Project Work.

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NEW JOBS THROUGH ESD COMPETENCIES

SAQ 4
SELF-Assessment QUESTIONNAIRE 4

Training Action
Sustainable development in the school: teacher training

Workshop: The Dimensions of Sustainable Development
Social and Cultural Aspects

☐ DATE:

Self-assess your knowledge of the following themes at the end of the training day

	Poor	Fair	Good	Excellent
1. *What did you know about the social sustainability of development?* Mark with an X	☐	☐	☐	☐
2. *How much new knowledge did you learn about the social sustainability of development?* Mark with an X *How relevant is this to my job?* Circle with an O	☐	☐	☐	☐
3. *What did you know about the cultural sustainability of development?* Mark with an X	☐	☐	☐	☐
4. *How much new knowledge did you learn about the cultural sustainability of development?* Mark with an X *How relevant is this to my job?* Circle with an O	☐	☐	☐	☐
5. *What did you know about the reasons for underlining the importance of cultural sustainability?* Mark with an X	☐	☐	☐	☐
6. *How much new knowledge did you learn about the reasons underlining the importance of cultural sustainability?* Mark with an X *How relevant is this to my job?* Circle with an O	☐	☐	☐	☐
7. *What did I know about National and International Documentation on the theme ?* Mark with an X	☐	☐	☐	☐
8. *How much new knowledge did I learn on National and International Documentation on the theme?* Mark with an X *How relevant is this to my job?* Circle with an O	☐	☐	☐	☐
1. *What did I know about integrated realities in respect to the four dimensions of Sustainable Development?* Mark with an X	☐	☐	☐	☐
9. *How much knowledge did I learn about integrated realities in respect to the four dimensions of Sustainable Development?* Mark with an X *How relevant is this to my job?* Circle with an O	☐	☐	☐	☐
10. *What did I know about the relationship between Sustainable Development and the educational approach to Sustainable Development?* Mark with an X	☐	☐	☐	☐
11. *How much new knowledge did I acquire?* Mark with an X *How relevant is this to my job?* Circle with an O	☐	☐	☐	☐

	Absolutely not	Somewhat	Yes, totally
12. *Was the work method used during the workshop useful?*	☐	☐	☐
13. *Did the participation in the workshop satisfy your expectations in respect to the objectives of the seminar?*	☐	☐	☐

Working environment of the participant: Elementary School ☐
Middle School ☐
High School ☐
Professional Training ☐

What would you suggest in order to improve the next workshops?

_____
_____
_____

www.njesd.com

OG 1

OBSERVATION GRID

COMMUNICATIVE SKILLS

**Training Action
Sustainable development in the school:
Teacher Training**

• *Activities* Teaching Methodologies	¨ DATE..			
During the course of the activity, rate the effectiveness of the following aspects and please specify the reasons for such evaluation	**Not very effective**	**Effective enough**	**Very effective**	**Absolutely effective**
NON VERBAL ASPECTS				
Use of the body				
• *Use of eye contact (direct, consistent, low..)*	..	..	..	..
Reasons for the evaluation:				
• *Facial expressions*	..	..	..	..
Reasons for the evaluation:				
• *Use of hands (expressive or not, too much, too little..)*	..	..	..	..
Reasons for the evaluation: …...				
• *Use of body language (posture, position, movements...)*	..	..	..	..
Reasons for the evaluation: …...				

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VERBAL ASPECTS				
Use of the voice				
During the course of the activity, rate the effectiveness of the following aspects and please specify the reasons for such evaluation	**Not very effective**	**Effective enough**	**Very effective**	**Absolutely effective**
Volume of the voice	..	..	..	..
Reasons for the evaluation: …… …… ……				
Tone of the voice (use of expression)	..	..	..	..
Reasons for the evaluation: …… …… ……				
Adequacy of speed in the exposition	..	..	..	..
Reasons for the evaluation: …… …… ……				

RELATIONSHIP ASPECTS				
Attention in the classroom				
During the course of the activity, rate the effectiveness of the following aspects and please specify the reasons for such evaluation	**Not very effective**	**Effective enough**	**Very effective**	**Absolutely effective**
Welcomes audience requests	..	..	..	..
Reasons for the evaluation: …… …… ……				
Responds to audience requests	..	..	..	..
Reasons for the evaluation: …… …… ……				
Stimulates interaction from the audience	..	..	..	..
Reasons for the evaluation: …… …… ……				

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EXHIBITION ASPECTS				
Content management				
During the course of the activity, rate the effectiveness of the following aspects and please specify the reasons for such evaluation	**Not very effective**	**Effective enough**	**Very effective**	**Absolutely effective**
Clarity	..	..	..	..
Reasons for the evaluation:				
Ability to summarize	..	..	..	..
Reasons for the evaluation:				
Connection between the contents that constitute the presentation (internal consistency)	..	..	..	..
Reasons for the evaluation:				
Connections between the contents of the presentation and those of the presentations of other group members	..	..	..	..
Reasons for the evaluation:				
Connections between other arguments previously developed in the work of other groups	..	..	..	..
Reasons for the evaluation:				

Working environment of the participant: Elementary School   ..

Middle School   ..

High School   ..

Professional Training   ..

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PWEG

PROJECT WORK EVALUATION GRID

Training Action
Sustainable development in the school:
Teacher Training

1. Activities **Project work evaluation**	☐ DATE..			
Analysing the paper to detect the presence of the following design elements	**Absent**	**Present and scarcely defined**	**Present and enough defined**	**Present and very well defined**
BASIC CONCEPTS ON SUSTAINABLE DEVELOPMENT				
Contents and structure				
Environmental aspects	..	..	..	..
Reasons for the evaluation:				
Economic aspects	..	..	..	..
Reasons for the evaluation:				
Social aspects	..	..	..	..
Reasons for the evaluation:				
Cultural aspects	..	..	..	..
Reasons for the evaluation:				
Tailoring of contents to the type of final users	..	..	..	..
Reasons for the evaluation:				
Contextualization to current reality	..	..	..	..
Reasons for the evaluation:				

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Use of the training tools in the analysis of contents				
Analysis by Square of sustainability	☐	☐	☐	☐
Reasons for the evaluation:				
Analysis by Triple helix model	☐	☐	☐	☐
Reasons for the evaluation:				

TRAINING COURSE FRAMEWORK

Activities, timing, resources

In analyzing the project work detect the presence of the following design elements	Absent	Present and scarcely defined	Present and enough defined	Present and very well defined
Presence of the proposed activities	☐	☐	☐	☐
Reasons for the evaluation:				
Presence of time scheduling	☐	☐	☐	☐
Reasons for the evaluation:				
Presence of used resources	☐	☐	☐	☐
Reasons for the evaluation:				

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TEACHING METHODOLOGIES				
Teaching and evaluating methodologies				
In analyzing the project work detect the presence of the following design elements	**Absent**	**Present and scarcely defined**	**Present and enough defined**	**Present and very well defined**
Cooperative learning	☐	☐	☐	☐
Reasons for the evaluation:				
Framing of the tasks of reality	☐	☐	☐	☐
Reasons for the evaluation:				
Interdisciplinarity	☐	☐	☐	☐
Reasons for the evaluation:				
Shared assessment	☐	☐	☐	☐
Reasons for the evaluation:				
Other	☐	☐	☐	☐
Reasons for the evaluation:				

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EXTERNAL CONTRIBUTIONS				
Collaborazioni, visite, testimonianze				
Collaborations, educational trips, testimonials				
In analyzing the project work detect the presence of the following design elements	Absent	Present and scarcely defined	Present and enough defined	Present and very well defined
Meetings with experts	☐	☐	☐	☐
Reasons for the evaluation:				
Educational trips	☐	☐	☐	☐
Reasons for the evaluation:				
Testimonials	☐	☐	☐	☐
Reasons for the evaluation:				

Working environment of the participant	Elementary School	☐
	Middle School	☐
	High School	☐
	Professional Training	☐

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9.
THE TRAINING ACTION FRAMEWORK
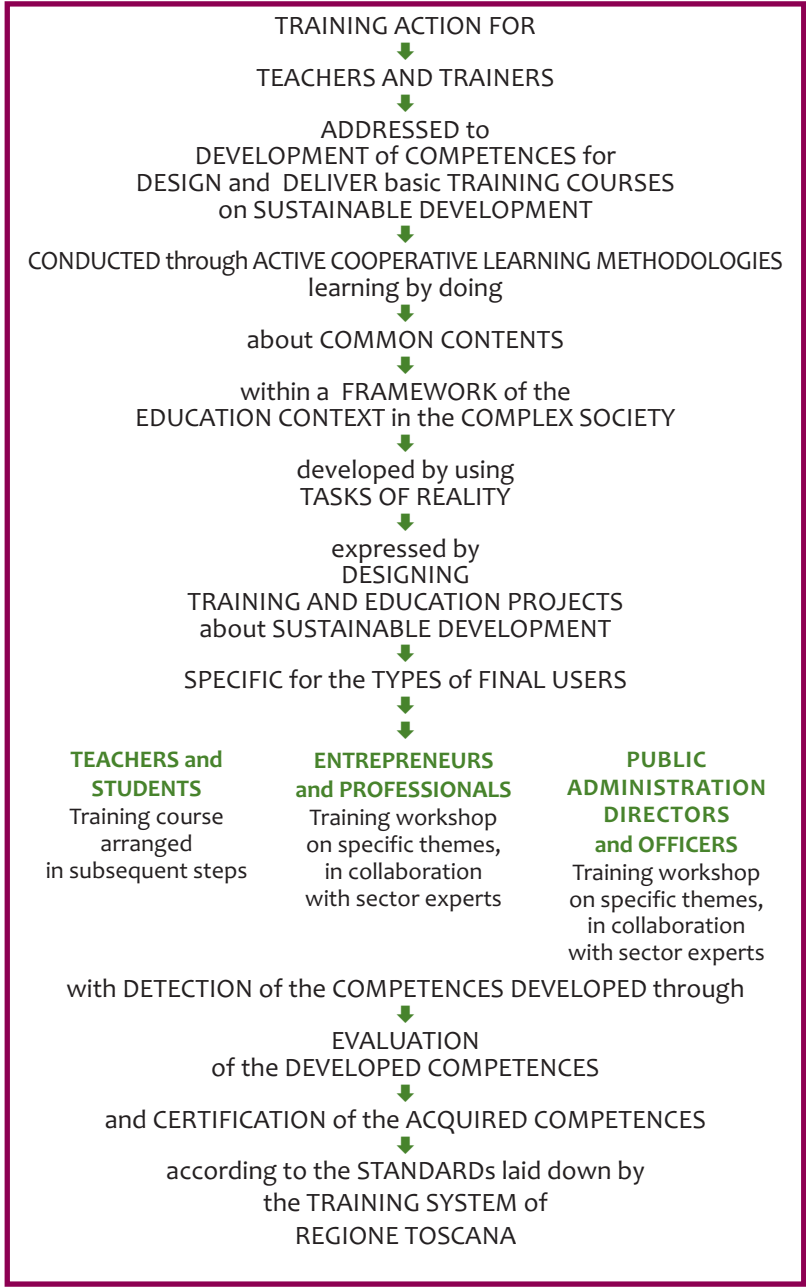
9.1 FRAMEWORK DESCRIPTION

The training action proposed by the NJ ESD COM project was developed to meet requirements in terms of designing and delivering training courses for a basic approach to the issues of Sustainable Development.

The project is aimed at trainers, first level users or target group, and has the purpose to develop competences for the design and delivery of training courses addressed to final users, or second level target group.

Following the Triple helix model, the final recipients were identified in three areas:

- Teachers and Students
- Entrepreneurs and Professionals
- Public Administration Directors and Officers.

TRAINING ACTION FOR

⬇

TEACHERS AND TRAINERS

⬇

ADDRESSED to
DEVELOPMENT of COMPETENCES for
DESIGN and DELIVER basic TRAINING COURSES
on SUSTAINABLE DEVELOPMENT

⬇

CONDUCTED through ACTIVE COOPERATIVE LEARNING METHODOLOGIES
learning by doing

⬇

about COMMON CONTENTS

⬇

within a FRAMEWORK of the
EDUCATION CONTEXT in the COMPLEX SOCIETY

⬇

developed by using
TASKS OF REALITY

⬇

expressed by
DESIGNING
TRAINING AND EDUCATION PROJECTS
about SUSTAINABLE DEVELOPMENT

⬇

SPECIFIC for the TYPES of FINAL USERS

⬇
⬇

| **TEACHERS and STUDENTS**
Training course arranged in subsequent steps | **ENTREPRENEURS and PROFESSIONALS**
Training workshop on specific themes, in collaboration with sector experts | **PUBLIC ADMINISTRATION DIRECTORS and OFFICERS**
Training workshop on specific themes, in collaboration with sector experts |

with DETECTION of the COMPETENCES DEVELOPED through

⬇

EVALUATION
of the DEVELOPED COMPETENCES

⬇

and CERTIFICATION of the ACQUIRED COMPETENCES

⬇

according to the STANDARDs laid down by
the TRAINING SYSTEM of
REGIONE TOSCANA

The training action programme is developed in sections, according to a modular structure so as to respond to the specific needs of the recipients.

The first section, in the **fourth** and **fifth** chapters of this manual, defines Sustainable Development, outlining its history and basic concepts.

This section helps to build a body of knowledge necessary for trainers when they are themselves involved in designing.

A basic knowledge of sustainability makes it possible to tailor the content to the characteristics and needs of the recipients, without losing an overall vision, highlighting its systemic value and the interrelations among the dimensions of development.

The modularity of this section allows to deal with the study of the four dimensions of sustainability with a different degree of focus of the various aspects.

The educational activities offered in schools will study the various issues of Sustainable Development according to the disciplines taught, and within which these issues can be declined.

To this regard, it is important to highlight the choice of the *task of reality* as the focus of the educational activity, task that can catalyze an essential disciplinary work.

A hint to work is definitely within the tasks of reality given by "Alternanza Scuola Lavoro[1]" provided in Legislative Decree n. 77/2005 and implemented in the technical document attached to the DM n.139, 22nd August, 2007.

Furthermore, the content may be organized and delivered with a level of complexity weighted according to the order and grade of the school.

In this context it is emphasized that an approach to the sustainability of development is always stronger when started from early childhood (**German Commission for UNESCO, 2011**).

Also in vocational training, organization of content and level of detail can be tailored according to the type of final users.

In relation to the areas of educational interventions, for example, one can deepen the social aspects of sustainability, when considering companies' social responsibility, rather than environmental issues, where the interest centres on water and waste management, or cultural aspects when dealing with dissemination and awareness campaigns.

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1   Alternza Scuola Lavoro is a recent opportunity defined in the Italian Education System that consists of alternating periods of training, in subsequent periods at school and at work, to get competences, experiencing the real world of work, e.g. in companies.

Even if the final beneficiaries are adults who work in the world of work, such as entrepreneurs and public administrators, the contents of this module are proposed according to a selection and thematic choice defined after analysis of their needs in collaboration with sector experts.

The discussion of these topics is supported by the use of the model The Square of Sustainability **(paragraph 7.2),** proposed to the trainers as the framework for the facts to be tested; it is starts to show its capabilities for future use as a training tool **(paragraph 7.1).**

The second section provides an opportunity to examine key documents **(Papers and slide presentations linked to the digital version)** of interest in the specific target group: data and statistics, regulations and documents regarding the context of Enterprise Systems and Public Administration, ministerial directions and guidelines regarding the education system.

Also in this case, the modularity allows to choose the focus and the level of thoroughness.

The third section focuses on teaching methods, to which is dedicated the **sixth** chapter of the present manual.

The training action suggests some methodologies of the cooperative approach, according to a choice that interprets the instructions of the MIUR (MIUR, 2009) and of the study group of the project CSCT (Sleur, 2008), illustrated and put into effect within the Active Learning approach.

In this section, the Square of sustainability and the Triple helix model are suggested like training tools (**chapter 7**).

Practical exercises in subgroups are the cornerstones of this section; the direct use of cooperative approach and its training tools allows to experiment its methodological potential.

The fourth section is the final step and the synthesis of all the elements proposed, acquired and elaborated in the previous phases, through the working out of the project work.

Participants in the training action in fact, working again in subgroups develop a a project work which suits appropriately to the needs of target group.

Some examples of training courses, already completed as part of educational interventions for **schools** and of training for **companies and public administrators**, can support the designing activity.

The end of this section is characterized by a group analysis about the project works; this moment has a double meaning in itself, on both training and evaluation levels.

It represents one the steps of the evaluation process: self and hetero evaluation.

In the proposal of the NJ ESD COM project, competences are identi-

fied according to the Training System of Regione Toscana, which defines them through knowledge and skills.

The evaluation of knowledge and skills, uses tools and evaluation methodologies referring to the assumptions and methodological choices developed in the **eighth chapter** to this manual.

9.2 DELIVERING AND SCHEDULING MODES

Below is the development of the programme according to a *standard model*

1. The proposal is organized as follows:

Table 9.1 - *Timing and modules organisation*

Section	Modules	Contents	Methodological observations	Time (hours)
I	I a) Sustainable Development, the historical evolution of the concept	What is Sustainable Development? The historical evolution of the concept Principal national and international documents on Sustainable Development	The contents are developed by alternating presentations with discussions. The verification of learning is achieved by means of Self-Assessment Questionnaires (SAQ).	2
	I b) The Pillars of Sustainable Development	Environmental aspects	The contents are developed by alternating moments of presentations with moments of discussion. The themes are introduced by means of the educational tool: "The Square of Sustainability" as a representative grid of the realities examined. Learning achieved is verified by means of a Self-Assessment Questionnaire (SAQ).	2
		Economic aspects		2
		Social aspects		2
		Cultural aspects		2
II	Sustainable Development in national and international documents and legislation.	IIa) Sustainable Development in Interministerial Programs and Documents: MATT-MIUR	The study of documents and themes is performed by alternating lectures with group work. The use of the Sustainability Scheme and the Triple Helix model as a grid for the reading of documents and the study of themes. Learning achieved is verified by means of Self-Assessment Questionnaires (SAQ).	4
		IIb) The Green Economy in Italy and Europe: norms and information		4
		IIc) Alcuni modelli di governance per la sosteniblità: patto dei Sindaci; rete delle agende 21; Green Cities; Smart Cities.		4
		IId) Regional, National and European financing for the support of: · eco-innovation; · the reduction of greenhouse gases; · saving energy; · the installation of production implants by FER; · the social responsibility of businesses	The testing of competences occurs by means of Observation Grids (OG).	4

III	Educational methodology and training tools	IIIa) Principles of active learning	The theoretical-practical principles are shared with course members by means of practical exercises	4+ 4 4+ 4
		IIIb) Methodologies of Active Learning and Cooperative Learning	Learning achieved is verified by means of Self-Assessment Questionnaires (SAQ). The testing of competences occurs by means of Observation Grids (OG).	(for further study)
		IIIc) The teaching of competences	The theoretical-practical principles are shared with course members by means of practical exercises.	2
		III d) The use of the models: Sqare of Sustainability and Triple helix	Learning achieved is verified by means of Self-Assessment Questionnaires (SAQ). The testing of competences occurs by means of Observation Grids (OG).	4 4
IV	The programming of a training course	IVa) Some samples of Sust. Dev. educational proposal for Schools; Public Authorities and Business	Analysis of the proposed exemples are made using the Square of Sustainability and Triple helix model. The testing of competences occurs by means of Observation Grids (OG).	2
		IVb) Project work Elaboration: Exercices in small groups	The trainee, in small groups, use the techniques and principles illustrated inthe previous lessons, to elaborate a traning action shaped on the need of the final users. The testing of competences occurs by means of observation grids (OG) and Evaluation Grids of the Project Work (EG PW).	6
		IV c) Analysis and Evaluation of the Project work elaborated;		2

Starting from the structure shown, training courses were done for teachers of high schools and primary schools tested in the NJ ESD COM project, and made up of the composition of modules defined on the basis of the needs expressed by **teachers.**

Similarly, the training workshop for **enterpreneurs** and **public administrators** was planned and implemented.

The testing phase carried out under the has NJ ESD COM project has highlighted some aspects, that will bring out the following points of attention for trainers:

▶ for the development of the competences identified, facing with a mastery of basic content in terms of Sustainable Development, a high effectiveness is to be attributed to the group and internal dynamics management, through teaching and tools inspired by active and cooperative approaches;

▶ for the delivery of training addressed to adult workers, great effectiveness is due to the approach to the issues of Sustainable Development through the discussion of sector questions of specific interest.

It is to be recommended to design training workshops in collaboration with sector experts, with their possibly testifying in the classroom; the commitment required by the integration of the activities of the two professional resources, teacher and sector expert, results in an increase of responsiveness of the training to the needs of the target group.

CONCLUSIONS

The term "Sustainable Development" has become more and more familiar, but what exactly does that mean? How do production and consumption affect sustainability? Economic globalization is an advantage or a drawback to Sustainable Development? Is it possible to measure sustainability through the traditional tools of economic analysis? What can governments, businesses and citizens do to promote it?

Although the issue is usually referred to natural environment, sustainability actually means using development to promote a fairer society, while respecting ecosystems and natural resources, through choices that citizens and governments are increasingly led to carry out.

Read carefully these data (from Tracey Strange, Anne Bayley, 2008; Monika Dittrich et alii, 2012):

– a billion mobile phones are sold each year and an average user changes mobile every 18-24 months;
– worldwide, a person uses on average (data 2008) about 10 tons of resources per year, 1.6 tons more than in 1980;
– in Europe the average is around 15 tons per year, in rich countries that are oil exporters it can reach 100 tons, in Bangladesh the average per capita reaches 2 tons per year;
– world consumption of materials has almost doubled in the period from 1980 to 2008, increasing by nearly 80%, and it has risen from 38 billion tons in 1980 to 68 in 2008;
– nowadays the economic system depends greatly from the input of natural resources;
– at the moment resources from the planet's natural systems are extracted at the highest level that has ever occurred throughout the history of mankind;
– 2,400 litres of water are needed to make a hamburger;
– one in five people lives in absolute poverty in developing countries.

In front of the need of the international community of a new economic policy based on sustainability, the report of the **High Level Panel on Global Sustainability** (UN, 2012) states that "the lack of political will to implement Sustainable Development comes from the matter that the issue of Sustainable Development has not been incorporated into the mainstream of political and economic debate, and that most decision makers consider Sustainable Development as alien to their responsibilities."

What does being responsible mean literally? The composition of the word response-ability, expresses the ability to give appropriate responses to situations, events, people, then, it means being able to act, to respond effectively to the needs in different situations.

While new technologies have led to a huge growth of man's powers, even allowing to make interventions on the edge of legality, for the first time in the history of mankind, human actions lead to irreversible consequences on a global level.

All this requires to evaluate the overall profitability of certain actions and to reflect on the legitimacy of practices that endanger the balance of the planet, as we know it, and the life of man.

For the common good and in his own interest, man must now face the issues raised by the great historical, cultural and scientific changes that feature the present complex society.

Ethics may be the intangible strategic resource to identify values and rules that guide man to act, identifying principles whose effectiveness lies in its being shared and carried out by as many people as possible.

If one considers that we live in a global world, where the contact between different cultures is becoming more and more frequent and massive, and the meeting could turn into a daily battle, in which the globalization of economy, technology, communication also involves the globalization of problems, it is not only desirable, but it is necessary a cross-party consensus, shared values, attitudes and fundamental criteria.

Humanity can no longer do without a common code of ethics, principles for a worldwide ethics, shared at all levels, individual and social, that permeates across systems that guide choices and actions dealing with production, education and governance.

The theory of *shared value creation* (Porter & Kramer, 2011) states that they are not the conventional economic needs that define markets, but the needs of society. One of the necessary steps becomes therefore a

reconciliation between the production system and society through the creation of shared value, where the creation of economic value matches to social needs.

Alongside the concept of social responsibility of the entrepreneur and the individual firm, it is fundamental the social responsibility of the territory.

The promotion of development that is sustainable in fact requires the involvement of all key players operating on a local area: businesses, trade associations, non-profit organizations, professional associations, universities, schools, local institutions, which, sharing good practice and a widespread attitude of attention and active application to the issues of Sustainable Development, become synergistic levers of change.

Subjects and interests converge well to increase the social capital, as well as the economic capital of communities, and promote a development that turns into welfare for all citizens and not for just a few.

The productive system will be required greater foresight and breadth of view, namely a capacity to care for a not immediate future and for what happens around a neighbourhood that is local and global together.

Foresight and responsibility that are increasingly recognized and rewarded by the market and by the systems of governance, also through strict laws and rules of behaviour on environmental compatibility, the taxation of annuities, the financial crime that penalize shortsighted, irresponsible, or even predatory behaviours by the traders.

A different role of businesses in society, a new way of doing business therefore becomes every day more necessary, even for the survival of companies.

A company, whose social responsibility makes it careful to its profit and to choices that generate development and welfare, creates a constructive relationships with the outside world, i.e. with society and public administrations, becoming more able to create value and to compete.

Beyond broad considerations of cultural and social order, it is now established that the so-called "eco-industry", i.e. those productive activities ranging from renewable energy to water management, waste, seismic and hydro-geological risk to urban mobility , is now a major business enterprise, also in terms of profit, worldwide and in Europe.

According to the data from the European Environmental Agency relating to 2011, the eco-industry in recent years has increased its revenue with an annual nominal growth rate of 8.3% and a value which represents 2.5% of European GDP.

The Green economy is proving a real driving force for economic recovery because it can enable immediately employment and investment.

For the same investment, in fact, in these sectors more jobs and increased domestic demand will be generated, as well as a real environmental benefit.

For example, data of the **European Environment Agency** (EEA, 2011) report that, in the waste sector, an increase of 20% in recycling involves the creation of 15,000 permanent jobs; in the management of hydro-geological risk, an investment in works of environmental renovation generates 10% occupancy more than an equal amount of work accomplished through conventional works; in the management of water resources, saving and efficiency interventions generate, for the same investment, 30% of employees more than traditional interventions.

As shown from the **World Happiness Report** (J. Helliwell et alii, 2012), although material prosperity is certainly important, it is far from determining the welfare of a society on its own.

While the standard values of living are essential to happiness, once guaranteed their basic levels, one may find that there is more happiness thanks to the quality of human relationships than to the increase of income.

It's not just wealth to make a people happy, but a mix of political freedom, strong social connections and absence of corruption.

At the individual level, good physical and mental health, job security and good family relationships are crucial to the level of happiness.

This topic is a central theme for the future of us all, and is closely linked with the possibility of being able, with urgency, to build a new development model.

Everyone, in this difficult ethics path, must therefore find a role, which correspond to different responsibilities, individual and social.

The Plan of Action adopted at the Second Summit of Heads of State and Government of Member States of the Council of Europe (Strasbourg, 10-11 October 1997), calls the urgency of greater individual awareness of rights and responsibilities, awareness that is acquired in various contexts throughout life, from family to school, from workplace to politics and non-governmental organizations, from community to media.

It is important to emphasize that shared values, the basis for a global ethic, should be explored and experienced since childhood and in view of life long learning, remarking the centrality of education and training systems as key lever of change.

Abiotic: A non living component of an ecosystem e.g. sunlight

Agenda 21: A framework of political recommendations designed to protect the environment and encourage nations to move towards achieving sustainable development in the 21st Century.

Anthropogenic: Produced by human activity

Available biological capacity: The quantity of biologically productive space available for human use.

Biodiversity responsibility: The amount of biologically productive area a nation would need to set aside in order for global biodiversity to be maintained. A figure of 12% is generally accepted as the minimum requirement.

Biodiversity: The variety of life in all its forms, levels and combinations. Includes ecosystem, species and genetic diversity.

Biofuel: A fuel produced from dry organic matter or combustible oils produced by plants. Examples of biofuel include alcohol (from fermented sugar), bio diesel from vegetable oil and wood.

Biological capacity: The total annual biological production capacity of a given biologically productive area.

Biological productivity: A measurement of biological production of a given area over a given time period. A typical indicator of biological productivity is the annual biomass accumulation of an ecosystem.

Biologically productive area: The land and water area that is biologically productive.

Biomass: The total mass of all living organisms within a biological community.

Biosphere: The part of the earth and its atmosphere in which living organisms exist or that is capable of supporting life.

Biotic: The living components of an ecosystem.

Carbon dioxide: (CO_2) A greenhouse gas produced through respiration and the

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1   Adapted from: **http://www.esd.rgs.org/glossarypopup.html**

decomposition of organic substances. Combustion of fossil fuels is primarily responsible for increased atmospheric concentrations of this gas.

Carbon footprint: A representation of the effect human activities have on the climate in terms of the total amount of greenhouse gases produced (measured in units of carbon dioxide).

Carbon sequestration: Refers to the process by which atmospheric carbon is absorbed in to carbon sinks such as the oceans, forests and soil.

Carrying capacity: The total population an area is able to support given the quality of the natural environment and the prevailing technology available.

Consumption: All the goods and services used by households.
Corporate

Corporate social responsibility (**CSR**, also called **corporate conscience**, **corporate citizenship**, **social performance**, or **sustainable responsible business/ Responsible Business**) is a form of corporate self-regulation integrated into a business model. CSR policy functions as a built-in, self-regulating mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. The goal of CSR is to embrace responsibility for the company's actions and encourage a positive impact through its activities on the environment, consumers, employees, communities, stakeholders and all other members of the public sphere who may also be considered as stakeholders.

CSR is titled to aid an organization's mission as well as a guide to what the company stands for and will uphold to its consumers. Development business ethics is one of the forms of applied ethics that examines ethical principles and moral or ethical problems that can arise in a business environment. ISO 26000 is the recognized international standard for CSR. Public sector organizations (the United Nations for example) adhere to the triple bottom line (TBL). It is widely accepted that CSR adheres to similar principles but with no formal act of legislation. The UN has developed the *Principles for Responsible Investment* as guidelines for investing entities.

Ecological deficit: The amount by which the ecological footprint of a country or region exceeds the biological capacity of the space available

Ecological footprint: The area of land and water required to support a defined economy or human population at a specified standard of living indefinitely, using prevailing technology.

Ecosystem: The system of interactions between living organisms and their environment.

Embodied energy: The energy used during the entire life cycle of a commodity i.e. manufacture, transportation and disposal.

Energy efficiency: The more efficient use of energy in order to reduce economic costs and environmental impacts. Using less energy/electricity to perform the same function.

ESD – Education for Sustainable Development: enables people to develop the knowledge, values, skills anc competences to participate in decisions about the way that we do things indi-

vidually and collectively, both locally and globally, that will improve the quality of life now without damaging the planet for the future.' The National Curriculum, 1999

1992: Education for sustainable development was first described by Chapter 36 of Agenda 21. It has developed from a mixture of environmental and development education ideas.

1998: The Government Sustainable Development Education Panel (SDEP) was formed to consider how schools could best actively promote ESD to ensure young people obtain the knowledge and skills to be 'active citizens for the new millennium'.

2000: The revision of the National Curriculum recognised the work of the panel and the profile of ESD increased. ESD was made a statutory requirement in the subjects of geography, science, design and technology and citizenship, and opportunities were also identified in subjects across the curriculum. Schools were asked to promote sustainable development ensuring students develop an 'awareness and understanding of, and respect for, the environments in which they live, and secure their commitment to sustainable development on a personal, national and global level'.

In order for the complex underlying theory of ESD to be understood by both teachers and students it was broken down in to seven identifiable key interrelated concepts as proposed by the Government Sustainable Development Education Panel. These are:

– Interdependence
– Citizenship and stewardship
– Needs and rights of future generations

– Diversity
– Quality of life
– Sustainable change
– Uncertainty and precaution

2002: The Qualifications and Curriculum Authority (QCA) started to produce curriculum guidance for schools where each of these key concepts was explained. This can be viewed online at http://www.nc.uk.net/esd/gq2.htm

2003: The government set out its long term aims for ESD in Learning to Last which was the culmination of the SDEP's work to date. The strategy covers all aspects of education. The key objective with relation to the statutory education system is to ensure schools have 'the professional capacity and the resources to develop knowledge, skills and aptitudes that enable all citizens to engage in the achievement of sustainable development'.

The Office for Standards in Education (Ofsted) published a report summarising findings from the inspection of a number of schools specifically focussing on ESD.
The report, Taking the first step forward: towards an education for sustainable development, used the seven key concepts identified by the SDEP as its focus and highlighted examples of good practice observed during inspections over an eleven month period (April 2002 to March 2003). The full report can be accessed at: http://www.ofsted.gov.uk/publications/docs/3389.doc

2005 to 2015: Has been declared the Decade of Education for Sustainable Development by the United Nations (UN).

Finite: Limited or restricted in nature.
Food Miles: The number of miles food produce travels from 'plough to plate',

that is from the place of production to consumption.

Fossil fuel: A naturally occurring fuel rich in carbon and hydrogen formed by the decomposition of pre historic organisms. Fossil fuels include coal, natural gas and fuels made from crude oil such as petrol and diesel.

Fuel economy: The number of miles driven divided by the number of gallons consumed.

Global hectare: One hectare of biologically productive space adjusted to world average biomass productivity allowing meaningful comparisons across regions to be made.

Greenhouse gases: Those gases present in the atmosphere that trap heat from the sun and warm the earth. Such gases include carbon dioxide, methane, water vapour, nitrous oxide, ozone and halocarbons.

Hectare: One hectare (Ha) is equivalent to 10, 000 square metres (100 x 100). This is approximately the same size as full size football pitch.
It 'a method of analysis that evaluates a set of interactions that a product or service has with the environment, considering its entire life cycle that includes pre-production points (therefore extraction and production of materials), production, distribution , use (and therefore reuse and maintenance), recycling and final disposal. LCA is internationally recognized through a number of ISO rules (International Organization for Standardization).

Landfill: Essentially a cavity in the ground in to which refuse is disposed of. Once full this is covered over and landscaped so as to appear as part of the surrounding area.

Life Cycle Assessment (LCA)

Lifestyle: A person's pattern of living as expressed in his or her activities, interests, and opinions.

LPG: Liquid Petroleum Gas.

Methane: (CH_4) A colourless, odourless gas formed when organic matter anaerobically decomposes. Methane is about 20 times more effective than carbon dioxide as a greenhouse gas. Major sources include fermentation in ruminant animals, decay of organic material in rice paddies and landfill.

Non-renewable resource: A resource that is not replaced or only replaced very slowly by natural processes.

Overshoot: The point where human consumption and waste production exceed nature's capacity to create new resources and absorb waste.

Per capita: For each person. Per head.

Recycling: The process by which discarded materials are collected, sorted, processed and converted in to raw materials which are then used in the production of new products.

Renewable resource: A natural resource that can be replaced

Resource: A new or reserve supply that can be drawn upon when needed.

Sustainability: Sustainability is effectively the goal of sustainable development.

Sustainable Development: Has been defined as 'Development which meets the needs of the present without compromising the ability of future generations to meet their own needs'.

The term "corporate social responsibility" came into common use in the late 1960s and early 1970s after many multinational corporations formed the term stakeholder, meaning those on whom an organization's activities have an impact. It was used to describe corporate owners beyond shareholders as a result of an influential book by R. Edward Freeman, *Strategic management: a stakeholder approach* in 1984. Proponents argue that corporations make more long term profits by operating with a perspective, while critics argue that CSR distracts from the economic role of businesses. Others argue CSR is merely window-dressing, or an attempt to pre-empt the role of governments as a watchdog over powerful multinational corporations.

Ton: One metric ton is equal to 1000 kilograms, approximately the weight of a small family car.

Triple bottom line: An expanded baseline for measuring performance, adding social and environmental dimensions to the traditional monetary benchmark.

APPENDIX

A) BEST PRACTICES

A1 Case studies:

A.1.1 Education and Training
– LEA Finoria: a Laboratory for Education for Sustainable Development in Tuscany. The educational proposals
– The Legambiente educational proposal: Energy Management
– ITIS A. Monaco (Cosenza): A technical High school suited for Sustainable Development
– Project Sistema Cittadella of Students, Grosseto

A.1.2 Companies
– Corporate Social Responsibility, CSR (It)
– GAIA – The intelligent engine for the real differentiated waste collection
– Entròpia: a young Italian business for the energetic efficiency
– CRIT (Centro Ricerca ed Innovazione Tecnologica): building nets for green innovation
– Alnarp Cleanwater (Sweden): a phyto depuration innovation: phosphorum recovery
– Park of Taste in Tuscany high Maremma (It)

A.1.3 Public Authorities
– More about Green Economy: Italian and European Best Pratices (It)
– *Malmö and the Green Revolution:*
– Malmö, Presentation of the city and his Green revolution
– Malmö, Clean Tech, for young and clean Business
– Malmö, Sustainable Business Development
– Hambourg and a Green Urbanistic revolution : the IBA Project
– A trip report from NJ ESD COM partner countries

- The Covenant of Mayors: a European agreement for the Green House Gases reduction
- Capannori (Lucca): a Council with the goal of zero impact (It)
- Parco Archeologico Tecnologico Colline Metallifere Grossetane: "Geodiversity and history as a lever for sustainable tourism
- Sustainable Tourism: a general overview (It)
- Sustainable Tourism and web 2.0: the experience of the Province of Grosseto (It)

A2 - Data Bases

A.2.1 DB Education and Training

A.2.2 DB Companies

A.2.3 DB Public Authorities

B) PAPERS AND SLIDE PRESENTATIONS LINKED IN THE DIGITAL VERSION

Papers Introduction:
- **doc intro I 00:** UNIONE EUROPEA. RACCOMANDAZIONE DEL PARLA-MENTO EUROPEO E DEL CONSIGLIO del 18 dicembre 2006 relativa a *Competenze chiave per l'apprendimento permanente* **(2006/962/CE)**
- **doc intro I 1:** UNIONE EUROPEA - COMUNICAZIONE DELLA COMMIS-SIONE - *COM(2001)264 definitivo*. *Sviluppo sostenibile in Europa per un mondo migliore: strategia dell'Unione europea per lo sviluppo sostenibile (Proposta della Commissione per il Consiglio europeo di Göteborg).* Bruxelles, 15.5.2001
- **doc intro I 2:** UNIONE EUROPEA - COMUNICAZIONE DELLA COMMIS-SIONE AL CONSIGLIO E AL PARLAMENTO EUROPEO – COM(2005) 658 definitivo. *Sul riesame della strategia per lo sviluppo sostenibile, una piattaforma d'azione.* Bruxelles, 13.12.2005
- **doc intro I 3:** UNIONE EUROPEA COMUNICAZIONE DELLA COMMIS-SIONE - COM(2010) 2020. *EUROPA 2020 Una strategia per una crescita intelligente, sostenibile e inclusiva.* Bruxelles, 3.3.2010
- **doc intro I 4:** CNEL - INDAGINE SULL'IMPATTO DELLE POLITICHE DI MITIGAZIONE DEI CAMBIAMENTI CLIMATICI SUL SISTEMA PRODUT-TIVO E SULL'OCCUPAZIONE IN ITALIA *La valutazione degli impatti economici e occupazionali del pacchetto europeo del 20-20-20 in Italia: una proposta metodologica applicata ai comparti della produzione eolica e fotovoltaica*

– **doc intro I 0:** SLEUR, W. (Ed.) (2008)*. Competencies for ESD (Education for Sustainable Development) teachers . A framework to integrate ESD in the curriculum of teacher training institutes.* **Brussels: CSCT** Project: Comenius 2.1 project 118277-CP-1-2004-BE-Comenius-C2.1

PART I: BACKGROUND AND CONDITIONS OF THE TRAINING ACTION

Slides ch.1 The educational challenge in the complex society
– (9 HT) ESD: sociological and pedagogical aspects

Papers ch. 2 Competences in Education for Sustainable Development
– doc 2.1: OECD (2005) *The definition and selection of key competencies Executive Summary*
– doc 2.2.: DELORS, Jacques (1996) *Learning – The treasure within; report to UNESCO of the international commission on education for the Twenty-first Century*
– doc 2.3: McKEOWN, R. (2002): *Education for Sustainable Development Toolkit*
– doc 2.4: DELORS J. (1995) *Libro bianco su Istruzione e Formazione. Insegnare e apprendere. Verso la società conoscitiva.* Bruxelles: Commissione europea
– doc 2.5: *The competences in the vocational, education and training system of Regione Toscana* (R. Marchi) (It)

PART II: THE TRAINING ACTION

part II a: THE CHARACTERISTICS OF THE TRAINING ACTION

Papers ch. 3 The characteristics of the training action
– doc 3.0.: UE (2009). *Raccomandazione del Parlamento europeo e del Consiglio del 23 aprile 2008 sulla costituzione del Quadro europeo delle qualifiche per l'apprendimento permanente – EQF.* On line available: **ec.europa.eu/education/pub/pdf/general/eqf/broch_it.pdf**
– doc 3.2: Ministero dell'istruzione, Università e Ricerca MIUR: *Direttiva ministeriale n. 90 1° dicembre 2003, sull'accreditamento di soggetti emittenti formazione e sul riconoscimento di corsi*

Slides ch. 3:
– (HT 19) The competences in the vocational, education and training system of Regione Toscana: the procedure for introducing new competences (It)

part II b: THE CONTENTS, A COMMON LANGUAGE

Papers ch. 4. Sustainable Development
– doc 4.1: MEADOWS Donella H., MEADOWS Dennis L., RANDERS Jorgen, BEHRENS III William W.(1972). *The Limits to Growth.* New York, Universe Books
– doc 4.2: - WCED (World Commission on Environment and Development) (1987). *Report of the World Commission on Environment and Development: Our Common Future.* Oxford: Oxford University Press
– doc 4.3: - MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE – MINISTERO DELLA PUBBLICA ISTRUZIONE – MINISTERO DELL'UNIVERSITÀ E DELLA RICERCA (2008). *Accordo Interministeriale circa l'educazione Ambientale e allo Sviluppo Sostenibile [Inter Ministerial Statement, Ministry of Environment, Land and Sea – Ministry of Education – Ministry of University and Research]*
– doc 4.4 - MIUR (2009). *Linee Guida per L'Educazione Ambientale ed allo Sviluppo Sostenibile [Guidelines for Environmental Education and Sustainable Development]*

Slides ch. 4:
– 2 HT Sustainable Development: definition and documents

Papers ch. 5. The Dimensions of Sustainable Development
– doc 5.0: UNESCO (2005). *Convention on the Protection and Promotion of the Diversity of Cultural Expressions* 2005 Paris, 20 October 2005
– doc. 5.15: EVANS, Alex (2010). *Resource Scarcity, Climate Change and the Risk of Violent Conflict.* New York: Center on International Cooperation New York University
– doc 5.1: FAO (2011c). *SOLAW: the State Of the worlds Land and Water Resources for food and agriculture: Managing systems at risk.* Summary report
– doc 5.2. FAO (s.d.) *The State Of the worlds Land and Water Resources: data*
– doc 5.3: FAO (2011b) *Save and Grow. A new paradigm for agriculture.* (Flyer) Roma: FAO
– doc 5.4: FAO (2011a). *Save and Grow. A policymaker's guide to the sustainable intensification of smallholder crop production.* Roma: FAO
– doc 5.5: UN Secretariat of the Convention on Biological Diversity. (2000) - *Sustaining life on Earth. How the Convention on Biological Diversity promotes nature and human well-being*
– doc. 5.6: MATTM (2010). *La strategia nazionale per la biodiversità; National Strategy for Biodiversity*
– doc 5.7: UN (1998). *The Kyoto protocol*

– doc 5.8: UNEP (2009). ***Global Green new Deal. Policy brief***
– doc. 5.81:UNEP (2011a). ***Towards a Green Economy, Pathways to Sustainable Development and poverty eradication.*** St. Martin-Bellevue: UNEP.
– doc 5.81b: UNEP (2011b). ***Towards a Green Economy. A Synthesis for Policy makers*** St. Martin-Bellevue: UNEP
– *doc 5.82:* RONCHI, Edo (2010) ***Gli Strumenti per lo sviluppo della Green Economy.*** In <u>Alfabeta 2</u>, numero 05, dicembre 2010. Milano: alfabeta edizioni (**Development Tools in the Green Economy)**
– doc 5.83: OCSE/OECD (2011). ***Verso una crescita verde Una sintesi per i responsabili politici; Towards Green Growth: a summary for policy makers***
– doc 5.84: OSCE/OECD (2011) **Your Better Life Index - COUNTRY NOTES**
– doc 5.85: Amm.ne Prov.li di Siena e Grosseto (2011). Progetto "RinnovAmbiente Azioni Formative per lo sviluppo delle energie rinnovabili e la compatibilità ambientale" *P.O.R. Obiettivo 2- 2007 - 2013 Regione Toscana Asse V Transnazionalità e Interregionalità: **Report viaggio di scambio in alta Provenza***
– doc 5.86: UNIONE EUROPEA (2012). COMMISSION STAFF WORKING DOCUMENT ***Exploiting the employment potential of green growth*** *Accompanying the document* COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Towards a job-rich recovery SWD(2012) 92 final
– doc 5.87a: CEDEFOP (2010). ***Skills for green jobs EUROPEAN SYNTHESIS REPORT***
– doc 5.87b: EACEA – Education, Audiovisual and Culture European Agency (2010) ***New Skills for New Jobs Policy initiatives in the field of education: Short overview of the current situation in Europe*** November 2010
– doc 5.87c: - BUSINESS EUROPE (2010). ***Greening the economy – Taking on employment and skills challenges***
– doc 5.87d: ILO, International Labour Organization (2010). ***Skills for Green Jobs. A Global view.*** Génève: ILO
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– doc 5.89: - EWEA (2012). ***Green Growth The impact of wind energy on jobs and the economy. a report*** *by the European Wind Energy Association*
– doc 5.9: UN (1948). ***The Universal Declaration for Human Rights***
– doc 5.10: UN (1966). **International Covenant on Economic, Social and Cultural Rights** (ICESCR)

- doc 5.11: UN (1966). **International Covenant on *Civil and Political Rights***
- doc 5.12: UN (2000). Resolution adopted 18th Sept. 2000 by the General Assembly ***United Nations Millennium Declaration***
- doc 5.13: Gates foundation (2010) ***Millennium Development Goals Report Card:*** Measuring progress across countries
- doc 5.14: UNESCO (1998). ***Action Plan on Cultural Policies for Development*** adopted by the Intergovernmental Conference on Cultural Policies for Development. Stockholm, Sweden, 2 April 1998
- doc. 5.01:UNESCO (1998). ***Final report of Intergovernmental Conference on Cultural Policies for Development: the power of culture.*** Conference venue Stockholm, 30 March–2 April. Editore Paris: UNESCO
- doc 5.02:WORLD COMMISSION ON CULTURE AND DEVELOPMENT *(1996). **Our Creative Diversity.*** Paris: UNESCO

Slides ch.5:
- 3 HT Biodiversity
- 4 HT Climate Change
- 2HT Sustainable Development: Definition and Documents
- 5 HT Green Economy Introduction
- 8 HT Italian Green Revolution

part II c: METHODOLOGY

Slides ch. 6 Teaching and learning methodology
- 15b HT Cooperative Learning (It)

Papers ch. 7 The Training tools
- doc 7.1: -MIUR (2010). ***Schema di regolamento recante norme concernenti il riordino degli istituti professionali*** ai sensi dell'articolo 64, comma 4, del decreto legge 25 giugno 2008, m. 112, convertito dalla legge 6 agosto 2008, n.133
- doc 7.2: **Vademecum. *La riforma degli Istituti tecnici*** CTS: un'occasione da non perdere

Slides ch. 7:
- 15a HT Square of sustainability - INFIS
- 6e HT Øresund TripleHelixRegion
- 6a HT Malmö Introduction to the city green revolution
- 6b HT Malmö Cleantech
- 15c HT Project Sistema Cittadella of Students, Grosseto

Papers Ch. 9. The training action framework
– doc 9.1: UNESCO German Commission (2010)**. Delivering future capacity in the kindergarten**: giving children a stronger role, advancing Sustainable Development
– doc. 9.2: Programma del corso per Insegnanti (teachers training programme – It)
– doc. 9.3: Programma del corso per Imprenditori (entrepreneurs training programme – It)
– doc. 9.4: Programma del corso per Amministratori pubblici (public officer training programme – It)
– doc. 9.5: Intervento per docenti (Training for teachers - it)
– doc. 9.6: Intervento per Amministratori pubblici ed imprenditori (Training for public officers and enterpreneurs - it)

Conclusions
– doc conclusion C0: DITTRICH Monika, GILJUM Stefan, Stephan LUTTER & Christine POLZIN (2012). *Green economies around the world? Implications of resource use for development and the environment.*
– doc conclusioni C1: *UN (2012). **Resilient People, Resilient Planet: A future worth choosing**. Reporto from the High-level Panel on Global Sustainability, 30 January 2012 I, Addis Abeba.*
– doc conclusioni C2: *EEA (2011). **Earnings, jobs and innovation: the role of recycling in a green economy**. Report No 8/2011. Copenhagen.*
– doc conclusioni C3: *HELLIWELL John, Jeffrey SACHS & Richard LAYARD (2012). **World Happiness Report,** commissioned for the 2012, April 2nd United Nations Conference on Happiness.*
– doc conclusioni C4: *AA. VV (2011). **GreenItaly, L'economia verde sfida la crisi. Rapporto 2011,** Symbola e Unioncamere, Roma.*
– doc conclusioni C5: ***MICHELINI, Laura - FIORENTINO, Daniela (2011). Nuovi modelli di Business per la creazione di valore condiviso: il sociale e l'inclusive business.*** In IMPRESA PROGETTO: electronic journal of management. n.1, 2011.

C) WEB SITES SELECTION

Ministero Ambiente Italiano: **www.minambiente.it**
Ministero Politiche Agricole Italiano: **www.politicheagricole.it**
Ministero Attività Produttive Italiano (Italian Ministery for Economical Dev): **www.sviluppoeconomico.gov.it**
GSE (Public Italian Energy Managment Services): **www.gse.it**
TERNA (Trasmission Grid Managment): **www.terna.it** (It)
    http://www.terna.it/Default.aspx?tabid=101 (Eng)

RSE (Ricerca Sistema Energetico): **http://www.rse-web.it/home.page** (It)
Italian Sustainable Development Foundation: **www.susdef.org** (Eng)
Fondazione Sviluppo Sostenibile:
   www.fondazionesvilupposostenibile.org (It)
Regione Toscana settore Ambiente: **http://www.regione.toscana.it/am-
   bienteeterritorio/index.html**
Laboratorio di Educazione Ambientale La Finoria: **www.leatoscana.org**
Legambiente: **www.legambiente.it**
WWF: **www.wwf.it**
FAI: **www.fondoambiente.it**
Osservatorio Kyoto: **www.osservatoriokyoto.it**
Web site of this project: **www.njesd.com**
Carbon Foot print global Network: **www.footprintnetwork.org**
Every day Tip to be more sustainable (It): **http://www.gse.it/it/Energia-
   Facile/PillolediSostenibilita/Pages/default.aspx**

Web sites: Sustainable Agriculture:
– **www.futurefarm.eu**
– **www.guidaconsumatore.com**
– **www.retegas.org**
– **www.equalway.org**
– **www.greenme.it/mangiare/filiera-corta/1515-agricoltura-a-km-zero-
   i-vantaggi-di-fare-la-spesa-dal-contadinowww.greenme.it/man-
   giare/filiera-corta/1515-agricoltura-a-km-zero-i-vantaggi-di-fare-la-spe
   sa-dal-contadino**

D) FILMS AND DOCUMENTARIES SELECTION

The Story of Stuff (23', USA 2007): www.storyofstuff.com
   *When Annie Leonard and her friends at Free Range Studios set out in
   2007 to share what she'd learned about the way we make, use and
   throw away Stuff, they thought 50,000 views would be a good result
   for her '20-minute cartoon about trash.' Today, with over 15 million
   views and counting, The Story of Stuff is one of the most watched en-
   vironmental-themed online movies of all time.*
   *Annie founded the non-profit **Story of Stuff Project** in 2008 to respond
   to tens of thousands of viewer requests for more information and ways
   to get involved. We create short, easily shareable online movies that ex-
   plore some of the key features of our relationship with Stuff—including
   how we can make things better; we provide high quality educational re-
   sources and programs to everyone from teachers and people of faith to
   business and community leaders; and we support the learning and ac-
   tion of the over 350,000 members of the Story of Stuff community.*

Garbage Warrior (96', USA, 2007): www.garbagewarrior.com
> *is a 2007 film about architect Mike Reynolds, inventor of the Earthship style of building, directed by Oliver Hodge. It follows Reynolds' struggle with the legislature of Taos, New Mexico, the location of his experimental Earthship community, in order to be allowed to build homes that do not match the structures of local building codes. The film concludes with a postscript showing Reynolds and his team of builders travelling to the Andaman Islands in the aftermath of the Boxing Day tsunami to assist the locals with disaster recovery and teaching them how to construct extremely low-cost homes.*

A Farm for the future (48', England 2009):
www.youtube.com/watch?v=vJMgfKqKXwY
> *BBC documentary on the prescient global farming and food crisis, filmed in the UK. Topics covered are the influence of oil on the food production, peak-oil, food security, carbon emissions, sustainability and permaculture.*

Le Peuple Migrateur (The Migrant People) (96', 2001, France):
> *A Romantic and scientific story of the bird migration filmed all over the world.*
> *To follow the migration of birds Jacques Perrin has worked four years from one continent to another, deploying men and resources without skimping: pilots, gliders, birds and twenty specialists. The birds, according to the season, flying over the world, glaciers, sea, islands, mountains and rivers. Carried by the miraculous instinct, from that innate ability to understand the mysterious wind that will take them. And then, a year after the road retaliate. Perrin is not limited to the document, it takes imagination and emphasis.*

Microcosmos (The Grass People) (76', 1996 France):
> *Living in an unknown planet, a meadow, a jungle of grass where, hours and hours marvelous fierce, pulsating life of its inhabitants: ants, snails, ladybugs, bees, caterpillars, spiders, beetles, grasshoppers, butterflies. The insects are not only movies in times of conflict and mating (the easiest to record), but even in more normal movement and behavior. Anthropomorphism at Disney is not completely banned. There is the right size, just to remember that man is an animal species. Removed a few opening words, everything is given to images, sounds (marked here and there too), music by Bruno Coulais. Shot for three seasons in the beautiful Aveyron (Auvergne) by two directors-entomologists with a remote camera, equipped with a special device that allows a focusing unit with an accuracy to the millimeter. Results are often extraordinary: shooting the infinitely small open ports on a surreal and fantastical world.*

Darwin's Nightmare (107', Austria 2004):
> *Darwin's Nightmare is a 2004 Austrian-French-Belgian documentary film written and directed by Hubert Sauper, dealing with the environmental*

and social effects of the fishing industry around Lake Victoria in Tanza-nia. It premiered at the 2004 Venice Film Festival, and was nominated for the 2006 Academy Award for Documentary Feature at the 78th Academy Awards.The Boston Globe called it "the year's best documentary about the animal world."

Deep Blue (90', UK-Germany, 2003)

Deep Blue is a documentary directed by Andy Byatt and Alastair Fothergill. "[...] It's a jurney for the spectators, a journey that starts from the familiar face of the ocean, the beach... We want to tell people that this is only a very small portion, and take it further and further away in 'deep blue, the unknown ocean, down in the deep ocean, and make everyone understand that ours is a blue planet, a planet not only made of earth." (Alastair Fothergill, making Of)

Earth (96', USA, 2007)

Documentary shot by 30 cameramen, produced from 2 sections of the British BBC Greenlight Media, distributed by Walt Disney. Protagonists are animals that move from North to South, forced by climate change. The script is signed by Leslie Megahey with 2 directors whose purpose (explicit) is to surprise the viewer with images startling, bizarre, spectacular, decorated by music (George Fenton) that range from dramatic to comedic synchronously and pathetic. While evoked several times, the threats of climate change remains a vague background noise: the comment _ in Italy with the voice of Bonolis _ never takes place. Nothing to do with Olmi's Terra Madre.

WALL-E (86', USA, 2008)

In 2805, Earth is covered in garbage due to decades of mass consumerism facilitated by the megacorporation Buy 'N Large. BnL evacuated Earth's population in fully automated starliners in 2105, leaving behind trash compactor Waste Allocation Load Lifter – Earth Class "WALL-E" robots to clean the planet, but they eventually stopped operating and Earth was left abandoned. One WALL-E unit has managed to remain active by repairing itself using parts from other broken units. It has also developed sentience, as with its regular duties it inquisitively collects artifacts of human civilization back to its storage truck home, has befriended a cockroach and enjoys listening to Hello, Dolly!

One day, WALL-E discovers and collects a growing seedling plant. A spaceship later lands and deploys Extraterrestrial Vegetation Evaluator or "EVE", an advanced robot sent from the BnL starliner Axiom to search for vegetation on Earth. Inspired by Hello, Dolly!, WALL-E falls in love with the initially cold and hostile EVE and...

Inconvenient Truth (94', USA, 2006)

An Inconvenient Truth is a documentary film on the worldwide problem of global warming, directed by Davis Guggenheim, and which is leading

the former vice president of the United States of America, Al Gore. It is based largely on a multimedia presentation created by Gore and used by him for many years during its information campaign on climate change.

Capitalism: A Love Story (127', USA 2009)

American documentary film directed, written by and starring Michael Moore. The film centers on the late-2000s financial crisis and the recovery stimulus, while putting forward an indictment of the current economic order in the United States and capitalism in general. Topics covered include Wall Street's "casino mentality", for-profit prisons, Goldman Sachs' influence in Washington, D.C., the poverty-level wages of many workers, the large wave of home foreclosures, corporate-owned life insurance, and the consequences of "runaway greed". The film also features a religious component where Moore examines whether or not capitalism is a sin and if Jesus would be a capitalist. This theme is of course not serious but satirical, shining light on possible ideological contradictions among evangelical conservatives who support free market ideals.

The Corporation (145', Canada, 2003)

The Corporation is a Canadian documentary directed by Mark Achbar, Jennifer Abbott and Joel Bakan's book of the tract. The documentary examines the power that corporations (those corporations in America are called) in the world economy, their profits and the damage they create.

Surplus (durata:54', di Erik Gandini, Svezia, 2003)

This documentary by strong content and strong technical expertise reflects the contradictions of the modern world that materialize through the images of television, the faces of political leaders, in the symbols of consumerism, in clashes during the G8 in Genova, in the work of Indian workers and in the Cuba of Fidel Castro. The narration is mostly entrusted to John Zerzan, American anarchist intellectual, interviewed for the film. His radical stance led to consider the ideology of the black block, and he, while not declaring this, argues that "destroy banks and windows is not violence, is more violent to watch MTV svaccati gulping down food on the couch."

In fact, the comment is made stronger by the search technique, through which the documentary develops a rhythm that comes very close to the videoclip. The director has relied in large part to the potential of montage/editing and to the musical soundtrack, from which comes the real complaint. The rational approach in terms of sarcastic voices and images (much used in the recurrence) are the most effective way to highlight the absurdity of a world in which "20% of the population consumes 80% of resources."

The italian (living in Sweden) director explains the motivations that led

him to shoot this documentary and its content: "I will not give messages and do not take place, I'm a filmmaker, I want to understand the issues that are to everyone's attention. I was at the G8 summit in Genoa, I burned the Fiat 500, and tried to understand why someone have done. Davide Ferrario's film "The streets of Genoa" I saw that they had burnt my car because it was close to a Volvo. From there I tried to figure out, working through combinations, without having a prior claim. As regards the intervention of Zerzan, he was very helpful, you can contact him through the internet. He says of himself to be only one who has read and written much, refuses to be inspirational to someone. "

The Yes Men Fix the World *(90', USA, France, UK, 2008)*

Is a 2009 English language documentary film, DIRECTED BY Andy Bichlbaum Mike Bonanno Kurt Engfehr about the culture jamming exploits of The Yes Men. The film premiered in New York City and Los Angeles on October 23, 2009 and in other U.S. cities beginning on October 30. Due to the movie being sued by United States Chamber of Commerce, a special edition of the movie is distributed through bittorrent through VODO and other prominent torrent sites like The Pirate Bay and EZTV.
The film documents the following projects:

– US Chamber of Commerce and climate change
– Dow Chemical and Bhopal
– ExxonMobil Vivoleum
– Halliburton Survivaball
– HUD and post-Katrina public housing
– New York Times hopeful future edition

"Vallico e la valle del Serchio" (16'; Italia, 2011)

Fabbriche di Vallico is a small village in the Garfagnana (north Toscana). Nestled between the mountains of the Apuan Alps (Alpi Apuane), the village lives the typical depopulation of mountain communities.
The agricultural and pastoral activities are no longer appealing to the younger generation, who prefer to descend to the valley in search of a stable job.
The young but prolific documentary filmmaker Federico Santini, with this documentary, realised for the italian National TV Broadcast Rai Geo & Geo, tries to explain the green revolution and innovation that has characterized the administration of the area.
Recovering what was the characteristic of this valley, the exploitation of water, they're trying to give new value to the old traditions, thanks to the renovation of old mills and ironworks and the retrieval of traditional agricultural activities such as the cultivation of the chestnut (Castanea sativa).

In addition to the recovery and new development of ancient crafts, Fabbriche di Vallico is betting on innovation and new technologies.

The water was moving hammers and mills, today also gives clean energy, often through mini generators in flowing water, self-produced or improved by the inhabitants of the territory.

The children have an innovative schooling system, where they are in contact by internet and audio-video connection with other schools of the Region (Giglio Island, Amiata ..), while citizens are provided with a place where one can get free help and training for utilising on-line services, offered by local government.

In this way Fabbriche di Vallico in becoming a laboratory of innovation. The bet is to be able to provide people a better quality of life, without leaving their own territory.

Will it be the new frontier of technology to stop the exodus from the mountains?

Notes:

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PART II c - METHODOLOGY

CAP. 6 – TEACHING AND LEARNING METHODOLOGY

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