

Educational Paths towards Sustainability

Proceedings of 3rd World Environmental
Education Congress (3rd WEEC)

Edited by **Mario Salomone**

3

Training the trainers
Former les formateurs
Formare i formatori



WEEC
International Environmental
Education Network

Educational Paths towards Sustainability

*Proceedings of 3rd World Environmental Education Congress (3rd WEEC)
Torino (Italy), 2-6 October 2005*

*Actes du 3^e Congrès Mondial de l'Éducation Relative à l'Environnement
(3rd WEEC)
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SESSION 3 Training the trainers Former les formateurs Formare i formatori

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Consorzio per il Recupero degli Imballaggi

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MESSAGE FROM THE EDITOR

This volume is part of the series of texts that make up the *Acts of the 3rd World Environmental Education Congress - Educational Paths towards Sustainability*, held in Torino, Italy October 2nd - 6th 2006.

The *Acts* contain the texts which were sent in or which it was possible to gather in time and while it is obvious that no collection of materials could ever completely represent the richness and the atmosphere of an event of such dimensions and complexity in which the photographs and the videos that accompanied (or replaced) with sounds and images the words of the speakers and in which a major role was played by interpersonal communication and by the 'atmosphere' lived by the participants in the congress.

For further documentation reference can be made to the web site of the congress (www.3weec.org) and to the Permanent International Secretariat, which has its headquarters in Torino (www.environmental-education.org).

The *Acts* are composed of a general volume (published in two separate editions, one in English and French, and one in Italian) and of twelve themed volumes, one for each of the sessions that made up the congress. The general volume has been printed, while the themed volumes are only available in electronic form and can be downloaded from the congress web-site, they are also included on a DVD enclosed with the general volume.

Only the general volume, which contains the contributions from the two opening and closing plenary sessions have been translated into the three official languages of the congress. The contributions for the themed volumes have been left in the language in which they were presented.

It is important to note that many participants in the congress used a foreign language when preparing their papers and posters and this explains any linguistic errors that the reader may encounter, we apologise for these. The high quality of the texts and the variety of languages used made it impossible to thoroughly review all the material, therefore we preferred to leave to each author the responsibility for the style and/or formal precision of his/her work. The translations realised for the general volume were carried out under our responsibility.

Mario Salomone

AVANT-PROPOS

Cet ouvrage fait partie de la série de volumes constituant les *Actes du 3rd World Environmental Education Congress – Educational Paths towards Sustainability* qui s'est tenu à Turin (Italie) du 2 au 6 octobre 2005.

Les *Actes* réunissent les textes qui nous sont parvenus ou qu'il a été possible de récupérer en temps utile. Cela dit, aucune collecte de matériels ne pourra jamais rendre complètement la richesse et l'atmosphère d'un événement d'une telle envergure et d'une telle complexité, où les photos et les vidéos ont souvent accompagné (ou remplacé) par des sons et des images les mots des intervenants et où la communication interpersonnelle et l'«atmosphère» vécue par les congressistes ont joué un rôle fondamental.

Pour une ultérieure documentation, nous renvoyons à ce qui a été publié sur le site web du congrès (www.3weec.org) et du Secrétariat permanent international qui est justement situé à Turin (www.environmental-education.org).

Les *Actes* sont composés d'un ouvrage général (publié en deux éditions séparées, l'une en anglais/français et l'autre en italien) et de douze volumes thématiques, un pour chacune des sessions du congrès.

L'ouvrage général est publié sur papier tandis que les volumes des sessions thématiques sont uniquement publiés en format électronique, téléchargeables du site web du congrès et contenus dans un DVD joint à l'ouvrage général.

Seuls les textes de l'ouvrage général, qui contient les interventions des deux sessions plénières d'ouverture et de clôture, ont été traduits dans les trois langues officielles du congrès. Pour ce qui est des interventions des sessions thématiques, elles ont été laissées dans la langue, ou dans les langues, dans laquelle/lesquelles elles nous sont parvenues.

Un avertissement important concerne le fait que de nombreux congressistes ont souvent utilisé pour leur paper ou leur poster une langue différente de leur langue maternelle et ceci peut expliquer les fautes de langue éventuelles que le lecteur ou la lectrice pourra relever dans certaines interventions et pour lesquelles nous vous prions de nous excuser. La grande quantité de textes et la variété des langues utilisées rendaient toutefois impossible toute réélaboration minutieuse : nous avons donc préféré laisser à chaque auteur la responsabilité de l'élégance et de la précision formelle de ce qu'il avait écrit. En revanche, nous assumons la responsabilité des traductions réalisées pour l'ouvrage général.

Mario Salomone

AVVERTENZA DEL CURATORE

Questo volume fa parte della serie di volumi che costituiscono gli *Atti del 3rd World Environmental Education Congress – Educational Paths towards Sustainability*, tenutosi a Torino (Italia) dal 2 al 6 ottobre 2005.

Gli *Atti* raccolgono i testi che ci sono giunti o che è stato possibile recuperare in tempo utile, anche se ovviamente nessuna raccolta di materiali potrà mai rendere completamente la ricchezza e l'atmosfera di un evento di tale dimensione e complessità, in cui spesso le foto e i video hanno accompagnato (o sostituito) con suoni ed immagini le parole dei relatori e in cui un grande ruolo è stato giocato dalla comunicazione interpersonale e dalla "atmosfera" vissuta dai congressisti.

Per un'ulteriore documentazione si rinvia anche a quanto pubblicato nel sito web del congresso (www.3weec.org) e del Segretariato Permanente internazionale, che a sede proprio in Torino (www.environmental-education.org).

Gli *Atti* si compongono di un volume generale (edito in due edizioni separate, una in inglese e francese e una in italiano) e di dodici volumi tematici, uno per ciascuna delle sessioni in cui era articolato in congresso.

Il volume generale è edito su carta, mentre i volumi delle sessioni tematiche sono editi solo in forma elettronica, scaricabili dal sito web del congresso e inclusi in un DVD allegato al volume generale.

Solo i testi del volume generale, che contiene gli interventi delle due sessioni plenarie di apertura e di chiusura, sono stati tradotti nelle tre lingue ufficiali del congresso. Gli interventi delle sessioni tematiche sono invece stati lasciati nella lingua, o nelle lingue, in cui ci sono pervenuti.

Un'avvertenza importante è che molti congressisti hanno spesso utilizzato per il loro paper o poster una lingua diversa da quella materna e questo può spiegare gli eventuali errori di lingua che il lettore o la lettrice potrà trovare in alcuni interventi e di cui ci scusiamo. La grande quantità di testi e la varietà di lingue utilizzate ne rendevano però impossibile una rielaborazione a fondo: abbiamo quindi preferito lasciare a ciascun autore la responsabilità dell'eleganza e/o precisione formale di quanto scritto. Sono invece sotto la nostra responsabilità le traduzioni realizzate per il volume generale.

Mario Salomone

Sub-session 3.1

LEGAMBIENTE SCUOLA E FORMAZIONE. UNA ASSOCIAZIONE DI PROFESSIONISTI DELL'EDUCAZIONE AMBIENTALE.

Paola Bonis

Legambiente Scuola e Formazione

Se un'associazione ambientalista pensa l'ambiente non con una accezione prettamente “naturalista”, ma come tutto ciò che ci circonda, in un “mondo tutto attaccato”; se la definizione che diamo al termine educazione ambientale è “formazione di mentalità e competenze utili per lo sviluppo locale e globale sostenibile”, comprendiamo immediatamente che tale associazione non può astenersi dal farsi coinvolgere pienamente in tutto ciò che riguarda la scuola.

La ragione di questo percorso sta nella profonda convinzione maturata in Legambiente, secondo cui la qualità del sistema formativo nazionale è condizione indispensabile anche per la realizzazione di efficaci politiche ambientali, a garanzia di una società e di un futuro sostenibile. Non è sufficiente dire che non bisogna buttare la carta per terra: affinché ciò avvenga, bisogna che la volontà di non farlo nasca dall'acquisizione di un diverso punto di vista, da un vero cambiamento culturale.

Con l'intento di promuovere questo cambiamento è nato nel 1987 il settore scuola e formazione di Legambiente, con la consapevolezza che l'ambientalismo è uno strumento utile per tutto il Paese se sa interloquire con le politiche strutturali, se sa fare proposte che migliorano e rinnovano il Paese, se sa diffondere nella vita di tutti i valori della solidarietà e dell'equità sociale. Questo modo di fare educazione ambientale, il nostro, ha lasciato il segno, ha marcato la storia delle educazioni trasversali.

Fin dall'inizio si è puntato ad inserire l'educazione ambientale all'interno dell'attività curricolare, curando sia la relazione con le discipline ed il loro rinnovamento epistemologico che la cultura della complessità, individuando nel ruolo centrale dell'insegnante la garanzia dell'innovazione educativa e metodologica.

Nel 1997 Legambiente ha visto l'autonomia scolastica come progetto di rinnovamento profondo, culturale, professionale ed organizzativo, che poteva essere l'occasione per valorizzare i temi del curriculum di scuola, della progettazione partecipata e della relazione tra scuola e territorio.

Nel 2000 è nata Legambiente Scuola e Formazione, riconosciuta dal MIUR quale ente qualificato per la formazione del personale scolastico. Essa vuole valorizzare la forma associativa fra professionisti per contribuire al miglioramento della scuola e delle professioni coinvolte nei processi

educativi e formativi, partendo dal presupposto che la scuola ha un ruolo centrale nel formare un'identità e una cultura personale e collettiva.

Legambiente Scuola e Formazione quindi vuole essere un luogo di incontro, di riflessione, di scambio e di esperienza.

Per questo offre ai suoi soci:

- Attività di formazione in presenza e a distanza.
- Lavori di ricerca professionale ed epistemologica.
- Gemellaggi con altre realtà.
- Occasioni di dibattito politico e culturale.
- Consulenza per la realizzazione di progetti educativi.
- Materiali didattici e informativi.

Legambiente Scuola e Formazione associa insegnanti, educatori, formatori ed animatori del territorio e di gruppi giovanili e vuole rappresentare un luogo privilegiato per affrontare, dal punto di vista ambientalista, i nodi culturali dell'educare in un mondo che cambia, per affrontare, in chiave politico-culturale e professionale, le sfide quotidiane dell'istruzione e della formazione.

È una associazione nazionale articolata sul territorio tramite coordinamenti regionali, gruppi locali e Centri di Educazione Ambientale, crea sul territorio eventi che diano una visibilità concreta alle nostre idee in un sistema in cui troviamo al primo posto la "capacità di rete". Chi non sa stare in rete difficilmente potrà promuovere processi di sviluppo sostenibile; questa è una delle professionalità richieste ad un educatore ambientalista, un requisito fondamentale per la ricerca di sostenibilità ambientale, economica, sociale e relazionale.

Il ruolo educativo dell'associazione si esercita non solo attraverso le azioni svolte sul territorio, dalle campagne ai progetti educativi in senso stretto, che coinvolgono i cittadini, ma attraverso la stessa pratica associativa.

Alcuni progetti e Campagne di Legambiente sono pensati in specifico come rivolti alle scuole e agli ambiti formativi. *Clima e Povertà* è il progetto educativo che ha l'obiettivo di affrontare il problema del legame tra i cambiamenti climatici (aumento della desertificazione e dei fenomeni alluvionali) e la crescente povertà che colpisce soprattutto i paesi del sud del mondo.

Clima e Povertà inoltre testimonia l'impegno di Legambiente ad allargare gli orizzonti dell'agire attraverso la cooperazione e le azioni di solidarietà internazionale con/e verso altri paesi, nel rispetto delle risorse locali e delle identità culturali. Il progetto consente:

- Gemellaggi internazionali: il gemellaggio scolastico potrà essere attivato con paesi extraeuropei dove si sono consolidate attività, relazioni con le rappresentanze locali, gli abitanti, le scuole. Perseguendo obiettivi culturali, educativi, formativi si contribuisce a rafforzare i progetti esistenti in questi paesi.
- La settimana della solidarietà: è un'iniziativa attraverso la quale le scuole che aderiscono possono compiere un atto di solidarietà

concreto e utile, anche se apparentemente piccolo, sostenendo attraverso la raccolta fondi le attività previste a Cuba, Ecuador, Swaziland. La raccolta fondi può essere attivata attraverso l'organizzazione di piccoli eventi o attività didattiche, dentro o fuori la scuola, dove i ragazzi avranno un ruolo da protagonisti.

Tesori d'Italia è il progetto educativo sul tema della valorizzazione dei numerosi e diffusi “tesori” di cui l'Italia è ricca e che la rendono unica in tutto il mondo. Le scuole, attraverso il progetto *Tesori d'Italia* potranno coniugare pratiche educative innovative con l'impegno culturale e sociale a favore del territorio in cui operano. Il progetto prevede, tra l'altro:

- L'Atlante dei Tesori d'Italia: è la raccolta telematica dei tesori scoperti, studiati e valorizzati dalle scuole che aderiscono al percorso educativo Tesori d'Italia. È questa un'occasione per promuovere e valorizzare i tesori e i territori di cui l'Italia “minore” è ricca e per presentare i percorsi educativi elaborati dalle classi.
- La scuola adotta un comune: è rivolto alle scuole dei Piccoli Comuni e alle scuole di città con l'obiettivo, da una parte, di portare i bambini e i ragazzi che vivono nelle grandi città a contatto con la varietà e la diversità delle numerose realtà territoriali del nostro Paese e, dall'altra, facilitare il superamento dell'isolamento culturale che vivono i giovani dei Piccoli Comuni.

Con La scuola adotta un Comune è possibile avviare:

- Gemellaggi a distanza, attraverso i quali le scuole possono conoscersi, scambiarsi informazioni e notizie legate anche a temi didattici sui quali stanno lavorando.
- Gemellaggi con soggiorni educativi, attraverso i quali, le scuole di città visitano e scoprono le bellezze dei Piccoli Comuni. Tali visite si possono svolgere o in occasione dei viaggi di istruzione o in momenti successivi, anche estivi, con il coinvolgimento diretto delle famiglie.
- I comuni in festa: durante l'anno scolastico viene organizzata una giornata di festa nei Piccoli Comuni che apriranno le loro “porte” alle scuole italiane: sarà un'occasione da non perdere per riscoprire le bellezze naturali, storiche, culturali e ricreative di un'Italia spesso dimenticata e per favorire lo scambio e la socializzazione fra i ragazzi e la conoscenza di realtà diverse.

Le Classi per l'Ambiente

Sono composte da alunni e insegnanti interessati alle tematiche dell'ambiente e dello sviluppo sostenibile, impegnati a comprendere le problematiche relative al futuro del nostro pianeta e alla qualità del nostro territorio, disponibili al lavoro cooperativo, alle iniziative di cittadinanza

attiva, desiderosi di vivere in una scuola migliore che abbia legami, scambi e collaborazioni con gli altri soggetti presenti nel suo territorio. La rete di *Scuole Capaci di Futuro* ha l'obiettivo di fornire strumenti e materiali idonei ad affrontare i numerosi cambiamenti in atto nel mondo della scuola, attraverso lo scambio di esperienze, riflessioni, informazioni e proposte culturali e metodologiche:

- *Rete di scuole capaci di futuro*

La rete è un luogo e un mezzo di confronto e ricerca su obiettivi comuni, su progetti, su iniziative territoriali attraverso i quali la scuola assume un carattere di protagonista culturale in un rapporto dialettico con gli altri attori sociali del territorio.

- *La festa dell'albero*

I protagonisti di questo appuntamento sono i ragazzi che a migliaia, con le loro famiglie, ogni anno adottano aree verdi, mettendo a dimora piccole piante e curandole anche nei mesi a seguire.

- *Non ti scordar di me*

È una giornata di volontariato organizzata ogni anno nelle scuole con il patrocinio dell'Associazione Nazionale dei Comuni Italiani e dell'Unione delle Province d'Italia per migliorare le condizioni degli edifici scolastici e degli ambienti circostanti, coinvolgendo le famiglie e gli abitanti del quartiere. Ogni istituto che aderisce ha a disposizione un questionario per indagare lo stato di salute dell'edificio e un manuale operativo per organizzare la giornata.

- *100 strade per giocare*

È la manifestazione rivolta a tutti i cittadini, grandi e piccini, per vivere in modo diverso le strade della città, in questa occasione chiuse al traffico e all'inquinamento e restituite al gioco e al divertimento, alle passeggiate e alle biciclette.

- *Le Bande del Cigno*

Le Bande del Cigno sono l'occasione per gli under 14 di potersi incontrare, stare insieme e divertirsi al di fuori dei consueti spazi di socializzazione e nel contempo di affermare il proprio punto di vista; un'esperienza semplice e qualificata di cittadinanza attiva che permette di indagare ed esplorare, ma anche di proporre ed intervenire.

Le Bande del Cigno agiscono fuori la scuola per rendere la città a misura di bambino, adottando spazi nel quartiere o costituendo organismi di rappresentanza per far valere le proprie esigenze. A livello nazionale formano una rete dove scambiarsi informazioni, punti di vista, esperienze. A loro disposizione due strumenti interattivi: Jey, la rivista degli under 14 di Legambiente e il sito www.ragazzi.legambiente.com.

I Centri di Educazione Ambientale di Legambiente

Distribuiti su tutto il territorio nazionale, i CEA di Legambiente si trovano nelle Aree Naturali Protette e nelle città d'arte. Sono strutture residenziali che offrono alle scuole sostegno a progetti educativi, attività di aggiornamento e formazione, percorsi didattici di educazione ambientale. Ai giovani offrono occasioni di incontro, volontariato, vacanza e studio.

I Centri di Documentazione

I Centri di Documentazione di Legambiente rendono accessibili a tutti le pubblicazioni prodotte dall'associazione nel corso degli anni (dibattiti, articoli, riviste, dossier, depliant). Molti materiali sono disponibili sul sito www.legambiente.com, altri possono essere richiesti dietro versamento di un contributo per le spese di spedizione.

Per informazioni: tel 06 86268327;

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Il sito web e lo spazio informazioni

Il Canale 6 del sito www.legambiente.com è dedicato al mondo della scuola e della formazione. Contiene, tra l'altro, tutti i numeri della newsletter informatica *Legambiente Scuola News*.

Le pagine del Canale 7 sono dedicate ai ragazzi e ai giovani. Contengono notizie sui campi estivi, gli appuntamenti e *Jey News*, la rivista on line per gli under 14.

EDUCOM@MED: EDUCATION IN COASTAL MANAGEMENT FOR THE MEDITERRANEAN

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Abstract

One of the main pillars for sustainable development practices is education and capacity building. Universities can play a fundamental role in creating the capacities required for integration of the economic, social and environmental approaches to the development challenges, and to translate the theoretical developments into practical decision-making and application at local scale. This goal can be achieved by formulation of new *curricula* responding to the need for inter-disciplinary skills.

In particular, the territorial management of transitional areas - like the coastal ones - requires complex knowledge and capacities that cannot be properly covered by sector experts. Within this framework, a EU-Tempus project has been launched by a consortium of partners formed by the Universities Ca' Foscari of Venice, Pablo de Olavide of Sevilla, Cairo, Split, and the UNEP PAP/RAC of Split, for creation of an E-learning based International Masters in "Coastal Management in the Mediterranean".

Introduction

The International Conference held in Graz¹ in April 2005 highlighted how higher education occupies a central position in shaping the way in which future generations learn to cope with the complexities of globalisation. Universities thus are called upon to teach not only the skills required to advance successfully in the labour market, but also to nourish in their students, faculty and staff a positive attitude towards cultural diversity and to help them to understand how people can contribute to a better life in a safer world.

Already during the World Conference on Higher Education (1998), organized by UNESCO, was defined the core missions of higher education systems as educating, training, undertaking research and, in particular, contributing to the sustainable development and improvement of society as

1. "Committing Universities to Sustainable Development" Graz, Austria. 20-23 April 2005.

a whole, but also to provide opportunities for learning throughout life. Higher education systems should respond to what society expects of them and thus to meet the challenge of a sustainable society. Therefore it is becoming more and more important for universities to support each other through international cooperation.

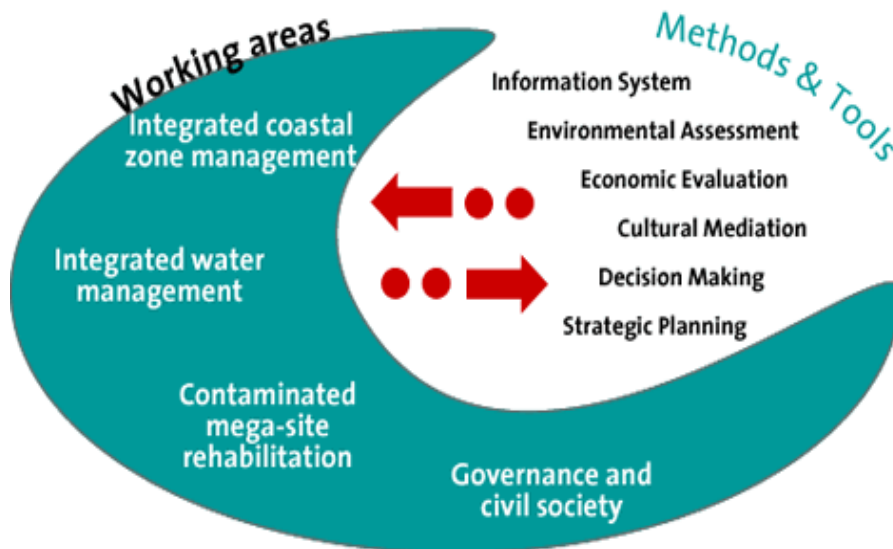


Fig. 1. IDEAS Working areas and methods. www.unive.it/ideas

Ca' Foscari University of Venice can be considered an example of University able to adapt itself according to the local and international requirements (Zanini, 2004). This strategy has permitted to establish a virtuous system where local, national and international institutions and the university have benefits. An example of this ability is its Interdepartmental Centre for Dynamic Interactions between Economy, Environment and Society (IDEAS), created in 2002 by the departments of Environmental Science, Economics, Law, History, and Eurasian Study.

IDEAS has its priorities (Fig. 1) in the fields of Integrated Coastal Zone Management (ICZM), Integrated Water Resource Management, contaminated mega-site rehabilitation, and governance and civil society in the Mediterranean. The aim of this Centre is to create and co-ordinate a high education and interdisciplinary research for the sustainable development, with a particular attention to the Mediterranean area and the Eastern Europe.

The competences of the researchers that collaborate with IDEAS are shared to integrate different disciplinary formations, particularly to promote inter-cultural exchanges through specialised courses but also activities open

to the population. Examples are the international Ph.D. in Analysis and Governance of Sustainable Development²(DAGO), the Master on Inter-Mediterranean mediation³(MIM), the Master on Environmental Certification and Quality, but also intercultural activities for the population and the new project for the Education in Coastal Management for the Mediterranean, the master Educom@MED.

Educom@MED: the project

In the European Union a long tradition in the development of environmental protection and the related regulations have provided the basis for a sophisticated view on the management of complex environmental systems, like the Coastal Environments; however, educational programmes have not followed the path for the creation of the needed skills in the field of Integrated Coastal Management. Thus, a demand for professionally trained managers able to recognise and understand the conflicting issues, particularly in the Mediterranean area, is strongly perceived. Within this framework has been defined Educom@MED, a Tempus financed project carried on by a consortium of six Universities and Management institutions: Universidad Pablo de Olavide, Sevilla (SPAIN), Università Ca Foscari, Venice (ITALY), University of Split (CROATIA), Cairo University (EGYPT) and the Priority Actions Programme/Regional Activity Centre (PAP/RAC) of the United Nations Environment Programme in Split (CROATIA).

The aim of Educom@Med is to create and implement a new curriculum for a postgraduate course in Coastal Management. Its crucial issue is to introduce, through an EU standardized curriculum, the possibility for stakeholders to achieve the necessary capacity building that is required to manage the complex coastal environments of the Mediterranean. The regional framework of cooperation is necessary for an ICZM Course, because it offers opportunities for the exchange of information, experiences and ideas between states on practices, policies and problems.

Educom@MED: methodologies and Course contents

The main focus, from an educational point of view, is to create a Mediterranean network sharing available teaching resources and capabilities in line with EU European Credit Transfer System principles and practices.

The growing awareness of coastal management issues, both on a national and on an international basis, has increased the demand for professionally trained managers who can recognize and understand the

2. It can be recognised as international Ph.D. thanks to a Mediterranean Interdisciplinary Network (Rete Interdisciplinare Mediterranea) with the University of Tunis, Rabat and Autònoma of Barcelona.

3. In collaboration with the University Autònoma of Barcelona, Montpellier, Palermo, Ceresdi and IUAV of Venice.

conflicting issues facing the many different users of coastal resources and provide strategic and practical management solutions.

Such a professional skill needs therefore a training course, in which theory, specialized knowledge, integrated methods and tools have to be encompassed. This will be achieved by developing, lobbying and running an E-learning based programme that draws upon the experiences and expertises of the partner countries. Distance learning has been preferred for its flexibility, more suited to the potential student of such specialized work and for its suitability for networking within the consortium.

In the E-learning, information and education mutually interact, becoming an innovative form of knowledge that allows the learner to construct his/her own knowledge, rather than being a recipient for the knowledge transmitted by the teacher. Moreover it can provide better educational material, academic discussions and networking possibilities, and it is an alternative when striving to raise anyone's environmental competences, as it expands the scope of where education and life-long learning may take place (Eneroth, 2000).

However, the access to ITC equipment might be a problem, but the consortium decided to facilitate students providing also Cd-Rom facilities, so as to reduce the time necessary to the Internet connection. Furthermore the technologies that enable the use of E learning represent a filter that reduces the communication possibilities among the course participants and makes it difficult to simulate an academic dialogue. Therefore there is a need to explore ways to improve E learning for environment.

The course will carry out also a field base component to develop the necessary skills in an environmental science course of this kind. Further on the fieldwork will allow to better assess the technical progress of the students and to enhance the networking nature of this international project, linking Europe to the Southern Mediterranean countries.

Experts in ICZM need to understand ecological, social, and economic issues through the many lenses of an interdisciplinary framework, because integrated decision-making is not possible without integrated thinking. Furthermore implementing any vision of sustainable development calls for more problem solving and action oriented environmental knowledge. For such reasons the course structure has been built according to the following scheme:

- Definition of the driving forces acting in the coastal zone
- Response and framework for the coastal zone management (CZM)
- Definition of elements to be integrated in CZM to answer to the problem identified in the first module
- Tool Box for ICAM based on case studies.

Discussion

When we deal with the training of trainers, we have to remind that with this term we don't indicate only teachers: trainers of environmental education are also all those consultants, company managers, territorial experts that can assure a real life-long learning. This Course would contribute to their preparation offering a formation based on their professional needs for an inclusive ICZM.

Moreover, the project provides an opportunity for the consortium to develop curriculum, to acquire experience regarding methods for curriculum development according to the Bologna Declaration and the ECT System, as well as training staff members in coastal management through Information and Technology. The staff of these universities will be enabled to exchange experiences, work together on the elaboration of the course materials and teaching with the EU universities members, gaining expertise in distance learning education.

Acknowledgements

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DESCRIPTION DE FORMATION INFORMELLE D'ANIMATEURS EN EDUCATION ENVIRONNEMENTALE EN ALGERIE

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Introduction

Eduquer à l'environnement, c'est mettre au premier plan les valeurs et amener chaque personne à l'autonomie et à la responsabilité. Eduquer à l'environnement c'est passer d'un monde-objet à un monde-projet (MEIRIEU, 2002). En Algérie la formation à l'éducation environnementale commence à être pratiquée dans le formel au cours des universités d'été et des séminaires proposés par le Ministère de l'Education Nationale (MEN) aux enseignants. Mais de nombreux animateurs non enseignants sont intéressés par cette formation nécessaire aussi dans l'informel. Voici donc pourquoi nous nous sommes impliqués dans ce volet de formation informelle. Nous sommes un club de quartier « Amitié sans Frontières » recevant les jeunes de 10-15 ans une après midi par semaine (le jeudi après midi en Algérie, étant équivalent du samedi après midi pour les pays européens). Les activités éducatives de ce club sont présentées dans le poster intitulé « Education environnementale en milieu extra scolaire et urbain en Algérie ».

Présentation de la formation

Pour pouvoir pratiquer l'éducation à l'environnement auprès de ces jeunes, les animateurs bénévoles de notre club vert de quartier reçoivent une formation mise en place par une équipe de formateurs. Elle concerne une vingtaine de jeunes, de dix-huit à trente ans. Il s'agit de jeunes travailleurs, de jeunes apprentis, de jeunes en recherche de travail ; certains n'ont pas terminé leur cursus scolaire. Cette formation se déroule sous trois formes complémentaires et indissolubles :

- Une réunion hebdomadaire à la fin des activités permet de faire le point de l'après midi
- Des week-ends trimestriels
- Des sessions plus longues au cours de l'année.

Au cours de ces temps privilégiés, les animateurs toujours répartis en petites équipes peuvent partager leur vécu et créer entre eux une solidarité.

L'Education à l'Environnement concerne tous les aspects de la vie et par suite différents volets sont abordés au cours de cette formation :

- la gestion d'un groupe
- la sécurité, l'hygiène et la santé
- l'art de vivre dans la nature
- la place de l'imaginaire
- la pédagogie de projet
- la psychologie de l'enfant et de l'adolescent
- le regard critique.

Méthodologie

Cette formation a pour but l'acquisition d'un savoir, d'un savoir-faire et surtout d'un savoir être. Elle comporte deux aspects : l'aspect théorique, par le biais d'intervenants extérieurs suscitant le débat, et l'aspect pratique, en lien avec le vécu, permettant l'appropriation des nouvelles acquisitions.

Les interventions des professionnels de l'environnement portent sur l'importance et le rôle du recyclage des déchets ainsi que la notion de biodiversité et d'écologie, l'intérêt et le but des parcs nationaux et régionaux.

S'il s'agit de conférences avec débat, l'appropriation des acquis se fait par des discussions en petits groupes, des jeux de rôles ainsi que par la préparation d'activités destinées aux enfants (réalisation d'affiches sur le thème présenté par l'intervenant, préparation concrète d'une activité ludique pour les enfants).

La rencontre des professionnels se fait aussi sous forme de sorties, permettant une immersion dans la nature ainsi que la préparation d'activités de terrain pour les enfants.

Des visites de Parcs Nationaux permettent d'apprendre à mener une sortie de ce type avec des enfants et de connaître des plantes utilisées à des fins médicinales ou d'aménagement du territoire, par exemple : l'If *Taxus baccata* sert à la fabrication de traitements de certains cancers, l'Eucalyptus permet le drainage de l'eau. Ces types de sorties sont guidés par les forestiers même des Parcs Nationaux choisis pour présenter les espèces locales. Les animateurs sont toujours en situation de découverte.

Des sorties en forêt permettent de comprendre l'importance de préserver la propreté d'un lieu. Lors de ces sorties, nous sommes accompagnés d'un professeur en botanique qui partage ses connaissances sur les plantes locales. Les animateurs ont ensuite en charge l'animation d'une après midi dans le même lieu avec les enfants : jeux de découvertes dans la forêt, pique nique et nettoyage du lieu.

Des visites d'usines de traitement et de régénération des matières plastiques et de recyclage du papier et du carton permettent aux animateurs le contact réel avec les professionnels. La transformation des déchets en matière

à nouveau utilisable est vue et expliquée par les responsables de ces usines. Une collecte de bouteilles plastique par les jeunes est depuis mise en place.

Evaluation et valorisation

L'évaluation est pratiquée tout au long de la formation : évaluation des après midi du jeudi ; évaluation des sessions de formation, évaluation finale en fin d'année. A tout moment, l'animateur prend en charge sa propre formation et développe un regard critique. (Figure 1)

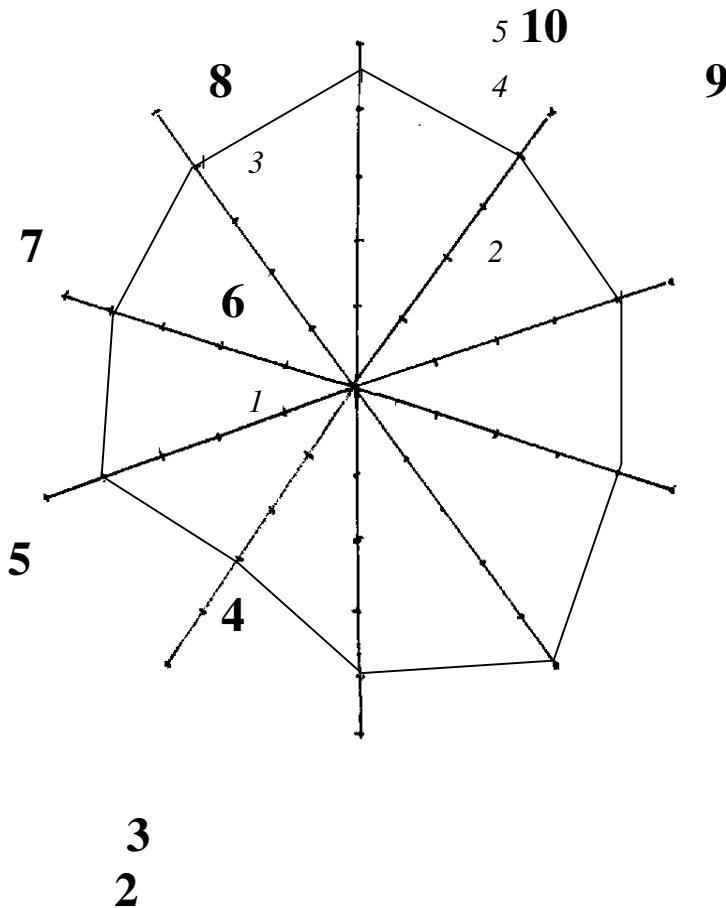


Fig. 1. Grille d'évaluation proposée en fin de stage.

Les points 1, 2, 3, 4, 5 concernent l'apport des formateurs et des intervenants extérieurs ; les points 6, 7, 8, 9, 10 concernent les savoir-faire acquis par les animateurs. Chacun remplit sa propre grille en notant de 1 à 5, une moyenne est ensuite réalisée et le débat est ouvert.

La formation porte également sur l'acquisition d'un regard critique sur l'action de l'homme sur l'environnement. Une évaluation de notre quartier a été faite par trois équipes d'animateurs, disposant d'une grille d'évaluation à travers la présence ou non d'espaces verts, de signalisation des chantiers, d'espaces pour les enfants, les piétons, la localisation des dépôts d'ordures. (Tableau I).

Evaluation	Bon ou suffisant	Mauvais ou insuffisant	Observations et améliorations possibles
Espaces verts			
Espaces enfants			
Espaces piétons			
Dépôts d'ordures			
Signalisation			
Patrimoine			

Tableau I. Grille d'évaluation du quartier

Une rencontre ultérieure avec un responsable de la commune a permis un débat fructueux sur les améliorations possibles du quartier et les changements de comportement à réaliser.

Conclusion

Au cours de cette formation, les animateurs découvrent la richesse du travail de groupe, pratiquent l'auto évaluation et la pédagogie de projet, en créant des liens avec le monde professionnel, l'administration communale et les familles du quartier.

Mots clés : formation, pédagogie de projet, éducation à l'environnement.

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DIVERSITY IN ENVIRONMENTAL EDUCATION: THE PRE-SERVICE TRAINING OF THE PRIMARY SCHOOL TEACHERS

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Introduction

The current paper presents the results of the first two phases of a broader project (BIOPAEDIA) “Biodiversity as a concept and a value in Education: Initial Training and Professional Readiness of Primary School Teachers”. The project is funded by the Cyprus Research Promotion Foundation and is currently running in Cyprus, Switzerland and England.

Because of the multiplier effect (Powers, 2004), the concept of environmental education and the way it is perceived among teacher trainers is of particular importance. Every teacher trainer will educate a large number of students, who themselves will educate a much larger number of pupils. It is thus essential to ensure the quality of training offered to the pre-service teachers because it will contribute to the formation of future citizens.

The research project acknowledges that environmental awareness and responsibility have been accepted as a necessity in primary education (McMilan et. al., 2004). Most of national curricula and educational policies have made environmental education a compulsory topic.

Nevertheless as research on environmental education reveals, teacher training does not place sufficient importance to environmental education (Van Peregum et al., 2005) or lacks consistency and coherence (Kyburz, Graber, & Robottom, 1999).

This can have a negative impact on the quality and effectiveness of the environmental education offered by primary education.

Methodology and objectives

Being aware of the particular nature of environmental education and all of the factors leading to its marginalisation, this research project proceeds to a review of the way environmental education is delivered in teacher training institutions where it is offered as a studies' option. The overall objectives of the project presented in this paper are to:

- Assess the importance given to environmental education in the initial teacher training.
- Investigate the teacher students' self efficacy to teach about the environment.

For this purpose three teacher training institutions, one in Cyprus, one in England and one in Switzerland, were taken as case studies. The research methodology makes use of document review and analysis of the universities' *syllabi*, in depth interviews with teacher trainers, and questionnaires addressed to the students, in order to investigate:

- How is environmental education included in the initial training programmes of the primary school teachers?
- Which was the students' environmental activity level during secondary education?
- Is there a pattern between their secondary education background and their university topic options?
- Which are the students' views on the environmental education they receive?
- How confident are the students for delivering environmental education compared to other curriculum topics?

Results

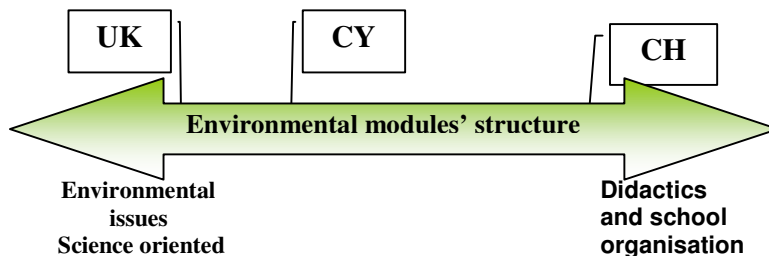
Environmental Education in the teacher training programmes

1. Special environmental modules

First results show that all participants offer at least one specialized environment-related module. Environmental modules in all cases were optional. Having to compete with traditional curriculum modules there is a high probability that the students will not select the environmental module and therefore graduate without receiving any specialised training (Powers, 2004). This hypothesis was verified by the students' questionnaire where in the cases where students had to choose between the environmental module and other natural science modules, they opted for science education.

There is a diversity of approaches to environmental education within the specialised modules, which differ in their context and structure. They vary from pure holistic environmental education to pure environmental science. The rationale behind each module's structure is based on one or more of the following arguments: sufficient or insufficient secondary education and national policies.

- In Switzerland, students were expected to be familiar with environmental issues before their entry to the university. Therefore equipping pre-service teachers with teaching techniques and skills required for their future function was a priority for their training.
- In England the teacher trainer delivering the environmental module gave priority to information, clarification of misconceptions and scientific understanding of various phenomena and environmental issues (due to insufficient secondary education information). Moreover national policy set global warming as a priority environmental issue.
- Cyprus appeared to be rather science oriented with certain didactics' elements too.



2. Integration of environmental issues in non-specialised modules

The review and analysis of the module descriptions revealed limited exploitation of the opportunities for cross-curricular links and a rather strong orientation of the modules towards their topics. Interviews with teacher trainers (social sciences, art, and science education modules) revealed that they consider environmental education a fundamental topic for the teacher training, and that they are aware of the opportunities available for environmental links within their areas. They were all presented with a quantitative 1-7 scale of relevance of their module with environmental education (7: maximum relevance obtained only by the specialised modules), which is illustrated in fig.1.

Although several linking opportunities were acknowledged, few non-specialised modules included the environmental dimension. The teacher trainers in Cyprus and England stated that they linked their modules with environmental issues once per semester (or slightly more).

The Swiss trainers took advantage of the existing environmental links at least once a month.

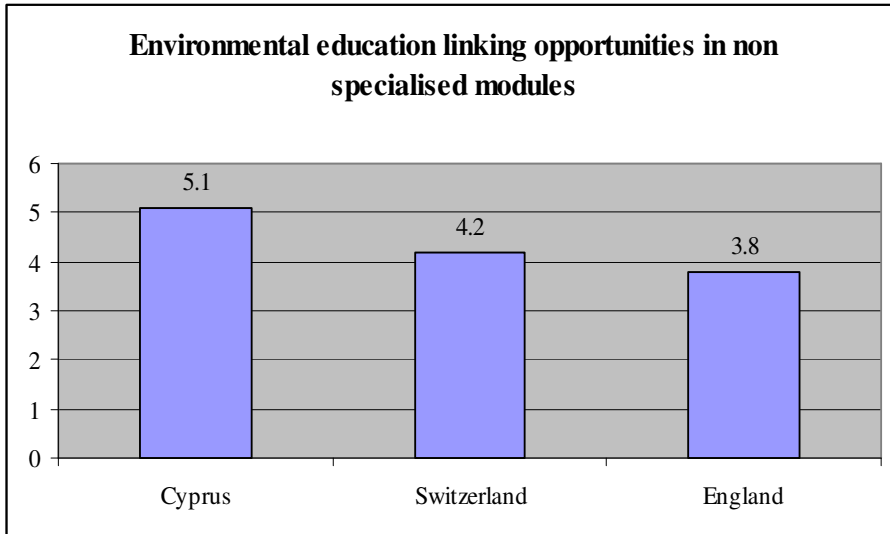


Fig. 1. Environmental Education linking opportunities within non-specialised modules.

Students' environmental activity in secondary education

Students' environmental activity in secondary education was investigated through the questionnaire. Only 28,6% of all the trained teachers had chosen a science topic (biology, physics, chemistry) or geography in secondary education.

Biology was the most popular natural science topic (15,0%). They were rarely involved in any environmental activities (e.g. environmental games, taking care of the school grounds, plant and animal study in the school grounds and away, etc.)

Fig. 2 illustrates the frequency with which students (during secondary education) studied plants and animals outdoors, in the school grounds.

Students from Cyprus and Switzerland had the opportunity to participate generally in these activities averagely once in a school year. Students from England appeared to have more opportunities to practice environmental activities during secondary education.

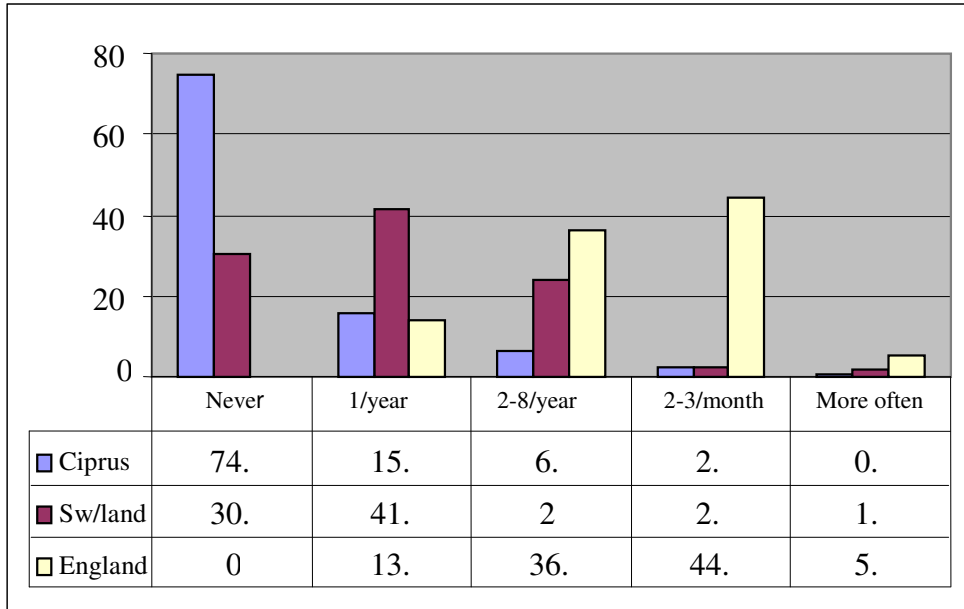


Fig. 2. Study plants and animals in the school grounds

Secondary education and university options.

Students with biology background tend to choose biology relevant modules: 93,8% of the students attending the environmental module in England had chosen biology as one of their specialisation topics in secondary education. Similarly, 84,5% of the Cypriot students that chose one of the environmental modules (environmental education or life and living organisms) had biology background. Few Swiss students appeared to have biology background.

Students' views on their environmental training

All students attending the specialised environmental modules were asked to rate their satisfaction level on the training they received on:

- Information on global and local environmental issues.
- Principles and philosophy of environmental education.
- Acquiring skills for developing positive environmental attitudes.
- Dealing with controversial issues.
- Organising outdoor activities and environmental games.

The training satisfaction level (1: min — 5: max) ranged for:

Cyprus	Switzerland	England
3,0 – 3,7	2,3 – 3,3	1,9 – 3,7

In Cyprus and Switzerland students were slightly more satisfied with their training on developing positive environmental values and attitudes.

Pre-service teachers' self efficacy on teaching about the environment

All students were asked to use a 1 - 5 scale to state how confident they feel to organise and implement a number of environmental activities. In total average the ones feeling more confident about their teaching skills are the students from Switzerland (3,9). Cypriot students felt slightly less confident (3,7). The least confident were the students from England (3,4).

Students were asked to state how competent they expect to be on teaching 11 curriculum topics and biodiversity due to their training. This question could also extract information about the importance the students gave to the curriculum topics. The first three topics for each country were those of the following figure.

Environmental Education was 8th in Cyprus, 7th in Switzerland and 4th in England. Biodiversity was 12th (last) in Cyprus, 11th in Switzerland and 11th in England.

<u>Cyprus</u>	<u>Switzerland</u>	<u>England</u>
Language	Language	Language
Religion	Mathematics	Mathematics
Sport	Sport	Science

Discussion

Secondary education choices appeared to influence university modules' choices. Nevertheless the students' confidence in organising and implementing environmental activities does not depend on their secondary education activities but rather on their experiences during university training. Students whose training focused on developing teaching skills appeared to be more confident compared to students who attended content modules. Swiss students appeared to be the most confident about organising

environmental activities probably because their training paid more emphasis on teaching skills.

Vice versa English students appeared to have the lowest self efficacy for teaching the topic probably because their training paid the least emphasis on teaching skills, compared to their peers from the other two countries.

Recommendations

Teacher training programmes should consider including at least one compulsory module on the environment in order to boost the teachers self-efficacy on teaching about the environment. Environmental modules should find the ideal balance between cognition and teaching skills in order to meet the students' needs and raise their self-efficacy levels for teaching the topic.

Within the non-specialised modules, the environmental integration opportunities should be further explored and used. There is a need for co-operation among the teachers' trainers in order to highlight these opportunities and integrate more effectively the environmental dimension in their modules revealing thus the interdisciplinary and holistic character of environmental education.

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SOFTIMMIGRANTS - SOME ELEMENTS TO DEVELOP A VOCATIONAL TRAINING FOCUSED ON SOCIO-CULTURAL SKILLS FOR MIGRANTS AND THEIR RECEIVERS

Filippo Laurenti

The survey here presented is a part of a Leonardo da Vinci project called “Development of socio-cultural working skills for immigrants and their receivers - Softimmigrants” (2002-2005). The project promotes the mobility of work force, the integration to the new society and the prevention of discrimination on work places because of the immigrants’ different culture and ignorance of new country’s working culture and habits. In this project are involved three pairs of countries: Finland - Estonia, Austria - Hungary, Italy - Rumania.

The objective of the Softimmigrants project is to improve the cultural sensitivity and socio-cultural skills of both immigrants and the staff of the enterprises employing them.

Target groups of immigrants have been selected regarding to sex, age and sector and the situation of the immigrants. The Austrian target groups represent the rapidly developing IT-sector seeking highly educated young people; immigrants are foreign workers. The Finnish target groups represent the building sector, affected by economical trends, the sector is male and suffers in Finland of aging of work force, immigrants want to come to Finland to live there. The Italian target groups represent the traditionally female branch, cleaning; immigrants are the Rumanian minority that already live as immigrants in Piemonte area. All companies involved in the project employ immigrants. This combination of target groups gives the project the advantages of transnationality because in this way we can find a multiply view on the issue of socio-cultural factors.

According with the results of this survey a pilot training focused on socio-cultural skills for migrants and their receivers has been developed and tested.

Survey Method

Each partner involved in the survey interviewed employers and workers belonging to their own target groups.

The method was an un-structured interview. The interview was divided into three parts:

1. A set of open questions.
2. A table of given competences to be valued by the interviewee.
3. A moment dedicated to a free discussion with the interviewee in order to get their opinions/ideas/experience about the topic of the

survey and let them express their satisfaction/lack of satisfaction about the interview.

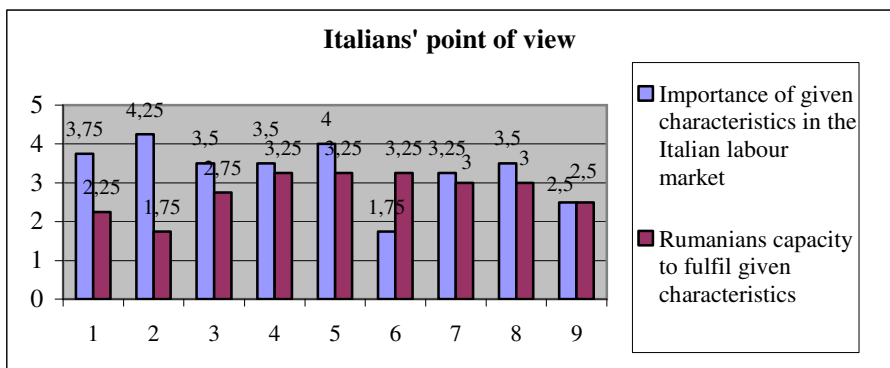
After discussion the table of given competences (1. bearing the responsibility for one's own work; 2. giving and receiving feedback; 3. communication and interaction skills; 4. cooperation and teamwork skills; 5. independent work; 6. taking initiative; 7. working in a strange environment; 8. general knowledge of working life; 9. general knowledge of culture) was presented and the interviewee was asked to assess the importance of the characteristics on a scale from 1 to 5. 1 means little important, 2 = fairly important, 3= important, 4= very important, 5= essential. (Based on the training programme of long-term unemployed by Dutch Laborel. Adapted in Amiedu in spring 2001. For further information regarding this "table" see www.softimmi.com)

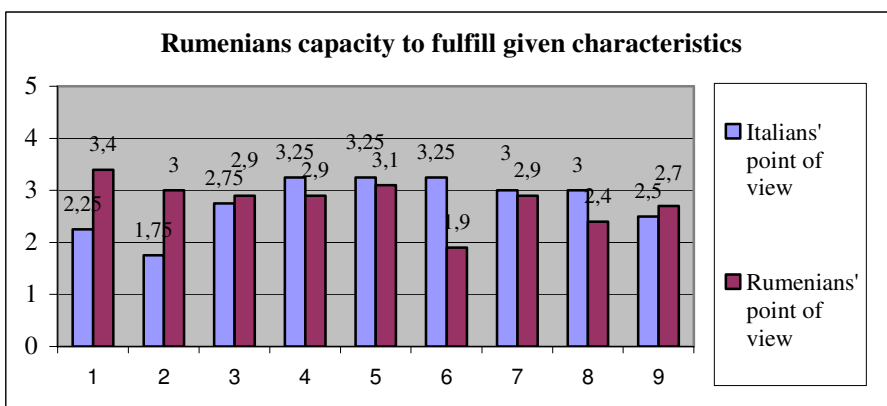
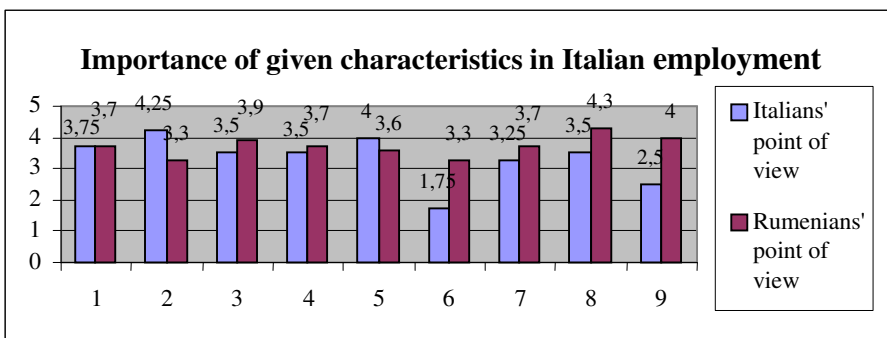
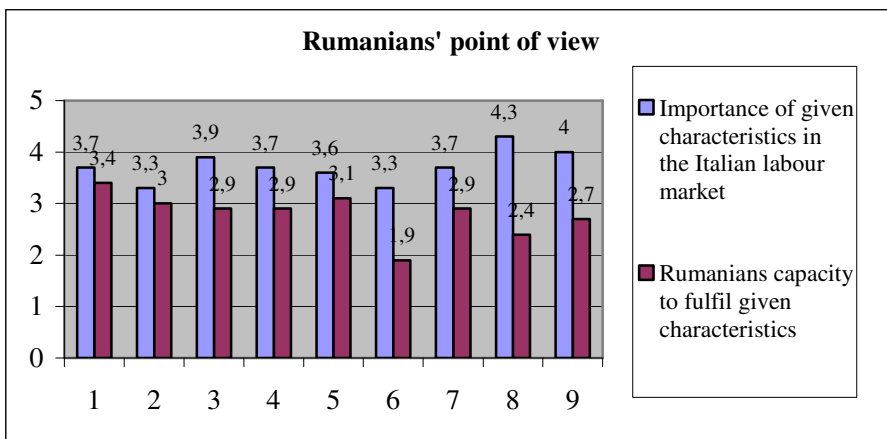
During the interviews this table was utilised as follows: the Italians interviewed were requested to give two marks: one referring to the importance of each characteristic in the Italian context of employment, the other the Romanian workers' abilities in responding to these characteristics. Also the Romanians interviewed were asked to give two marks: one their idea of the importance of each characteristic in the Italian employment context, the other their ability to respond to these characteristics. The interviewees, both the Italians and the Rumanians, were also asked if any of the issues are, in their opinion, culture-bound, and which ones.

This way of using this check list comparing answers from the employers and the Romanian workers about their ideas (how important such a characteristic is important in Italy) and perceptions (up to what point they are able to meet these characteristics), has meant the possibility to identify elements of reciprocal incomprehension which turned out to be absolutely useful in the developing of a vocational training course to fill the gap in socio-cultural skills.

Results of the Survey

Socio cultural Competences





Interviewees' comments on given characteristics' cultural influences

Bearing the responsibility

The Romanian labour market, still influenced by years of Soviet regime, would appear to have produced in the Romanians the lack of ability to assume their own responsibilities.

Giving and receiving feedback

The Romanian workers often demonstrate a reduced ability to express their own opinions in a manner that is considered by the Italians as educated, they often use tones and manners that are a bit too "energetic". They often feel object of racist attacks, taking a simple rebuke about work as an aggression at a personal level.

What clearly emerges is what some Romanians affirmed to be a consequence of the dictatorship: the lack of direct superiors (as the State was the only employer) has meant that the Romanians have not had the possibility of getting used to collaborating with superiors.

Communication and interaction skills

Mostly as the previous point.

Cooperation and teamwork skills

The Romanian workers are rather rigid in group relations in the work place and they show notable difficulty in collaborating with others.

Independent work

No differences found

Taking initiative

Once again it would appear that the origins of the Romanians has had a notable negative influence. Most of the persons interviewed considered the Romanian employment system one that left little or no space at all for taking initiative.

Working in a strange environment

Afraid of the new working and social context, uprooted from their homeland in a new place they don't know, blocked by a language unknown to them, the Romanians encounter quite a few problems for integrating into the Italian context. The situation improves when they only change employment after a first job in Italy.

General knowledge of working life

The Romanian labour market would appear not to be interested in the subject of work legislation, thus leaving Romanian workers with a lack of awareness of the importance of respect of legislation and little interest in the subject.

General knowledge of culture
No differences found.

Conclusions

When the Romanian workers arrive in Italy they encounter a labour market, which is regulated by laws that are very different from the existing ones in their country. With its State model of Russian influence, the Romanian labour market until recently guaranteed a job for everyone, the quality of work was not a determining factor in the success of employment for each worker; one of the workers interviewed repeated a popular way of saying in Romania, that represents the distance of the State, the only employer in the Romanian labour market: a worker says to his colleague “I’ll pretend that I work, you pretend to pay me, that’s it!”.

Responsibility for one’s work, and the ability to relate to superiors were completely unknown to Romanian workers, because of the context they were used to working in.

The habit of being evaluated for one’s work results is totally lacking in Romanian workers, which means that often when criticised they react with aggressive or unjustified behaviour.

From here the suggestion to teach Romanians the importance of taking one’s own responsibility for work carried out that must respond to a criteria of quality, and the importance of cooperation and teamwork skills.

Another difference that needs to face regards the attention paid to work legislation in Italy; not used to giving importance to this subject in Romania, the Romanian workers do not give importance to this factor in Italy, whereas the employers consider fundamental an interest in this area.

Also the subject of hierarchy in the work place would appear to be frail: the employers interviewed stated that the Romanian workers learn quite quickly about work levels and the limits of their own job, but they deliberately choose not to pay attention to them when convenient. It will therefore be necessary to work not so much on the perception of hierarchic levels but more on the respect of levels.

It is also necessary to take into consideration the Romanians’ lack of ability in cooperating and working in a team, which they are not used to doing and as a consequence are too rigid in relations with colleagues.

From these conclusions there is certainly an environmental feature, which influences the behaviour of Romanians in Italy every day and not only in the field of employment. Finding themselves in a new context (work and cultural), considered quite different from what they are used to, only partly understandable; forced to use a new language to move around in their job and to sort out Italian bureaucracy; without suitable practical and psychological back up from family and friends. This means that the Romanians (like any other foreign newcomer to Italy) felt as though they have been thrown into a hostile environment, where they react, as a form of defence, in a way that seems aggressive (often finishing up considering

normal rebukes and criticisms as racist attacks) It is of particular interest to our research the fact that the employers are aware of these dynamics. They know that the foreign workers find difficulty and are willing to help on one condition. To quote one of the persons interviewed “as foreigners they have made a very difficult choice and we are willing to admit this and help them, but they must develop a positive attitude of collaboration and cooperation: they must “eat humble pie” and admit that they have a lot to learn because they are in a new context”.

A considerable part of the vocational training should focus on analysing and managing conflicts that arise in the work place because of this type of aggressive defensive behaviour.

As turns out from the charts above presented, Romanians consider themselves to be totally inadequate for the Italian labour market. In fact they have defined themselves unprepared on each characteristic mentioned. The more important they consider a characteristic the more they consider themselves insufficient. But not only: for five characteristics out of the nine proposed, the Italians have a higher opinion of the Romanians’ ability than the Romanians themselves. It is therefore obvious that the Romanians undervalue their own abilities.

With regard to this consideration it should be a strategic move to include psychological counselling to help the Romanians improve their self esteem, this as well as supporting them from a personal point of view, would be helpful for reducing their insecurity and as a consequence the aggressiveness that they use for defending themselves in the workplace.

VALUTAZIONE PRELIMINARE SULL'OFFERTA FORMATIVA DELLA RISERVA NATURALE MARINA DI MIRAMARE

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La Riserva Marina di Miramare, avendo tra le sue finalità istitutive anche quella di fornire opportunità per la realizzazione di programmi di educazione ambientale, ha avviato al suo interno fin dal 1989 un Centro di Educazione all'Ambiente Marino (C.E.A.M.), al fine di progettare e svolgere attività didattiche, consentendo la scoperta e lo studio dell'ecosistema mare.

Lo scopo del presente lavoro è stato quello di analizzare l'efficacia dei pacchetti didattici offerti dal C.E.A.M. attraverso la formulazione di questionari appositamente elaborati e distribuiti agli studenti che hanno visitato la Riserva da inizio ottobre a metà novembre 2002. Sono stati preparati tre questionari, uno per ogni livello di scuola (elementari, medie e superiori), con la finalità di capire quanto gli studenti percepiscano il messaggio loro inviato durante la visita a Miramare riguardo ai problemi ambientali, alla conservazione della natura ed al concetto di sviluppo sostenibile.

Alcuni gruppi di domande dei tre questionari, pur contenendo linguaggi diversi, possono essere confrontati e per questo motivo l'analisi dei dati è stata effettuata su sub-campioni di studenti così raggruppati:

- livello di scuola: elementari, medie e superiori;
- durata dell'attività: mezza e una giornata per le elementari e le medie, una e due giornate le superiori;
- studenti che avevano già visitato altre aree protette rispetto a quelli alla prima esperienza.

		elementari	medie	superiori
durata attività	0,5 giorni	40	65	
	1 giorno	48	64	74
	2 giorni			45
prima visita	sì	46	58	49
	no	40	47	72
totale		88	119	128

Tab. 1. Numero di studenti ai quali sono stati distribuiti i questionari, con specificate le tipologie di attività effettuate nella Riserva.

Risultati interessanti relativi all'analisi dei 379 questionari. Scuole elementari

I risultati relativi al questionario rivolto agli studenti delle elementari sono qui di seguito riportati.

Definizione di riserva marina (Fig. 1): la maggior parte degli studenti si è concentrata sulle risposte 3 (risposta meno corretta) e 4 (risposta più corretta).

Motivo della visita (Fig. 2): per la maggior parte degli studenti è la visita alla Riserva Marina.

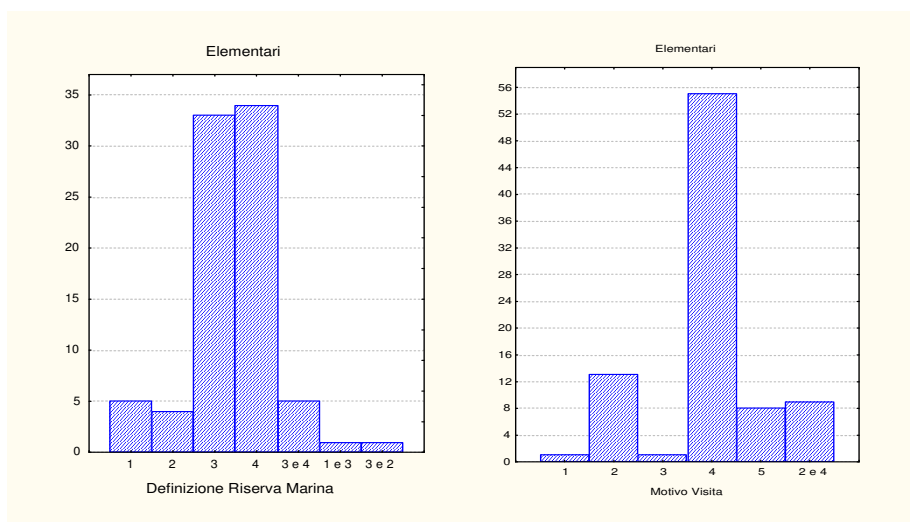


Fig.1: *definizione di riserva marina*

1=posto dove non si può entrare e ci sono solo piante e animali particolari;
2=posto creato per proteggere la natura, in cui l'uomo entra poco;
3=posto in cui si fa ricerca scientifica;
4=posto che per le sue caratteristiche naturali ha bisogno di protezione speciale, ma senza escludere le normali attività dell'uomo.

Fig.2: *motivo della visita*

1=perché è vicino alla scuola;
2=per fare una gita nella natura;
3=per vedere il Castello;
4=per vedere la Riserva Marina;
5=per vedere il Castello e la Riserva.

Significato di conservazione della natura (Fig.3): nessuno ha dato la risposta corretta (numero 5), se non combinata con altre (erano previste anche risposte multiple); la maggior parte ha dato come corretta la risposta 3.

Motivo per cui è stata istituita la Riserva Marina a Miramare (Fig.4): quasi tutti hanno dato la risposta "più corretta", la numero 3, anche se le altre potevano trarre in inganno perché non totalmente sbagliate.

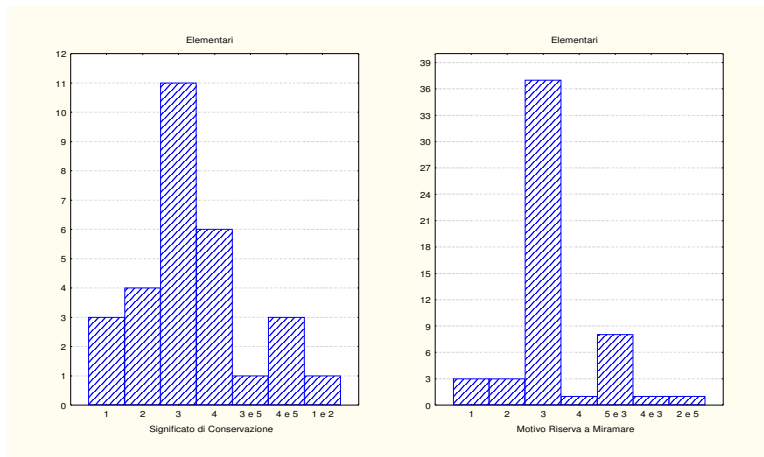


Fig.3: *significato di conservazione*

1=prendere animali e piante e metterli in un barattolo; 2=imbalsamare animali e seccare piante, e fare un museo; 3=salvare le specie in estinzione facendo degli zoo;
4=usare la natura senza alterarle troppo;
5=proteggere animali e piante nel loro ambiente per consentirne l'esistenza anche in futuro.

Fig.4: *motivo dell'istituzione della Riserva*

1=è un bel posto;

2=ci sono tanti pesci;

3=ci sono scogli e sabbia, quindi si possono proteggere ambienti e animali diversi;

4=c'è una forte escursione di marea;

5=ci sono piante e animali in pericolo di estinzione.

Nella figura 5 sono riportati i confronti fra le risposte date dagli studenti, raggruppati in base al fatto che avessero o meno precedentemente visitato un'area protetta; per le tre domande: *motivo per cui è stata istituita una riserva marina a Miramare, definizione di riserva marina; significato di "conservazione"*.

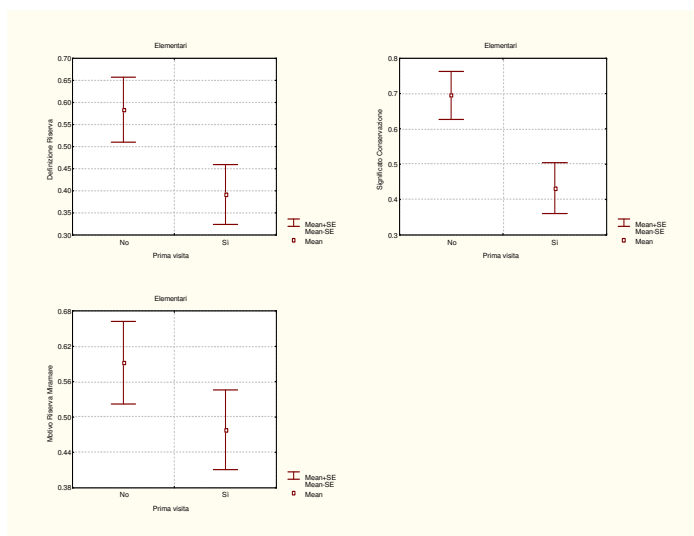


Fig. 5: confronti fra studenti che avevano già visitato altre aree protette e studenti che erano alla prima visita (“Sì” e “No” corrispondono a risposta giusta e risposta sbagliata): (a) rispetto alla definizione di riserva marina; (b) rispetto al significato di conservazione della natura; (c) rispetto al motivo per cui è stata istituita una riserva marina a Miramare.

Si nota che i bambini che non sono alla prima esperienza rispondono più correttamente; l'esperienza ripetuta è quindi una forte discriminante per i bambini delle elementari.

Scuole medie: confronto fra studenti che hanno svolto attività di mezza e di una giornata

Nella figura 6 sono riportati i risultati relativi alla definizione di “riserva marina”; in entrambi i casi la maggioranza ha dato la risposta 2,

che non è la più corretta. La risposta corretta (4) è data in maggioranza dai ragazzi che sono stati un giorno.

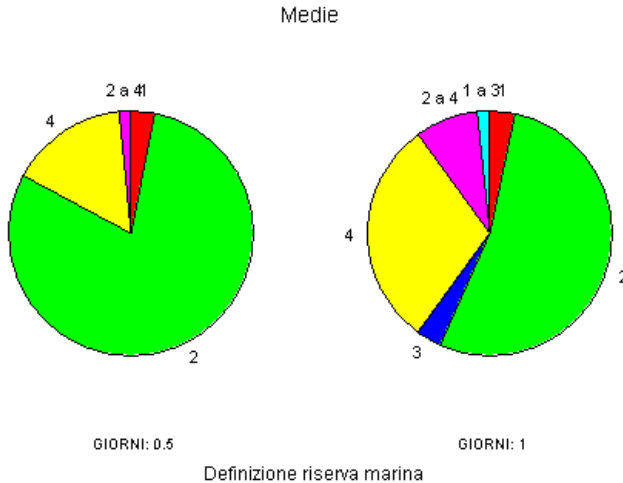


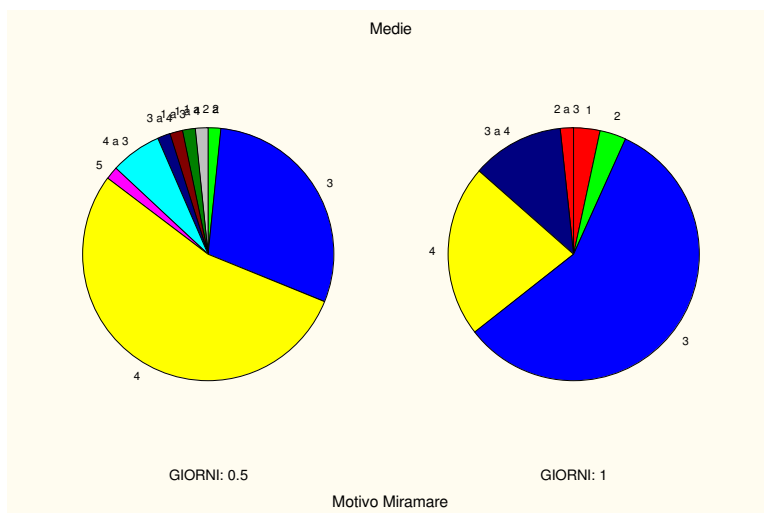
Fig.6: definizione di riserva marina.

1=luogo a cui l'uomo non può accedere per non disturbare gli animali e le piante presenti;
2=luogo creato per proteggere la natura, in cui l'uomo ha accesso limitato;
3=luogo in cui si fa solo ricerca scientifica;
4=luogo che per le sue caratteristiche particolari ha bisogno di una protezione speciale, che però non esclude le normali attività dell'uomo.

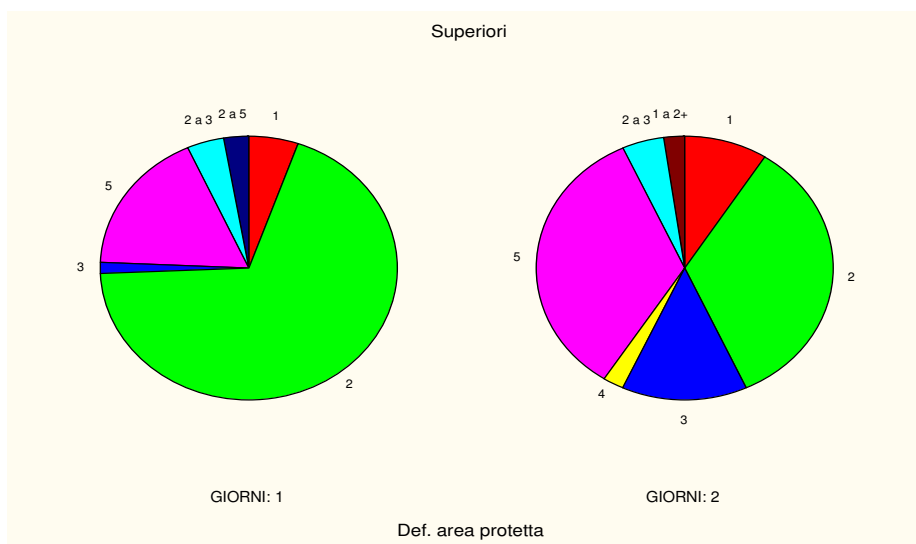
Nel grafico (Fig.7) relativo al *motivo per cui è stata creata la riserva marina a Miramare* si nota una forte differenza fra i ragazzi che hanno svolto attività di mezza giornata, che hanno dato prevalentemente la risposta 4, e quelli che hanno svolto attività di una giornata, che hanno dato prevalentemente la risposta più corretta (3).

Fig.7: motivo dell'istituzione della Riserva di Miramare.

1=è un bel posto;
2=ci sono tanti pesci;
3=ci sono tanti tipi di ambienti in un unico luogo, così si possono proteggere ambienti diversi in una volta sola;
4=ci sono specie in pericolo di estinzione.



Scuole superiori: confronto fra studenti che hanno svolto attività di una e di due giornate



La figura 8, relativa alla *definizione di area protetta*, mostra una notevole differenza fra i ragazzi che hanno svolto attività di un giorno e di due; chi ha fatto una visita di due giorni dà più risposte giuste (5), anche se sono però numerose le risposte 1 e 3, che sono quelle meno corrette. Ciò denota una certa confusione riguardo a questa domanda, forse a causa del maggiore carico di informazioni assimilate dagli studenti che fanno attività di due giorni.

Fig. 8: differenza fra le risposte relative alla definizione di area protetta fra ragazzi che hanno svolto attività di un giorno rispetto a quelle di ragazzi che hanno svolto attività di due giorni.

1=luogo preservato da ogni tipo di contaminazione ed alterazione, in cui non è ammessa la presenza dell'uomo;

2=oasi naturalistica, tutelata e protetta, separata dalle zone circostanti, in cui l'uomo può solo entrare;

3=luogo in cui si fa solo ricerca scientifica;

4=zona in cui sono ammesse attrezzature per l'impiego sociale del tempo libero (parco attrezzato);

5=territorio caratterizzato da particolari risorse naturali, in cui, con vincoli differenziati, sia possibile conciliare la salvaguardia delle risorse ambientali e lo sviluppo economico.

Nella figura 9 si verifica che la differenza nel numero di risposte esatte (risposta 2) relativamente alla *definizione di sviluppo sostenibile* non è degna di nota in relazione alla diversa durata delle attività. Probabilmente il concetto di sviluppo sostenibile non è nuovo per i ragazzi delle superiori, quindi la durata dell'attività non influisce sulla loro risposta, oppure è un concetto nuovo che li ha colpiti, venendo immediatamente memorizzato.

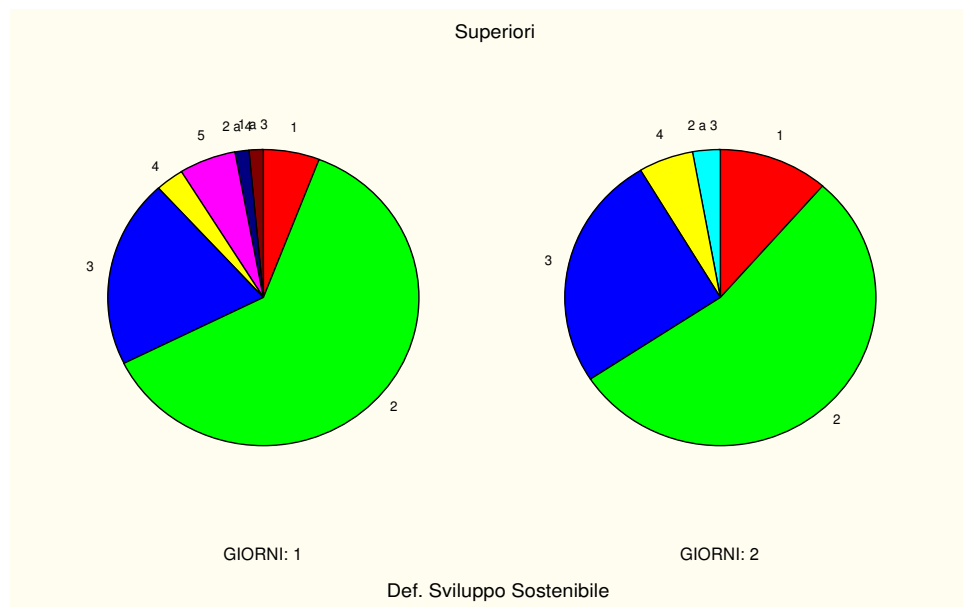


Fig. 9: differenza fra le risposte relative alla definizione di sviluppo sostenibile fra ragazzi che hanno svolto attività di un giorno rispetto a quelle di ragazzi che hanno svolto attività di due giorni.

1=sviluppare tecnologie sempre più avanzate in grado di sostenere la sopravvivenza del genere umano;

2=sviluppare nuove tecnologie in grado di migliorare la qualità della vita dell'uomo, senza però intaccare gli equilibri della natura, in modo che l'ambiente in cui viviamo non venga degradato in modo irreversibile;

3=sviluppo economico che, pur sfruttando le risorse naturali, dà loro modo di rigenerarsi;

4=sostenere economicamente e tecnologicamente i paesi in via di sviluppo, affinché raggiungano il livello dei paesi industrializzati.

Conclusioni

Gli studenti delle elementari hanno risposto correttamente alle domande più specifiche sulla Riserva di Miramare, mentre hanno dimostrato una maggiore incertezza sui concetti generali di riserva marina e di conservazione della natura, che probabilmente sono ancora troppo complessi. Per bambini di questa età è risultata fondamentale l'esperienza diretta: gli alunni che erano già stati in altre aree protette hanno risposto in modo più corretto.

Le risposte degli studenti delle medie non mostrano una forte differenziazione a seconda della durata dell'attività svolta. Il fatto che alcune risposte meno corrette siano state date dai ragazzi che si sono fermati più a lungo può essere spiegato considerando che l'attività più lunga ha portato naturalmente ad una maggiore mole di informazioni trasmesse in un periodo di tempo comunque ristretto, non permettendo agli studenti di assimilarle tutte.

La diversa durata dell'attività svolta dai ragazzi delle superiori sembra influenzare poco le risposte date, se non in alcuni casi, come per la *definizione di area protetta*. La presenza di risposte multiple a questa domanda vede però spesso associata alla definizione corretta, indicata dai ragazzi che hanno svolto l'attività di due giorni, la presenza di percentuali rilevanti delle due risposte meno corrette: ciò in parte inficia il risultato positivo che sembra avere la maggior durata dell'esperienza a Miramare. Il fatto di aver visitato precedentemente altre aree protette non influisce sulle risposte date.

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TURKISH PRESERVICE PHYSICS TEACHERS' KNOWLEDGE AND AWARENESS OF ENVIRONMENTAL ISSUES AND ELECTROMAGNETIC POLLUTION

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Abstract

The aim of this study is to investigate pre-service physics teachers' attitudes towards environment and assess their knowledge and awareness of environmental issues, particularly electromagnetic pollution. The study was carried out with the participation of 160 pre-service physics teachers at Faculty of Education at Dicle University in Turkey. Two different questionnaires were conducted to collect the data. The results displayed that pre-service physics teachers responded positively towards environmental issues. All participants suggested environment education as subject in schools with the majority favoured environment education being taught at primary and secondary levels.

Key words: Environmental issues, Electromagnetic pollution, Physics education, Student teachers.

Introduction

Over the last decade, environmental problems have increasingly attracted attention from scientists, environmental activists as well as ordinary people. Amongst the various problems we impose on the environment; such as water, air, noise, soil and space pollution, there is also industrial wastes, solid wastes and electromagnetic pollution, as well as the depletion of the ozone layer, global warming and loss of bio-diversity. One of the important but little acknowledged concerns is electromagnetic pollution (Szmigielski and Sobiczewska, 2000; Repacholi et al, 1999). In the last few decades, the use of devices which emit electromagnetic fields (EMFs) has increased considerably. This proliferation has been accompanied by an increased concern about possible health effect of exposure to these fields (Bernhardt et al., 1997; ICNIRP, 1998; WHO, 1993). In many countries, cellular phones (CPs), electric and electronic equipments have become so much a part of modern life that people assume that their safety is proven and these appliances do not cause any health problems. However, CPs are EMF transmitter and this radiation has been linked in some studies with

possible cellular effects (Brusick et al., 1998; Lia and Singh, 1996; Verchaeve and Maes, 1998).

These issues often appear in the printed and visual media. Nevertheless, the interest of media in environmental issues can often be confusing rather than informing, as it is well underlined by Adler (1992) that media can cause misconceptions and errors that render the environment education difficult. In order to prevent or reduce misconception and ill information that is constructed by students during the construction of their knowledge (Groves and Puhg, 2002), teacher education programmes become important as encouraging student to discuss environmental issues. This study focused on Turkish pre-service physics teachers' perception and understanding of environmental issues.

Methodology

Two different types of questionnaires were used for this study: an Attitude Scale Toward Environment (ASTE) and Environmental Issues Questionnaire (EIQ). The study was carried out with the participation of 160 pre-service physics teachers (118 male and 42 female) from the Physics Education Department in Education Faculty at Dicle University in Turkey. The survey was performed over the 2004-2005 academic year.

The scale (ASTE) consisted of 21 Likert type items, which some of them were adapted from the previous attitude scales (Aiken, 1979; Dauphinee et al., 1997). The minimum and maximum scores for the scale were 21 and 105 respectively. The reliability coefficient for the scale was found to be 86. EIQ consisted of 16 open-ended statements. The data were analysed by SPSS program.

Findings. The influence of demographic differences on student teachers' attitudes towards environment

The mean value of the ASTE for all participants was 86.10, 85.68 for male and 87.15 for female respectively. These results indicated that pre-service physics teachers had positive attitudes toward environment. There were no significant differences between male and female participants' attitudes toward environment ($P > 0.05$). The study also revealed that there were no significant differences between the two age groups (18 to 23 and 24 to 29 years old) of student teachers ($P > 0.05$, 85.25 and 86.94 respectively) in terms of their attitudes towards the environment.

Student teachers' perceptions towards environment issues

In terms of global environmental issues, 84 % of the participants were concerned with the increase in environmental issues, while 16 % of student teachers did not display any concern.

Of the items listed by the participants, awareness of industrial wastes (86%), noise pollution (71 %) and electromagnetic pollution (60 %) were most popular. And air pollution (51%), ozone depletion (47 %), water pollution (43), solid wastes (42 %), nuclear power plants and weapons (40 %) and global warming (30 %) were perceived as serious environmental issues. Also, a minority of student teachers (18 %) perceived soil pollution and shabby urbanisation (16 %) as important.

The participants saw industrial wastes (63 %), noise pollution (58 %), electromagnetic pollution (46 %), air pollution (42 %), ozone depletion (40 %), water pollution (40 %), nuclear power plants and weapons (39 %), solid wastes (34 %) and global warming (29 %) to be amongst the worst environmental problems. Participants believed that technological developments (68 %), human factor (56 %), industrial wastes (49 %), lack of education (47 %), nuclear power plants and weapons (29 %) and loss of biodiversity (6%) were the causes of the global environmental pollution.

Information Sources of Environmental Issues

The majority of the respondents indicated that they acquired their knowledge of environmental issues from printed (52%) and visual (31%) media as well as school (19%), family (16%), internet (10%), friends (7%) and environmental organisations (5%). Twenty per cent of the participants believed that the environmental news and programmes in printed and visual media were sufficient, while 80 % disagreed with the idea. The participants were asked if they believed that there was a need to study environment as a subject in schools. All of them responded positively to the suggestion. Undoubtedly, environmental subjects should be taught by teachers in schools (Groves and Pugh, 1999). Fifty per cent of participants took part in the study, suggested that environmental subject should be compulsory in primary school, while 20 % of them thought it was important to have a compulsory environmental subject in secondary school and 30 % at all levels of schooling.

Pre-service teachers' Opinions of Electromagnetic Pollution

Sixty eight per cent of the participants believed that technological developments cause electromagnetic pollution. Fifty one per cent of participants believed that electromagnetic pollution is caused by CPs, BSs and other communications means that are harmful to ecological system, while 47 % indicated that electric and electronic appliances produced electromagnetic pollution and 48 % of pre-service physics teachers believed that electromagnetic pollution is harmful to human health. Also, 28 % of the participants indicated that electromagnetic pollution caused hereditary damage in biological organisms, while 26 % believed that brain cancer is caused by electromagnetic field. As a result of electromagnetic pollution, 22 % of

participants asserted that natural magnetic field of earth may change. Only 9 % of participants indicated that this pollution has fatal effect on bio-organisms.

Sources of Electromagnetic Pollution

Seventy three per cent of the participants believed cellular phones, while for 60 % electric and electronic appliances, 50 % base stations, 32 % transmitters, 16 % radars, 11 % high voltage lines, 10 % cosmic rays and 8 % nuclear power plans and weapons were the sources of electromagnetic pollution.

Ways to Alleviate the Electromagnetic Pollution

Pre-service physics teachers suggested several logical ways to alleviate electromagnetic pollution: Seventy per cent of them believed that development of environmental friendly technology, while for 68 % the use of technology consciously, for 52 % raising human awareness of environment, for 14 % avoiding usage of environmentally harmful technology were important. Likewise, 34 % of the participants claimed that mobile phone companies could use warning red labels (SAR: Specific Absorption Rate - ICNIRP, 1998).

Conclusions

This study investigated pre-service physics teachers' attitude towards and knowledge of environmental issues. Pre-service teachers are greatly concerned with environmental issues such as industrial wastes, noise pollution, electromagnetic pollution, air pollution and so on. Despite this positive attitude towards environment, their concerns are not reflected at practical level. The research revealed that student teachers are usually informed through printed and visual media. Participants were well aware of the inadequacy of media in informing environmental issues. This inadequacy at a certain level leads student teachers to develop misconception of environmental issues. The results showed the need and importance of studying environmental education as a subject in primary and secondary schools. Also an appropriate curriculum development seems crucial to prevent any misconception that might be carried to students after completion of pre-service teacher education.

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**FORMATION INITIALE ET CONCEPTIONS
DE L'ENVIRONNEMENT CHEZ LES ENSEIGNANTS.
CAS DU PREMIER CYCLE
DE L'ÉCOLE DE BASE TUNISIENNE**

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Introduction.

L'usage du mot « environnement » ne détermine pas seulement les jugements de valeur que les uns ou les autres peuvent porter à son sujet, mais aussi, il structure des opinions, des professions ou des institutions, sert à construire des politiques ou stratégies de marché, délimite des champs d'intervention ou de connaissances, contribue à définir des cultures, des identités ou des représentations du monde et justifie éventuellement des comportements ou des actions qui peuvent ne rien avoir avec l'environnement entendu dans son sens courant.

Il y a autant de définitions et de conceptions de l'environnement que ceux qui le conçoivent et veulent le définir. Dans ce travail, nous nous sommes référés à trois grandes conceptions qui nous semblent les plus globales. La première est objective et bio-centrique, où l'environnement s'est assimilé à la nature et précisément à une série ou système d'objets isolés. La deuxième s'oppose d'une manière quasi symétrique à la première. Elle est subjective et anthropocentrique puisqu'elle envisage l'environnement en « systèmes de relations entre l'Homme et son milieu naturel et construit entre des sujets et des objets » (Theys, 1993) ; ce que nomme Sauvé l'environnement milieu de vie et l'environnement communautaire. La troisième conception se situe entre les deux premières. Elle est « technocratique » ou « objecto -subjective ». Elle fait émerger une notion de dépendance réciproques entre l'Homme et son milieu naturel et construit et subséquemment l'environnement devient le produit de la relation entre éco et sociosystème.

Les enseignants n'échappent pas à la diversité des conceptions de l'environnement. Ces dernières subissent l'influence de plusieurs facteurs. La formation initiale des enseignants du premier cycle de l'école de base tunisienne est le facteur dont nous étudions l'influence sur la conception de l'environnement dans le présent travail.

Méthodologie

Afin de dégager l'influence de la formation initiale sur l'édification des conceptions de l'environnement chez les enseignants, nous avons choisi un échantillon d'enseignants du primaire, formé de deux sous-groupes (les enseignants de l'ancienne école normale et ceux de l'Institut Supérieur de Formation des Maîtres). Dans un premier temps, les enseignants ont fait le choix de dix mots qui représentent le plus, à leurs sens, le mot environnement. Ils ont schématisé, dans un second temps, la relation entre des constituants d'un écosystème prairie (SOLEIL. SOL. RENARD. O2. LAPINS. HERBES. CO2.BACTÉRIE). Les figures suivantes illustrent les résultats attendus pour les deux questions.

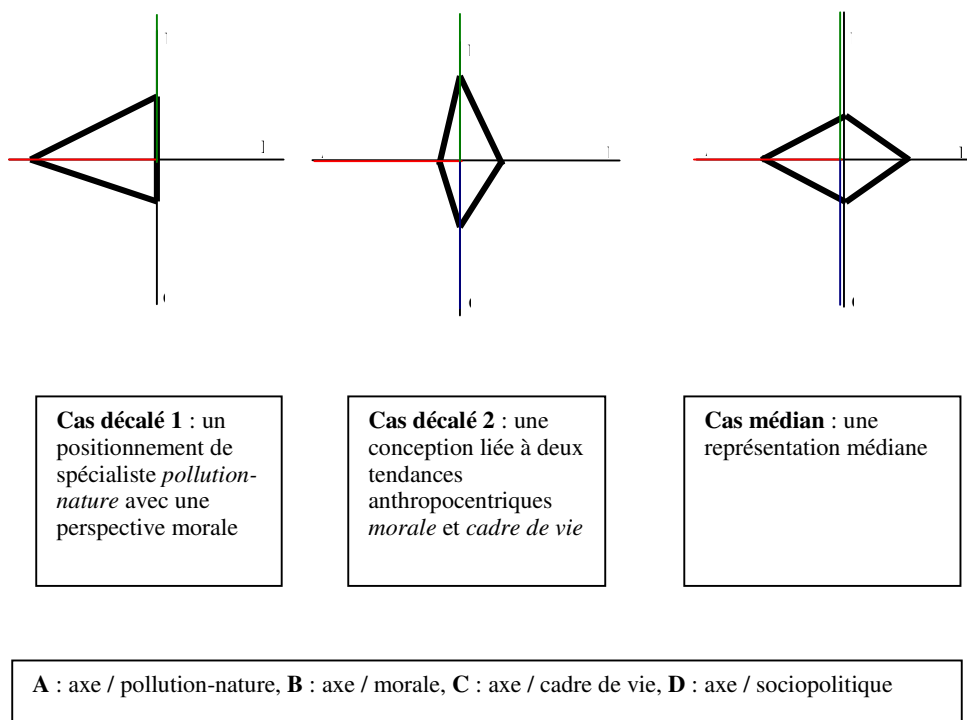


Fig.1. Catégories de conceptions attendues selon la formation

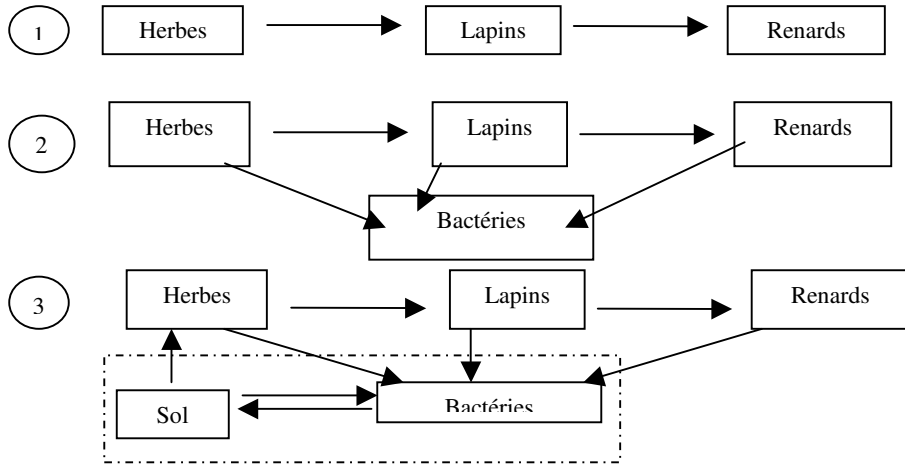


Fig. 2. Exemples de réponses sur le cycle du C par classe (1, 2, 3).
D'après Clément & Forissier)

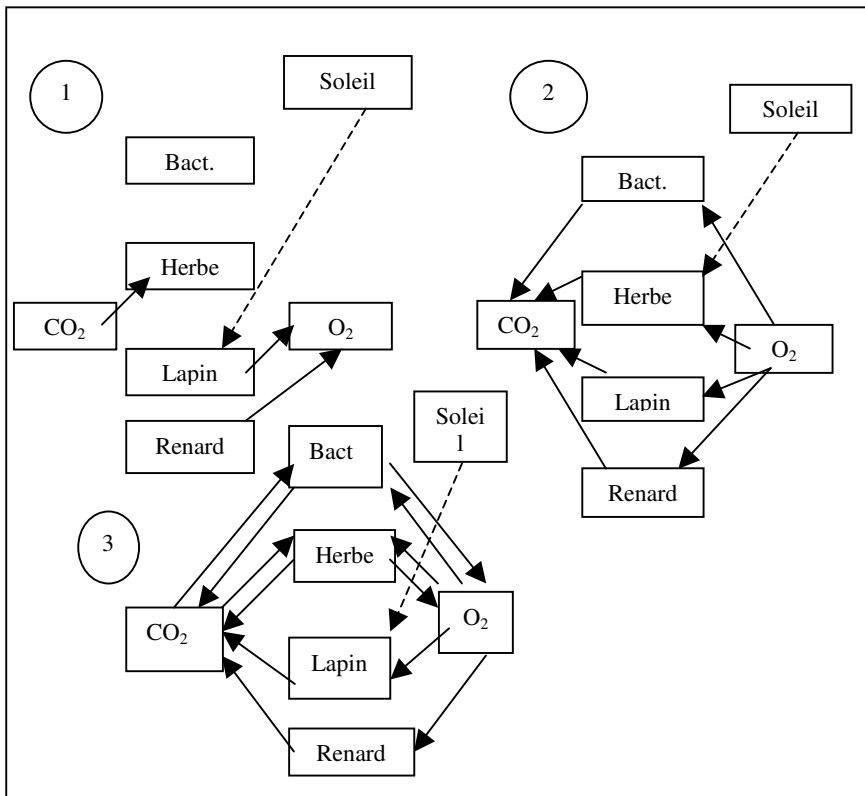


Fig. 3. Exemples de réponses sur le cycle de l'O2 par classe (1, 2, 3).
D'après Clément & Forissier

Analyse et conclusion

Partant des mots choisis, nous avons noté une différence d'emploi de lexique définissant l'environnement selon la formation (tableau 1).

FORMATION	Conception des spécialistes	Conception anthropocentrique	Conception médiane
Bac sciences + 2ans à l'I.S.F.M	E14, E15, E29, E27, E34,		
Bac lettres +2ans à l'I.S.F.M	E13, E23,	E16, E28, E20, E30	E17, E19, E25,
Les enseignants normaliens	E1, E5, E10, E11, E32,	E2, E3, E4, E9, E12, E18, E33,	E6, E7, E8, E21, E22, E24, E26, E31,

Tableau 1. Les différents types de conceptions de l'environnement chez les enseignants de premier cycle de l'école de base

L'environnement est exprimé par "pollution", "nature", "sources", ou encore "faune-flore" chez les enseignants ayant une formation scientifique de base. Ils ont présenté une conception à orientation scientifique autour de la nature, la pollution et l'écologie. La relation entre l'homme et l'environnement se conçoit à l'échelle de la biosphère avec une double relation hiérarchique entre le global et le local d'une part, la nature et l'homme de l'autre. Ceci résulte une reconnaissance de l'homme biologique, une conscience bio-sphérique et un outil d'étude de naturaliste et scientifique. Ce que Sauvé désigne par l'environnement problème à résoudre et ressource à gérer.

Pour ceux ayant suivi une formation littéraire, cet environnement est "le patrimoine", "le retour à la nature" ou "le bien-être". C'est une conception liée à deux tendances anthropocentriques : morale et cadre de vie. Elle caractérise les enseignants voyant dans la nature un objet à respecter et à apprécier. Quant à l'environnement, il est à aménager et connaître. L'anthropocentrisme apporte une réflexion critique et prospective sur les aspects sociaux et politiques du projet, une reconnaissance de l'homme culturel et un savoir-faire particulier dans le champ éducatif.

La troisième catégorie des enseignants présente une conception médiane. Elle englobe toutes les orientations scientifiques, esthétiques, communautaires, sociales. L'homme et l'environnement sont ainsi des co-productions de valeurs et de contraintes mutuelles. Cette co-production peut être envisagée de deux façons. Soit d'une manière positive, et on s'interroge alors sur les conditions de création du meilleur environnement possible pour l'Homme. C'est l'environnement ressource de Sauvé, centré

sur la notion de patrimoine et ressources limitées. Soit d'une manière plus négative, en définissant à travers la gestion de l'environnement ce qui est supportable pour la nature dans les activités humaines, ou inversement, ce qui est supportable pour l'homme et la société dans la nature. Ce type correspond chez Sauvé à « l'environnement problème » où l'homme vise à apprendre, à préserver et à restaurer un environnement menacé.

La deuxième partie du test a montré également que la conception des enseignants à propos de l'environnement semble être linéaire et non systémique (Fig. 5), à l'exception de quelques-uns qui ont une formation hétérogène ou scientifique. Pour la majorité de ces enseignants, les relations entre les différents constituants de l'environnement sont linéaires et causales et se résument généralement en une relation alimentaire entre les constituants vivants de la Nature. Ceci pourrait refléter une formation initiale linéaire, causale et cloisonnée dont les enseignants dépendraient encore. Il s'agit aussi d'un mode explicatif plus simple à concevoir plus qu'une vision systémique. Les premiers enseignements marquent d'une façon durable les conceptions. Malgré son unicité d'enseignement, l'instituteur reste soumis aux enseignements tronçonnés par disciplines qu'il a reçu durant ses études (Clément, 1998 ; Tissier, 1998). Le modèle systémique, plus pertinent pour représenter les dimensions cycliques de l'écosystème, n'est que peu présenté pour les deux cycles dans un même schéma (E9 et E14). Ceci peut être le résultat d'un obstacle épistémologique chez ces individus (Clément, 2002) ainsi que l'enracinement dans chaque discipline aux niveaux lycée et universitaire (Tissier, 1998). Ces résultats pourraient être expliqués aussi par le fait que ces enseignants n'ont pas abordé ce thème pendant un certain temps ou même depuis qu'ils ont quitté l'université et par conséquent ce savoir tombe dans l'oubli.

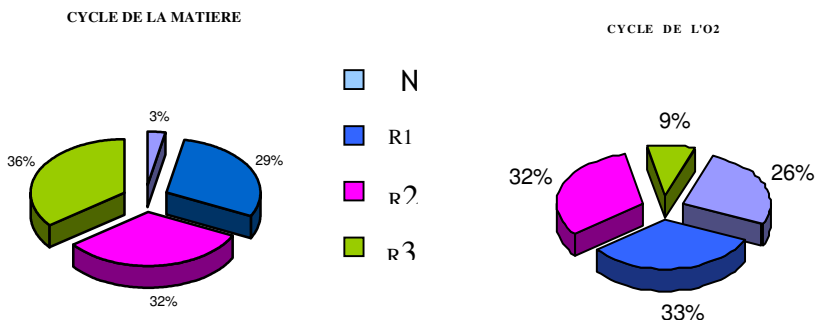


Fig. 5. La cyclicité de l'écosystème
Répartition des types de réponse chez les enseignants
N : non réponse, R1 : réponse 1, R2 : réponse 2, R3 : réponse 3

Ces conceptions relevées montrent une relation entre la formation initiale, la conception et la cyclicité de l'environnement chez chacun des enseignants de notre échantillon. Néanmoins, cette formation n'est pas le seul facteur intervenant, plusieurs autres encore peuvent y participer. Ces facteurs sont multiples tels que la culture, les systèmes de valeurs, la religion, le milieu de vie de chaque individu. Nous citons aussi l'oubli de certaines notions. En effet, si une notion a été enseignée à maintes reprises par un enseignant, elle serait assez bien maîtrisée. Mais si elle n'a pas été abordée pendant un certain temps, elle pourrait tomber dans l'oubli. Nous avons remarqué aussi la présence chez tous ces enseignants, d'un degré certes différent, de l'axe de la morale ce qui revient à leur métier d'éducateur et d'enseignant. Il est indéniable que la formation initiale a une influence sur la conception de l'environnement chez ces enseignants ; mais elle peut être mise en corrélation avec tout ce que nous avons cité préalablement. En résumé, les différents résultats obtenus auprès des enseignants constituant notre échantillon sont diversifiés. Même si nous avons pu les regrouper sous trois catégories, chaque conception garde sa propre spécificité. Cette spécificité est le résultat de l'originalité de chaque individu nécessitant la prise en compte de la situation particulière de chacun, ses pratiques, son histoire, sa culture, ses représentations sociales telles que les systèmes de croyance, de valeurs.

Pour conclure, nous pouvons dire que la formation initiale a certainement une influence sur les conceptions des enseignants à propos de l'environnement, mais elle n'est pas le seul facteur intervenant. Elle peut donc contribuer à la constitution de ces conceptions avec la collaboration de facteurs divers que nous avons tenté de mettre en évidence dans une autre étude.

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A CASE STUDY OF ENVIRONMENTAL EDUCATION: BIOMONITORING OF OZONE WITH YOUNG STUDENTS

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Abstract

The wide diffusion of tropospheric ozone is nowadays a major air quality problem, in urban areas as well as in rural and remote localities; its man-related air mixing ratios are increasing and severe impacts on human life and welfare are expected, such as adverse health effects, damage to manufacts and injury to plants. Biological monitoring (“bio monitoring”) of ozone is a powerful tool for filling the gap between the causes and effects of environmental toxins, as bio indication agents assess in an easy-to-detect fashion the cumulative effects of pollution.

A project on bio monitoring of air quality was launched in 2004 to involve 400 students (ages 6-13) from seven schools in Livorno (Central Italy) in active bio detection of ozone effects with sensitive Bel-W3 tobacco seedlings. Results implied the reading of 5000 raw figures and were fortified by the data captured by three automatic gas analysers. Under the guidance of their teachers, the students had several opportunities to practice with many basic and applied study areas and were initiated into the scientific method in a simple and absorbing manner. Biological and chemical data were in good relationship and were treated with geostatistical methods; results were exposed in the form of cartographic restitutions. Though primarily an educational exercise, the survey provided sound research elements and the picture of pollution that emerged has increased the knowledge of air quality in the area. Bio monitoring is confirmed to be a powerful tool to involve young people in key educational topics.

Key words: Air pollution; Environmental quality; Indicator plants; Oxidative stress; Tobacco.

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Introduction

Air quality is likely to be the environmental issue of most concern in the future (Beaumont et al., 1999) and the detrimental effects of air pollution on human health and welfare are well known (Brimblecombe and Maynard, 2001). Biological monitoring (“bio monitoring”) of ozone is a powerful, cost effective, user friendly, tool for filling the gap between the causes and effects of environmental pollutants, as bio indication agents assess the cumulative effects of pollution. A useful application can be the location of air quality stations and the setting up of bio monitoring campaigns with school children (Castell and Maronnier, 2002; Lorenzini and Nali, 2004). This paper describes a set of pilot studies aimed at involving several schools in mapping air quality by means of indicator plants in the district of Livorno (Tuscany, Central Italy).

Materials and Methods

A simultaneous and coordinate pilot study was performed in the spring 2004, involving seven schools (and seventeen classrooms) in the district of Livorno (Fig. 1). Altogether, about 400 kids were involved in the project, their grade range spanning from primary schools (6-10 years), to junior secondary (11-13 years). In April 2004, a series of preliminary seminars was given to the teachers. An ad hoc Internet forum was set up in a specific web site (www.biomonitoraggio.org) and a discussion group activated.

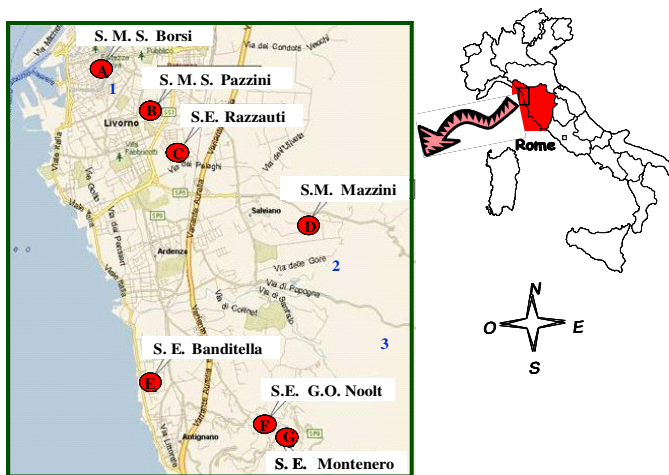


Fig. 1. Map of the area investigated showing the location of the schools (indicated by letters) and of the photometric analysers of ozone (indicated by numbers). Legend: A, SM Borsi; B, SM Pazzini; C, S.E. Razzauti; D, SM Mazzini; E, SE Banditella; F, SE Noolt; G, SE Montenero; 1, Piazza Cappelletto (Livorno); 2, Maurogordato (Livorno); 3, Gabbro Rosignano Marittimo).

Ready-to-use miniaturised kits (Lorenzini, 1994) were delivered on May 10 and 17, 2004, and exposed to ambient air for seven days. The entire methodology, data results and elaboration has been performed in according to Lorenzini and Nali (2004).

The actual ozone presence in the study area during the campaign was measured by three automatic photometric analysers run by local environmental authorities; their location is also reported in Fig. 1. Raw data were processed to describe the typical day and compute the AOT40s (Accumulated exposure Over a Threshold of 40 ppb - Nali et al., 2002a) and the M1 (maximum daily hourly means - Nali et al., 2002b). Two-dimensional zone-maps of CII and AOT40 values were drawn using the Surfer plotting program using kriging as the interpolation algorithm (Olea, 1974).

The reproducibility (i.e. the concordance of the estimates of pupils and of expert evaluation team) was evaluated using k statistics (Cohen, 1960).

Results

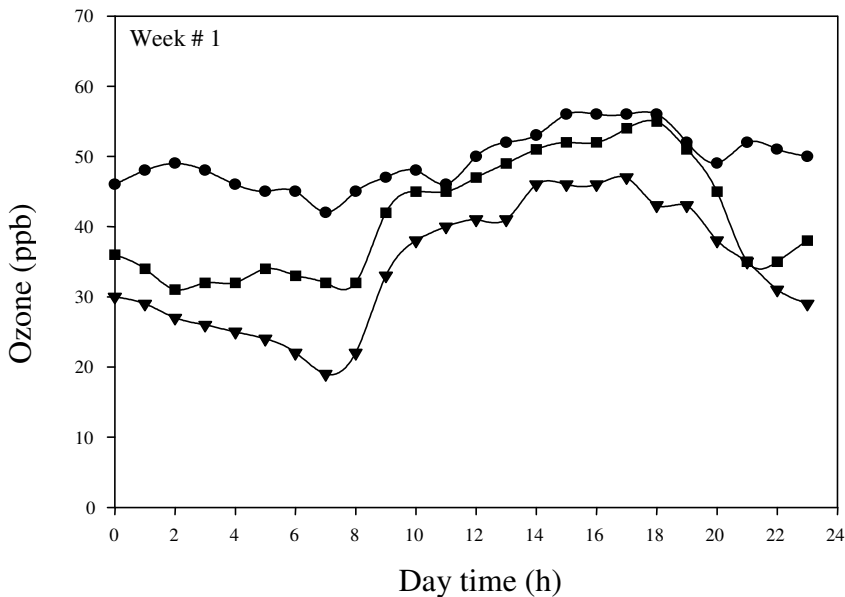


Fig. 2. Ozone average diurnal profiles for the period 10 to 16 (week # 1) and 17 to 23 May (week # 2), 2004 from the automatic analysers. Legend: triangle down, Capiello (Livorno); square, Maurogordato (Livorno); circle, Gabbro (Rosignano Marittimo).

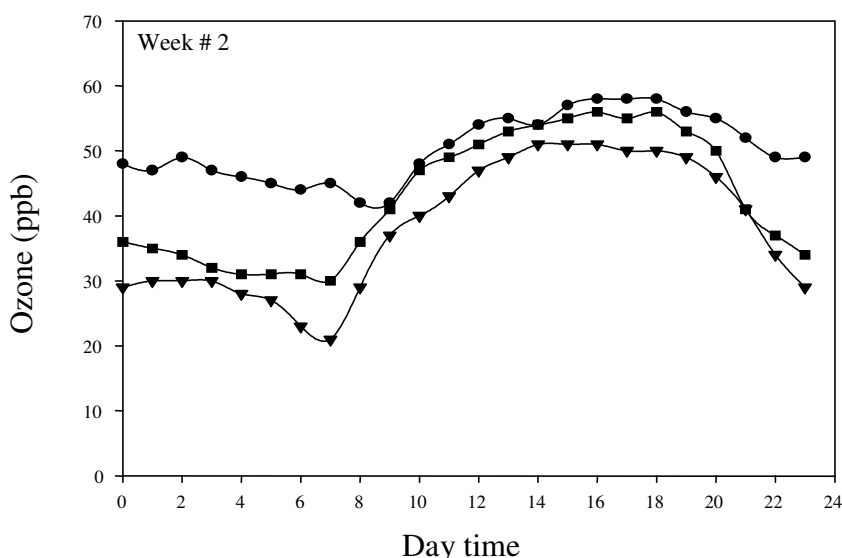


Fig. 2. shows the typical bell-shaped circadian profile of ozone levels in the three stations where the analysers were present during the two weeks of the present study; this is due to the dependence of ozone formation on the presence of solar radiation (Colbeck and MacKenzie, 1994). Cumulated AOT40s and M1 values are reported in Table 1.

Station	AOT40		M1	
	Week # 1	Week # 2	Week # 1	Week # 2
Cappiello (Livorno)	1008	1306	76	67
Maurogordato (Livorno)	974	1113	72	63
Gabbro (Rosignano Marittimo)	2793	2720	89	78

Table 1. Cumulated AOT40s (ppb h) and maximum hourly means (M1, ppb) for ozone in the three stations where photometric analysers were operating, in the period 10 to 16 (week # 1) and 17 to 23 May (week # 2), 2004.

Due to the relevant ozone levels, which occurred in Tuscany in the late spring of 2004, all the sensitive Bel-W3 tobacco seedlings showed typical bifacial necrotic symptoms after a few days of exposure to ambient air in all the exposure sites.

In many cases, the standard deviation of the average score was very high, due to the large variability of single scores expressed by each pupil. Fig 3. Relative scattered distribution of the average Cotyledonar Injury Index reported by each classroom from the actual figure detected by the expert team.

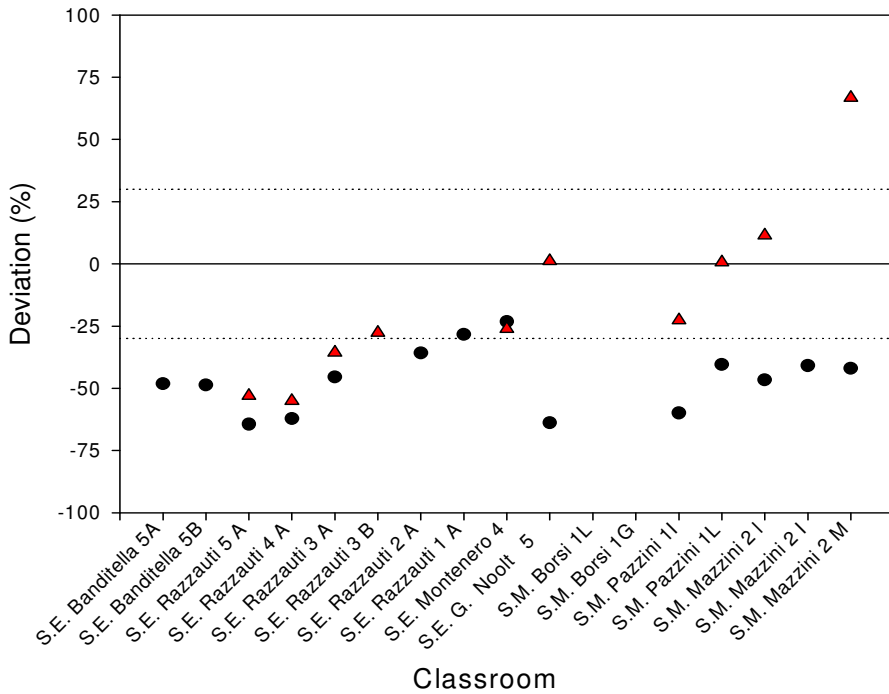


Fig. 3. summarizes the average results given by each classroom, in comparison to the lectures given by the expert team. Eight classrooms gave results within a range of plus or minus 30% in comparison with the reference score. The bulk of the responses highlighted a quite low level of accuracy, but an acceptable level of reproducibility (Table 2).

Type of school	School	k	Strenght of agreement
Primary	Noolt 5	0.31	fair
	Razzauti 3A	0.20	slight
	Montenero 4	0.26	fair
Junior secondary	Pazzini 1L	0.26	fair
	Pazzini 1I	0.18	slight
	Mazzini 2L	0.44	moderate

Table 2. Values of k, as a measure of reproducibility of the estimates of pupils in comparison to expert evaluation team ones.

The processing of all of the validated data by the expert team allowed the creation of two thematic charts, which describe the spatial distribution of CII and of AOT40 (Fig. 4a-b).

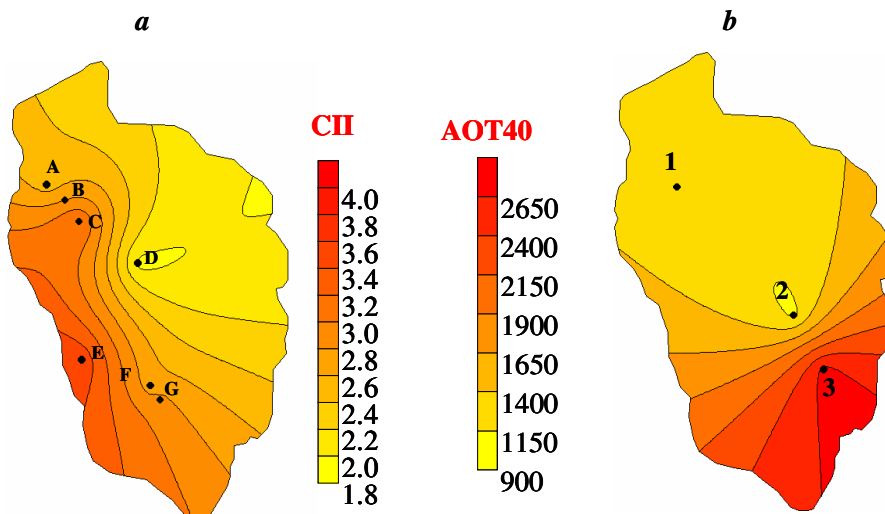


Fig. 4. Spatial distribution of the Cotyledonar Injury Index (CII, on a 0-4 scale) on tobacco Bel-W3 (ozone supersensitive) seedlings (based on data recovered by the experienced team) (a) and of AOT40 (ppb h) (b) in the study area.

Discussion and Conclusive Remarkings

Ozone confirmed to be a significant presence in all the area investigated, both in urban and in rural areas. This is not surprising anymore, as it is clear that the geographical and climatic context of Tuscany is favourable to significant high levels of photo chemically produced ozone (Nali et al., 2001).

The project was a success on the educational plan and reached its aims, which were those to allow students to have a first-hand experience of how polluted is their aerial environment, by using an extraordinary and reliable tool, such as biological monitoring.

The use of the miniaturized kit described here is a solid example of good science, reliable, specific, quick, very cost-efficient and easy to manage (Toncelli and Lorenzini, 1999). The kit represents an original and innovative tool whose simplicity and readiness may be profitably used to trace formative pathways for students, so as to improve their awareness and involvement in key topics of environmental education.

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TRANSDISCIPLINARITY AND ENVIRONMENTAL EDUCATION: A PRODUCTIVE ASSOCIATION FOR TEACHERS

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Abstract

In this paper we share our experience in a symbolic research with teachers at one public school in Guarulhos, in São Paulo city of Brazil. We present some interesting results about the pedagogic performance from this teachers in environmental approaches through the trans-disciplinarity and how this different way for knowledge construction produce opportunities for a better quality of their perceptions for the relations with themselves, with their pupils and their parents and with the environment.

Context

Mankind is before a contemporary world, based in economical models spoiling of natural resources and responsible for unfair life conditions and excluding for the great majority of human beings. This condition demands an urgent search for a new “civilizatory” Project, based on sustainability, integrating harmonically social, environmental and economical issues.

The Environmental Education, powered by the bases and principles of trans-disciplinarity, can become a possible way of change and school, as a privileged place to work for the formation of values, through the integrated action of teachers, pupils and the community, can contribute significantly in the search for solutions.

In this context, and for believing that the quality of the external landscapes produced by human beings (teachers) has a direct relation with the quality of the interior landscapes of them, it has been developed a symbolic research with thirty-two teachers from the City School Dr. José Mauricio Oliveira, city of Guarulhos, Sao Paulo, Brazil.

Methodological procedure

We developed the research based in:

- Monthly meetings with all the teachers, providing moments of dialogued reflection using different kind of symbols (passion/circle; spiral, stairs/“three polar” formation; new consciousness of the reality/wind; the knowledge/web; environmental education/wave - infinite), through reading reflective texts and poems, hearing music's, dancing circle sacred dances, looking videos, observing pictures or photos, relating with the daily work in their classrooms.
- Promotion of situations based on trans-disciplinary pillars (levels of reality, complexity and logic of the third part included) and on principles (severity, openness and tolerance) in search for the improvement of the formation working for the teachers involved, looking for an environmental education that contribute with pedagogical practices that aim the development of ecologically correct attitudes from the students.
- Searching for a trans-disciplinary praxis, constructing through our experience as one of the members of the Coordination Team at the Learning Company of the CETRANS (Trans-disciplinary Education Centre - São Paulo, Brazil); based in the Principles of the Trans-disciplinary Charter (Arrabida - Portugal - 1994); The Learnings for the XXI century (UNESCO). The work about self-formation of Pascal Galvani and the Trans-disciplinarity Manifesto of Basarab Nicolescu.
- Minute register of the perceptions about the appearing of formative landscapes produced during the meetings; reports, written register of guided or spontaneous speeches, observation of the art works produced, pictures and evaluation forms.
- The analysis of the results was organized based on the axles of the “three polar” formation (self-formation, hetero-formation and eco-formation), proposed by Galvani.

Results

The work was directed in a sense of trying answer the following question: “Is it possible, based on the pillars and principles of trans-disciplinarity and using vectors and symbols, to empower the environmental education at school composing formative landscapes, that contribute with the formation at service of public teachers, for making possible transformations in their interior landscapes, optimising the social-environmental performance at school?”

The research propitiated: sensitizising and reflecting spaces; new and differing formative landscapes; a new way in learning construction and

teacher formation; made the faculty more perceptive about its own pedagogical acting and for its quality of relationship with the world.

Qualitative results

We find concrete examples in some meaningful speeches: “If it goes to the human side, this will bring calmness and consequently it will reflect in our work class”; “Despite the obstacles (...) to transform the obstacle in something pleasurable”; “(...) to do a well done job with each age range (...) so that the child can develop herself as a good construction like the web”; “All we are seeing brought me a greater self-confidence (...)”; “We have to work more the process to teach the students to think”; “(...)these reflections drove us to a more humanitarian way in life as well as at school”; “(...) it made me have a more attentive look to the world around me”.

Quantitative results

At the end of the six months of work, a questionnaire with open and closed questions has been applied. To the closed questions, the following results have been obtained.

These six months through environmental education under transdisciplinarity light contributed to make you:

- 1 - More reflexive in relation to your pedagogical practice?
- 2 - More reflexive about the quality of your interpersonal relations?
- 3 - More perceptive to the world around you?

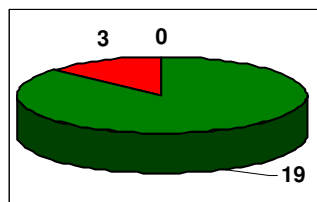
Being the answers foreseen as: Yes () More or Less () No () together with a justification.

The three questions have been proposed to reach the three points of three polar transdisciplinary formation: Self-Formation (Question nº1), hetero-formation (question nº2) and eco-formation (question nº3).

The results were:

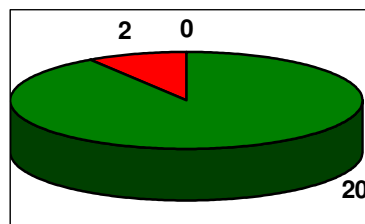
Question nº 1

	Total	%
YES	19	79,16
More or Less	03	12,5
NO	0	0



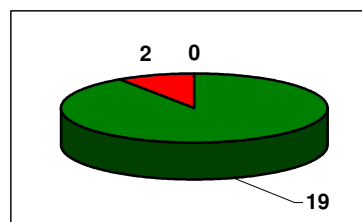
Question n° 2

	Total	%
YES	20	83,33
More or Less	2	8,33
NO	0	0



Question n° 3

	Total	%
YES	19	79,16
More or Less	2	8,33
NO	0	0



Observing the absolute values as well the percentages, it becomes evident that for the three questions, most answers were affirmative, what leads us to the conclusion that the realized work contribute positively for the formation of the participants in self, hetero as well as eco formation.

It must be remarked that the sum of the values doesn't fulfill 100%, since some participants didn't answer all questions.

Conclusion and follow up

With these results we think it is possible to affirm that the trans-disciplinary approach to the environmental education of teachers brought an opportunity for find a new better way to work and in this context the school could better perform their social responsibility with the global formation of their students.

As it happened with the teachers from this public school, we approach different other groups with the trans-disciplinary praxis (University students, Post-graduation Students, health professionals, etc), achieving, usually, the same beneficial results of persons that, becoming more perceptive for themselves, the others, and the surroundings, end up establishing more harmonic relations and contributing to the consolidation of much healthier environments.

IL CIELO: UN AMBIENTE DA CONOSCERE E DIFENDERE. PROPOSTE DI DIDATTICA DELL'ASTRONOMIA

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Presentazione di proposte didattiche per rendere gli studenti, di diversi ordini di scuola, consapevoli del fatto che il nostro pianeta è unico, che la conoscenza del cielo è ed è stata importante per la crescita della conoscenza, che la salvaguardia della visione del cielo stellato è un valore.

Forse la terra non è l'unico pianeta abitato ma al momento non conosciamo altre forme di vita simili alla nostra su pianeti di altri sistemi stellari. La conoscenza e le sue sfide sono il bagaglio dell'uomo e il suo vanto. La conoscenza della natura e delle caratteristiche dei corpi celesti ne sono un esempio. Alcuni procedimenti possono essere riprodotti in classe alla maniera degli antichi per comprendere l'importanza del metodo e il valore dell'intelligenza dello scienziato. La bellezza del cielo stellato attira lo sguardo dell'uomo, adulto o bambino, la conoscenza dei fenomeni celesti è un arricchimento che contribuisce alla crescita umana culturale ed emotiva del bambino, del giovane, del cittadino.

Le attività proposte favoriscono questo coinvolgimento, sono adatte a studenti dalle scuole primarie alle secondarie oppure ad un pubblico generico e si prefiggono gli obiettivi di :sviluppare conoscenze scientifiche, sensibilizzare sulla delicatezza del sistema cielo-terra, favorire le capacità di sperimentazione attraverso l'uso di strumentini costruiti con materiale di poco costo e facile reperimento.

Le attività proposte sono: la misura del diametro del sole con un tubo di cartone e una prima indicazione sulla potenza assorbita (usando una guancia di studente!), la misura della costante solare a terra con valutazioni sull'assorbimento da parte dell'atmosfera terrestre con uno strumento (bolometro) costruito ad hoc, la misura del diametro terrestre con il metodo di Eratostene e il riconoscimento delle principali costellazioni del nostro emisfero con l'uso di un trovastelle di semplice realizzazione.

Un altro spunto di lavoro nelle classi fortemente legato all'ambiente è il tema dell'inquinamento luminoso per il quale non ho spazio in questo contesto se non per citare attività svolte indicate nel sito EAAE Italia www.pd.astro.it/eaae. Esse sono: un lavoro dell' Istituto Sociale di Torino presentato ad Atene (maggio 1999) al meeting della Dark Sky Association organizzato dalla rappresentante greca EAAE, l'insegnante Margarita Metaxa , e "Un francobollo per le stelle e la difesa del cielo stellato": scuola

elementare “Roberto D’Azeglio” di Torino (7 ottobre 2005: giornata nazionale delle Poste e filatelia e vigilia della giornata nazionale contro l’inquinamento luminoso).

Altre attività possibili legano l’astronomia all’arte, e di queste cito un’attività che ha preso spunto da una ricerca condotta dal prof. Giovanni Ferrero dell’Università di Genova. Egli ha ritrovato nelle sculture dei capitelli di una deliziosa chiesetta di Cortazzone, sulla collina di Asti, la “storia” cioè il resoconto di un’eclisse di sole del medioevo scolpito da un misterioso monaco.

La trasposizione didattica di questa ricerca ha coinvolto molto un gruppo di studenti ai quali è stata proposta l’attività. Disponiamo di poster per il confronto tra le indicazioni dei capitelli e la ricostruzione a computer del cielo nella sera dell’evento astronomico.

Come si vede dunque l’ambiente cielo offre spunti di attività didattiche molto diversificate che mi accingo ad esporre molto in sintesi. Naturalmente ogni insegnante sa valutare e adattare le proposte alle classi più idonee in base ai prerequisiti, competenze e finalità specifiche.

La misura del diametro del sole con un tubo di cartone è una prima indicazione della potenza assorbita.

Noi vogliamo calcolare quanto è grande e quanto scalda il sole usando materiale di facilissimo reperimento. Conoscendo la distanza terra sole (circa 150 milioni di Km, che si può ottenere da altre semplici esperienze) possiamo ricavare la misura del diametro solare utilizzando l’attrezzatura seguente: tubi di lunghezza diversa (50 cm, 80 cm, 1 metro o più) e, per ognuno, un foglio di carta translucida (carta forno ad esempio) e uno di alluminio (in cucina si nasconde molto materiale utile!) ed infine uno spillo. Dopo aver fissato alle due estremità dei tubi, rispettivamente un foglio di carta translucida e uno di alluminio, pratichiamo su quest’ultimo un piccolo foro in centro con lo spillo. Puntiamo il tubo al sole (ma non i nostri occhi!!!) e facciamo in modo che i raggi entrino paralleli al tubo esponendo al sole la parte con il foro di spillo. Noteremo, quando riusciamo a catturare l’immagine del sole proiettata dalla parte opposta, sul foglio translucido, che essa ha dimensioni diverse a seconda della lunghezza del tubo. Allora non resta che fare la proporzione: la distanza terra-sole e il diametro solare sono in proporzione come la lunghezza del tubo e la dimensione della macchiolina. Conosco tre grandezze e quindi calcolo la quarta (la misura del diametro del sole) con una semplice divisione.

La cosa più difficile è tenere fermo il tubo quando si riesce a catturare la macchiolina dell’immagine del sole e misurarla. Essa misura alcuni mm (dipende dalla lunghezza dei tubi come detto) e non dipende dalla larghezza del tubo. Si suggerisce di usare un cavalletto per appoggiare il tubo oppure la spalla di uno studente immobile! La distanza terra sole varia durante l’anno, ma è in media 149 600 000 Km. Utilizzando i dati che indicano la distanza giusta (più vicino il sole in inverno e più lontano in

estate, è bene ricordarlo) la misura del diametro del sole è ancora più precisa. Con un tubo di circa un metro, la macchiolina è circa 9- 10 mm.

Ma vogliamo fare di più. La lampadina “sole” di quanti Watt è? La potenza emessa da una lampadina misura l’energia erogata nell’unità di tempo. Prendo una lampadina da 100 W e voglio confrontare la sua potenza con quella del sole. Ho solo bisogno di un volontario /a. Disporre il suddetto volontario con una guancia al sole e gli occhi chiusi. Avvicinare, cominciando da una distanza di circa mezzo metro, all’altra guancia una lampadina da 100 W accesa. Quando lo studente sente lo stesso calore sulle due guance, si può ragionare sul fatto che l’energia irradiata da una sorgente, per unità di superficie, è proporzionale alla distanza al quadrato (una legge oggetto di tutti i programmi scolastici). Non resta dunque che fare la proporzione: la potenza del sole sta alla distanza terra-sole (al quadrato), come la potenza della lampadina (100 W) sta alla distanza guancia-lampadina (al quadrato) indicata dal volontario come la distanza giusta, quella cioè alla quale egli sente, sulle due guance, lo stesso calore. Questa distanza è circa 10 cm verificata con studenti di diversa sensibilità!

È interessante osservare che l’energia solare che ci arriva a terra è assorbita dall’atmosfera e in modo diverso a seconda della giornata: limpida, inquinata o nuvolosa e ovviamente dell’ora in cui si effettua la prova. Ripetere dunque l’esperienza in diverse giornate è fonte di interessanti spunti di discussione. Anche in questo caso si può andare a vedere che il valore della costante solare indicato dai libri di testo (circa 1400 W al metro quadrato) è sempre almeno dimezzato a terra, e in alcuni casi (forte inquinamento anche con cielo limpido, oppure cielo grigio e nuvoloso) ancora minore.

La misura della costante solare a terra con valutazioni sull’assorbimento da parte dell’atmosfera terrestre con uno strumento costruito ad hoc: il bolometro.

Sappiamo di poter considerare il Sole come un corpo nero che irraggia in modo uguale in tutte le direzioni. Scopo dell’attività è sperimentare come la costante solare cambi in funzione del diverso strato di atmosfera attraversato cioè delle ore di misurazione diverse nella giornata, dell’inquinamento atmosferico di una città come Torino. L’assorbimento infatti dipende dall’abbondanza di alcuni elementi presenti nell’atmosfera quali ozono, vapore acqueo, biossido di carbonio, metano, presenza e natura delle polveri. Lo strumento cattura luce, mangia energia (dal greco “bolos” cibo) deve essere costruito in modo che un dischetto di metallo, ben isolato termicamente, annerito con nero fumo sia esposto in modo perpendicolare ai raggi del sole. Una finestra leggermente più ampia della misura del dischetto si trova all’estremità opposta di un corto tubo del tipo di quelli usati dagli idraulici (in PVC), in cui è posizionato il dischetto. Praticiamo un foro in cui infilare il termometro nel dischetto, attraversando anche il tubo contenitore ed esponiamo il dispositivo al sole inclinandolo correttamente,

dopo aver individuato la direzione dei raggi solari con un apposito mirino (vedi figura). Iniziamo a registrare la temperatura ad intervalli regolari per circa 10 - 12 minuti. Conoscendo il calore specifico del metallo del dischetto, la sua massa e l'aumento di temperatura, ricaviamo il calore assorbito che divideremo per il tempo di osservazione registrato.

La misura del diametro terrestre con il metodo di Eratostene

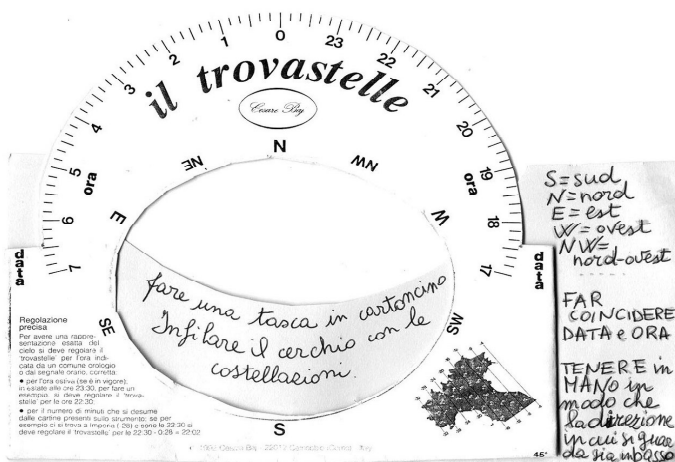
Si tratta di un'esperienza molto nota che quasi tutti i testi di scienze o di fisica di scuola superiore descrivono, ma è importante sottolinearne la valenza didattica se l'esperienza viene ripetuta con le classi. Come è noto Eratostene riuscì a calcolare, nel terzo secolo avanti Cristo, con una buona approssimazione la misura del raggio terrestre misurando la diversa inclinazione dei raggi solari al mezzogiorno in due punti dell'Egitto di cui conosceva la distanza. Egli aspettò il momento in cui nel pozzo di Siene (attuale Assuan) il sole penetrava in profondità illuminando il fondo: Siene si trova quasi sul tropico del Cancro e ciò si verifica al solstizio d'estate al mezzogiorno. Confrontò questo con l'inclinazione dei raggi rispetto alla verticale in quel medesimo istante ad Alessandria d'Egitto, distante un certo numero di giorni di cammino a cammello e circa sul medesimo meridiano, accordandosi ovviamente con un collaboratore! Conoscendo l'angolo al centro (del valore poco superiore a 7 gradi anche se non era questa l'unità usata) e la corda sottesa cioè la distanza Siene-Alessandria, si ricava il lato dell'angolo cioè il raggio terrestre. In altri termini avendo egli trovato che alla distanza Siene-Alessandria corrisponde un angolo pari ad un cinquantesimo di angolo giro, ottenne la circonferenza terrestre moltiplicando per 50 la distanza tra i luoghi di osservazione.

Al giorno d'oggi gli studenti sul medesimo (o quasi) meridiano si mettono in comunicazione attraverso la rete e confrontano in tempo reale i dati di misurazione delle ombre di paletti piantati nel terreno in modo perfettamente perpendicolare. Ovviamente alle nostre latitudini il sole non è a picco come nel pozzo di Siene che si trova sulla linea del tropico, ma il principio del confronto di inclinazione dei raggi attraverso la lunghezza dell'ombra di un paletto è identico. Muniti di righello, carta geografica, goniometro e un po' di precisione si raggiungono risultati di tutto rispetto.

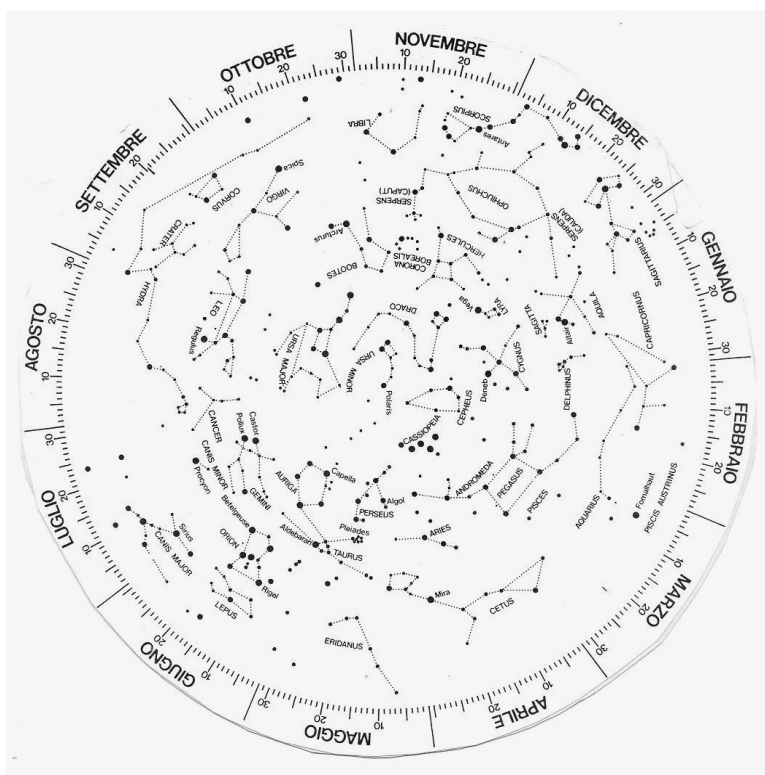
Il trovastelle

Seguendo le indicazioni della figura si può facilmente costruire questo strumentino (che era in vendita alcuni anni fa nei negozi Natura and Co di C. Bay).

Ulteriori indicazioni su: <http://cddazeglioto.scuole.piemonte.it>, alla voce anno della fisica-attività mostra.

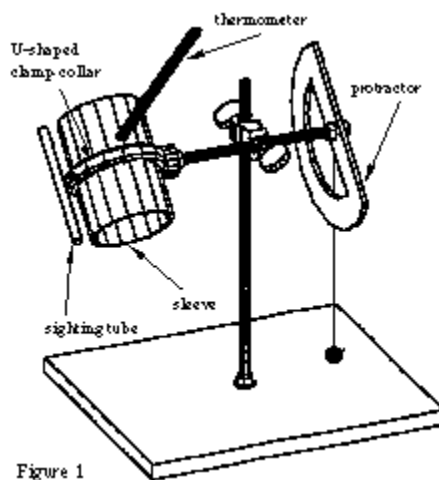
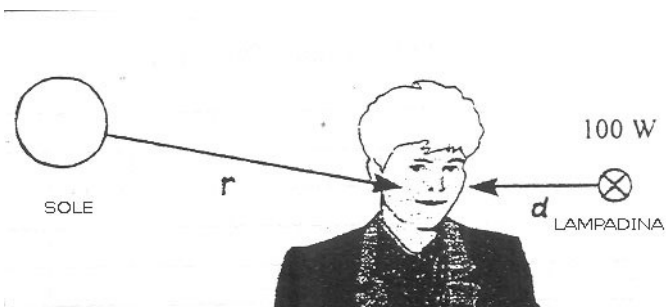


Disegno dalla proposta dell'insegnante Rainer Gaitsch , socio EAAE della Germania





Studenti dell'Istituto Sup. "D. Birago" di Torino, con i tubi di cartone.



Il bolometro. Figura tratta da Newsletter n.1 EAAE pagina 15 Luglio '95.
Riferimento: gruppo francese del CLEA.

ANALISI DELL'OFFERTA EDUCATIVA: PRIMO PASSO PER LA CREAZIONE DI RETI TRA OPERATORI

Maria Antonietta Quadrelli

Responsabile Ufficio Educazione WWF Italia

In Italia, a partire dagli anni Ottanta, sono aumentati i soggetti che operano nel campo dell'educazione ambientale, del turismo scolastico, della sensibilizzazione, della formazione: dalle associazioni ambientaliste storiche ai comitati locali, dagli enti pubblici a quelli privati.

La ricerca, che viene presentata come un modello da riproporre, parte dall'ipotesi che, volendo far crescere la qualità degli interventi di educazione ambientale attraverso la formazione, e in particolare la formazione di formatori, si debba tenere conto degli operatori che sul territorio offrono alla scuola e ai cittadini interventi di educazione ambientale, nella convinzione che gli operatori del settore siano i primi soggetti da supportare.

Attraverso la ricerca si voleva prima di tutto: realizzare la mappatura dell'offerta educativa in termini di operatori, servizi e strutture; conoscere il mondo degli operatori; far acquisire consapevolezza della propria identità ai soggetti presenti sul territorio; recuperare la progettazione diffusa; favorire la messa in rete delle competenze presenti sul territorio, mettendo in collegamento gli operatori che a vario titolo si occupano di educazione ambientale nel territorio; rendere più efficiente ed efficace il lavoro degli operatori del settore.

La ricerca è partita all'interno di aree protette con tre indagini che hanno analizzato e messo a confronto:

- Il Parco Agricolo Sud Milano, un parco di cintura metropolitana nel 1997 e 1999.
- Il Parco Nazionale dello Stelvio, settore lombardo, un parco nazionale, nel 2001.

Cioè due contesti territoriali profondamente diversi, un parco agricolo di cintura metropolitana il cui territorio si situa tutto all'interno della provincia di Milano, e un parco nazionale nel territorio alpino.

Il progetto prevedeva la mappatura dell'offerta educativa all'interno dell'area protetta attraverso l'individuazione dei soggetti presenti, la somministrazione di un questionario/traccia di intervista, la sua trascrizione e la validazione del risultato da parte del soggetto intervistato. I contenuti dell'intervista erano l'auto descrizione del soggetto, l'elenco delle tipologie delle iniziative svolte, i destinatari dei loro interventi, le tematiche trattate, le collaborazioni con altri enti e i progetti futuri.

La ricerca seguiva le modalità della ricerca intervento, che già nella fase di raccolta dati produce un cambiamento rendendo i soggetti, dal

momento stesso in cui si devono valorizzare attraverso l'intervista, più consapevoli di se stessi. Mentre l'analisi critica dei dati emersi dalla ricerca fornisce agli Enti Gestori elementi per intervenire con azioni formative mirate, con azioni di orientamento e di raccordo rivolte ai vari soggetti individuati. Dall'interpretazione dei dati raccolti, infatti, si possono individuare le risorse presenti da valorizzare e i punti critici su cui intervenire.

Parco Agricolo Sud Milano

- Istituito nel 1990.
- 48000 ha in area di cintura metropolitana (provincia di Milano).
- 61 Comuni.
- 48 Strutture.
- Cascine.
- Musei.
- Monumenti.
- Aree naturali.
- Organizzate per la fruizione con personale.
- 129 Soggetti.
- 62 Amministrazioni Pubbliche.
- 52 Associazioni.
- 9 Enti pubblici.
- 3 Società.
- 4 Altro.
- Tipologie di attività.
- Uscite sul territorio 27%.
- Produzione materiali 23 %.
- Lezioni in classe 15%.
- Cicli/progetti 15%.
- Formazione docenti 11%.
- Iniziative di sensibilizzazione 10%.
- Argomenti trattati.
- Caratteristiche del territorio 51%.
- Problematiche del territorio 24%.
- Problematiche globali 10%.
- Qualità della vita in città 8%.
- Altro 7%.

Parco Nazionale dello Stelvio

- 63.000 ha in provincia di Sondrio e Brescia.
- 10 comuni.
- 15 Strutture.
- Orti botanici.
- Musei.
- Centri faunistici.

- Monumenti.
- Aree naturali.
- Organizzate per la fruizione.
- 55 Soggetti.
- 10 Comuni.
- 14 Associazioni.
- 20 Enti pubblici.
- 5 Società.
- 6 Altro.
- Tipologie di attività.
- Trekking e soggiorni 32%.
- Uscite didattiche 20%.
- Formazione docenti 20%.
- Proposta di percorsi didattici 16%.
- Iniziative di sensibilizzazione 8%.
- Lezioni in classe 4%.
- Argomenti trattati.
- Caratteristiche fisiche del territorio 54%.
- Caratteristiche storiche culturali del territorio 24%.
- Sistema delle acque 22%.

Mettere in rete queste realtà, creare nuove forme di confronto, valorizzarle, orientarle rispetto ai propri fini è sicuramente un compito importante di un Ente Parco nell'ottica di incentivare nuove forme di occupazione, attivare nuovi processi produttivi che nel territorio, attraverso l'offerta di servizi nel campo dell'educazione ambientale e del turismo; in conclusione, incrementare lo sviluppo.

Sicuramente questo tipo di ricerca comporta i seguenti risultati: i soggetti si descrivono e nel farlo prendono consapevolezza di essere inseriti in un sistema con sovrapposizioni, similitudini e differenze. Un altro importante prodotto di questa indagine è la documentazione delle attività.

Da tutte le indagini, indipendentemente dal periodo e dalle caratteristiche del territorio emerge che la quasi totalità dei soggetti censiti si muove sul territorio programmando i propri interventi, nella stragrande maggioranza dei casi, in modo non coordinato e sicuramente meno efficace ed efficiente di quanto potrebbe essere se queste realtà si confrontassero e seguissero un orientamento concordato. Si tratta comunque di realtà caratterizzate da una forte motivazione, con competenze specifiche e un fortissimo legame con il territorio in cui operano. Per contro la scarsa consapevolezza del ruolo che giocano e del contesto in cui si trovano, come anche la mancanza di coordinamento, di documentazione e il forte livello di sovrapposizione, dettato spesso dalla tipologia dei finanziamenti, rende difficile una trasformazione in rete, un recupero della progettualità diffusa, una crescita in termini di efficacia ed efficienza.

Per favorire il passaggio da un intervento di educazione ambientale inconsapevole e sordinato a un intervento più maturo e professionale

alimentato dal confronto tra le attività dei vari operatori e dalla storicizzazione degli interventi c'è molto ancora da fare. Spesso di fronte alla ricchezza e varietà dei soggetti e dei progetti, gli enti preposti manifestano una grande difficoltà. Il percorso di valorizzazione e di coinvolgimento dell'esistente sembra un percorso difficile da attuare. Eppure ci sembra importante e maggiormente coerente il fatto di non perdere e far crescere questo patrimonio umano proprio partendo dalla sua conoscenza per impostare interventi di formazione e costruzione di reti.

SCIENCE-ART CONNECTION: USING A CONTEMPORARY ART MUSEUM AS ENVIRONMENTAL LITERACY TOOL FOR PRE-SERVICE SCIENCE TEACHERS.

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Abstract

In connection with the opening exhibition, “Emergencies”, at the MUSAC - Contemporary Art Museum of Castilla y León - (Spain), with a distinct environmental approach, teaching units including pre- and post-visit activities were developed to widen the conception of visiting pre-service science teachers about environmental problems.

Keywords: No-formal learning. Museum as educational tool. Environmental education. Training of teachers

Aprovechando la reciente inauguración del Museo de Arte Contemporáneo de Castilla y León, MUSAC, se ha utilizado su primera exposición, “Emergencias”, con un fuerte contenido ambiental, para explorar y ampliar las concepciones sobre el medio ambiente y el desarrollo sostenible en los estudiantes para Maestro.

Palabras clave: Aprendizaje no formal. Utilización educativa de museos. Educación ambiental. Formación de profesores.

Objetivos

- Ampliar las concepciones de los futuros profesores de ciencias sobre los problemas ambientales que padece el mundo.
- Explorar la utilización de museos no científicos en la formación ambiental de maestros en formación.

Introducción

En abril de 2005 abrió sus puertas el museo de Arte Contemporáneo de Castilla y León (MUSAC) con una magnífica exposición inaugural en la que bajo el título “Emergencias” se mostraba de manera clara cómo el mundo del arte contemporáneo está comprometido con la situación de emergencia

planetaria que actualmente padece la humanidad. La exposición utilizaba el arte contemporáneo emergente para lanzar una mirada general a las situaciones de crisis en el mundo. Se creaba así un espacio para la reflexión donde el espectador, a través del arte, percibía y se sentía afectado por algunos problemas acuciantes de nuestra sociedad como son la destrucción del medio ambiente, los conflictos armados, los movimientos migratorios, las nuevas estructuras sociales o las emergencias culturales, entre otros.

Como profesores de Ciencias nos llamó inmediatamente la atención esta preocupación del mundo artístico en contraste con la escasa atención que la educación científica muestra hacia la formación ambiental de los estudiantes, a pesar de las llamadas que las conferencias mundiales efectúan insistentemente sobre la necesidad de formar ciudadanos comprometidos con el medioambiente como única vía hacia la sostenibilidad. Por ello nos propusimos aprovechar la oportunidad que nos proporcionaba tener en nuestra ciudad la citada exposición y decidimos utilizarla para intentar mejorar la formación ambiental de nuestros alumnos.

Marco teórico

- El trabajo que describimos asume dos premisas fundamentales: la primera es que el conocimiento ambiental posee una componente fuertemente interdisciplinar, y la segunda, que las situaciones de aprendizaje no formal ofrecen oportunidades para la alfabetización ambiental, tanto en el ámbito del currículum escolar como para la población escolarizada. Incorporar estas ideas a la formación de profesores conduce a que se deba mejorar la formación interdisciplinar de los mismos y a que sean capaces de utilizar espacios educativos no formales en su práctica docente.
- El concepto de medio ambiente incluye tanto realidades naturales como otras de tipo urbano, social, cultural, etc. En consecuencia el conocimiento ambiental integra saberes diversos, a menudo generados en ámbitos que no son epistemológicamente coherentes. Los profesores comprometidos con la educación ambiental se enfrentan, por tanto, al reto de superar la visión reduccionista que les ofrece su formación inicial. En concreto los profesores de ciencias deben superar la tendencia a considerar prioritariamente los sistemas naturales e integrar factores sociales, culturales, políticos y económicos en su visión del mundo (Fien, 1995; Tilbury, 1995; Edwards et al., 2004) lo que les resulta difícil.

El aprendizaje en situaciones no formales y las experiencias extraescolares se han fomentado desde diversos sistemas educativos como medio para acrecentar el interés y la motivación de los estudiantes. Los museos constituyen contextos no formales de aprendizaje que han sido estudiados en profundidad como medio para mejorar la alfabetización científica tanto en adultos como en niños y adolescentes escolarizados.

Generalmente se han utilizado visitas a museos de ciencias como medio para mejorar la comprensión de conceptos científicos o ambientales, aunque no tenemos constancia de la utilización de museos de arte para lograr fines similares. Algunos investigadores han mostrado las limitaciones que presentan para mediar en el aprendizaje de conceptos nuevos (Bitgood, 1989), sin embargo otros estudios han mostrado que las visitas a museos en combinación con actividades previas y/o posteriores, pueden proporcionar rendimientos de aprendizaje considerables (Henriksen y Jorbe 2001).

En este trabajo hemos utilizado una visita a un museo de Arte Contemporáneo combinada con actividades previas y posteriores con el fin de ampliar la visión ambiental de futuros maestros de educación primaria.

Exposición “Emergencias”

Emergencias presentó por primera vez al público una parte de la colección MUSAC. Este proyecto inaugural pretendía ser una llamada de atención sobre las problemáticas urgentes de nuestra sociedad. La muestra, que ocupaba todo el espacio expositivo de este nuevo museo (5 salas y más de 3.400 metros cuadrados), exhibía obras de 55 artistas que reflejaban estas “emergencias” planetarias. En la Tabla 1 se recogen las obras presentes en la exposición Emergencias, agrupadas en las categorías que hemos denominado “emergencias” y que se refieren a distintos tipos de necesidades apremiantes de nuestro mundo (las obras pueden consultarse en el catálogo de la exposición que acompañamos en la presentación de este trabajo o en la página web del museo <http://www.musac.org.es>).

Emergencias	Obras/autores
problemas que surgen y parten del medio ambiente	Ohne Titel XIII (México)/Andreas Gursky; serie Black Tide (Marea Negra)/Allan Sekula; Supergas/Superflex
los distintos tipos de discriminación	Espejito/Pilar Albarracín; Paraíso/Carmela García; Sin título nº1 casa de campo/Cristina García Rodero; Dream of Beauty 3.1/Kirsten Geisler; Antonio, serie utópicos 2004/Pierre Gonnord; Paradise omeros/Isaac Julián; Mujeres peligrosas/Gilda Mantilla; Serie instrumentos de tortura/Marina Núñez; Flame(Capriccio)/Julia Montilla; Scarred for life II serie/Tracey Moffatt, Dorian Gray/Yinka Shonibare; De la serie Now that You Are Mine/Trine Sondergaard; Burka/Joana Vasconcelos
desigualdad	Serie American Night/Paul Graham; Paisaje11/Ángel Marcos; serie case histoty/Boris Mikhailov; serie Sugarcane/Zwelethu Mthethwa; Santos inocentes/Jorge Pineda.

puntos en conflicto	Serie History/Luc Delahaye; United Nations Miniatura/Thomas Hirschhorn; Un Charco de sangre, poema/Jorge Macchi; Solid Sea 03: The Road Map/Multiplicity; Carretera entre Prizren y Djakovica cerca de Meja, el 14 de abril de 1999/Simeón Saiz; zarabanda/Pepo Salazar
ocupación espacial	Residente pulido. Ranchos (serie)/Alexander Apóstol; Suburbia/Sergio Belinchón; Reykjavik-Series/Olafur Eliasson; What We Want-TOKYO-D01AB/Francesco Jodice; Caracas: House with Extended Territory/Marjetica Potrc; Das nachste Mal/Next Time/Corinna Schnitt
movimientos migratorios	No/w/here/Rogelio López Cuenca; Estrecho/Valeriano López; Travelbox (Wayaway)/El Perro
la alienación del hombre	A room whith a view/Shoja Azari; Rehaznos to Belice/Marc Bijl; Joy of my life/Daniel Buetti; Mayday at Mayfair (serie)/Immo Klink; Climate/Iñigo Manglano-Ovalle; Boot/Toni Oursler; Crash course/Sven Pahlsson; Emergency Observer Trip/Fernando Sánchez Castillo
emergencias culturales	Visita Guiada/Sandra Gamarra; Utopia/Mujeres Creando; Dammi i colori/Anri Sala; Video art: The iberoamerican legend/Martín Sastre
nuevas estructuras sociales	Tänään Today/Eija-Liisa Ahtila; En círculo II/Mira Bernabeu; La familia/Enrique Marty
el continente africano como "emergencia"	Emergency/Alfredo Jaar

Tabla 1

Metodología

En este trabajo han participado 36 alumnos de segundo curso de la carrera de Maestro de Educación Primaria. La actividad se ha desarrollado como parte de la asignatura de Ciencias de la Naturaleza y su Didáctica.

Hemos considerado 4 fases en el desarrollo de esta actividad:

- Test para explorar las concepciones previas sobre los problemas ambientales.
- Visita al MUSAC.
- Debate en gran grupo sobre los temas ambientales presentes en la exposición. Consenso sobre las emergencias ambientales planetarias.
- Trabajo en equipo sobre las distintas emergencias ambientales consensuadas en la fase anterior.

El debate en gran grupo que tienen lugar en la fase tercera se realizó durante una de las clases presenciales de la asignatura.

Resultados y discusión

Para indagar las ideas previas sobre “problemas ambientales” se pidió a los participantes que contestaran por escrito la pregunta ¿Cuáles son, en tu opinión, los principales problemas ambientales que afectan a nuestro planeta? Las respuestas mostraron un claro sesgo hacia el medio natural, incluso reducida a los problemas directamente relacionados con la contaminación, y una ausencia significativa de referencias socio-culturales (ver Tabla 2).

La visita al MUSAC funcionó como desencadenante de la actividad propiamente dicha. Para visitar el museo se les dejó libertad absoluta a los participantes para que lo hicieran por su cuenta solos, acompañados o en grupo. El museo dispone de un servicio gratuito de guías aunque ninguno de los participantes lo utilizó. Todos recogieron, por indicación expresa, la guía/periódico de la exposición.

La semana siguiente a la visita al museo se celebró un debate en gran grupo, centrado en el contenido ambiental de la exposición visitada. Se inicia con dos preguntas:

- ¿Qué temas importantes has visto o crees que son tratados en la exposición?
- ¿Cuáles de ellos te parece que son temas ambientales o que tienen relación directa con el medio ambiente?

Cuatro obras fueron relacionadas directamente, desde el primer momento, con la problemática ambiental por los futuros profesores de ciencia: las referidas a vertederos, marea negra del Prestige, producción de biogas y desmontes. Son aquellas que hacen referencia expresa al medio natural y la contaminación pero también se identifica rápidamente problemas más globales relacionados con el cambio climático.

A pesar de que hay en la exposición obras que de forma directa se refieren a la guerra - la que mayor superficie ocupa en la exposición - la emigración, la desculturización, la discriminación de la mujer, el conflicto judío-palestino, el consumismo, etc. en una primera lectura de la exposición sólo tres participantes identificaron los desequilibrios entre grupos humanos o el crecimiento urbano desordenado como aspectos de la problemática ambiental.

Pronto surgieron contribuciones de los participantes apuntando hacia problemas ambientales, tratados explícitamente en la exposición, que trascienden el medio natural, pero que aparecieron de forma desestructurada y fragmentada y el profesor tuvo que asumir el papel de moderador, dinamizando el debate y buscando elementos estructurantes.

Para dinamizar el debate se utilizaron preguntas elaboradas previamente, referentes al contenido del MUSAC:

- ¿Es la guerra un problema ambiental?
- Una autopista, ¿es un problema ambiental en cuanto barrera del medio natural? Y el muro de “seguridad” que construye Israel entre su territorio y Cisjordania, ¿es un problema ambiental?
- ¿Son temas ambientales la globalización, los movimientos humanos, los movimientos económicos, la desculturización?...

Como conclusión del debate los alumnos decidieron por consenso las principales emergencias ambientales que afectan a la humanidad y que debían ser objeto de trabajo posterior en pequeño grupo. Como se ve en la Tabla 2, el rango de los problemas ambientales que los alumnos consideraban importantes en esta fase (contaminación, cambio climático, agotamiento o deterioro de los recursos naturales, crecimiento urbano desordenado, pérdida de diversidad cultural, desequilibrios entre grupos humanos, nuevas estructuras sociales) se mostró mucho más amplio que en el test previo.

Emergencias ambientales consensuadas	Test previo (participantes que detectan la emergencia)
Contaminación	33
Cambio climático	9
Deterioro de los recursos naturales	11
Crecimiento urbano desordenado	1
Desequilibrios entre grupos humanos	2
Pérdida de diversidad cultural	0
Nuevas estructuras sociales	0

Tabla 2

Por último, siguiendo las indicaciones de Gil et al. (2005), los trabajos de los distintos equipos fueron puestos en común y cotejados con información especializada proporcionada por el profesor para favorecer una discusión global de una cierta profundidad.

Conclusiones

La sola visita al museo no parece suficiente para ampliar la consideración de los problemas ambientales a los temas sociales. Es cierto que en bastantes casos se empieza a ver una relación entre la consideración del entramado social como parte del Medio Ambiente y la visita al museo de arte contemporáneo, pero es principalmente después del trabajo en equipo, y la confrontación en gran grupo, cuando el Medio Ambiente se contempla como una confluencia del medio natural, el medio social y el medio económico o tecnológico. Parece que el diálogo o discusión se muestra

como fundamental para “observar” el arte contemporáneo y, en nuestro caso, también para descubrir esas “emergencias” ambientales.

El simple hecho de utilizar un museo de arte en el contexto de la enseñanza/aprendizaje de las Ciencias produce cierta “perplejidad” - e incluso rechazo - entre los alumnos y resulta un buen punto de partida para la toma de conciencia por parte de éstos de la necesidad de abordar la problemática ambiental desde un punto de vista interdisciplinar.

El mundo del arte contemporáneo muestra, desde su particular perspectiva, una gran preocupación por los problemas que afectan a la sostenibilidad de nuestro planeta. Creemos que se puede complementar la formación ambiental de los profesores de ciencias con la mirada que propone el arte contemporáneo.

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EDUCATION FOR SUSTAINABLE DEVELOPMENT IN PRESCHOOL INSTITUTIONS. DEVELOPMENT AND TESTING OF A TRAINING CONCEPT FOR SCHLESWIG-HOLSTEIN (GERMANY)

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Education for Sustainable Development

During the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992, more than 178 governments adopted the Agenda 21 and thus the concept of sustainable development as a global mission statement. Sustainable development is understood as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

Sustainable development as a comprehensive societal modernization concept requires an innovative advancement of education in all areas: from preschool to adult education. It is the objective of education to establish a better understanding for ecological, economic and social problems, and to stimulate society’s reflection about ethical questions. In addition, education should support people’s consciousness structures, competences, attitudes and values in terms of sustainability. This requires a change of perspective in education, a re-orientation towards an Education for Sustainable Development (ESD).

The comprehensive education objective of ESD is the acquisition of “Gestaltungskompetenz” (de Haan/Harenberg, 1999).

“Gestaltungskompetenz” is defined as “the forward-looking ability to actively modify and shape the future of societies in which we live in terms of sustainable development”. The structuring and the organisation of the future require considerable competences from everyone who is involved in communication and decision processes. The entirety of these competences is summarized in the term “Gestaltungskompetenz”.

It is the duty of all educational institutions to intensively deal with the matters of sustainable development. In the last years, the implementation of ESD in Germany particularly advanced in school institutions, which is mostly due to the program “21” (BLK, 2005). In contrast, the field of preschool education has been neglected until now, with only a few model projects for the integration of ESD in this educational area.

Education for Sustainable Development in Preschool Institutions

Sustainability is not meant to be a new topic for didactic efforts in preschool institutions but as an overall concept, providing orientation for the choice and the arrangements of projects and didactic concepts. The themes and the perspectives regarding content mentioned in the concept of ESD may be taken as a basis in preschool institutions, in order to sensitise the children for the natural basics on which life depends, to enhance their perceptivity, but also to help them to look behind the things after doing some research of their own. In addition, ESD contributes to the children's personality development. Whatever the children learn in preschool institutions (comprehension, knowledge, experience) forms the foundation for educational processes in school, vocational school, higher education institutions and for learning outside school, finally for processes of lifelong learning.

Approaches of environmental education already existing in preschool education should be complemented by social, economic and cultural aspects, in order to enhance integrative, networked thinking. New findings in developmental psychology, learning and scientific theory show that such approaches do not pose excessive demands on children.

Project work is the central methodical approach for ESD in preschool institutions. Projects with a serious character enable the acquisition of "Gestaltungskompetenz". At the same time, they may contribute to a sustainable organisation of the kindergarten and/or its surroundings. In "serious situations", children may experience self-efficacy and they may learn "to take responsibility for themselves and for others" (Godemann, 2002). Thus, in such projects, the kids may deal, e.g., with their routes to the kindergarten, with the origin of the foods used in the institution or with different cultures (taking children with a migratory background as example). Then, they may become constructively active in this area.

ESD does not only have consequences for the pedagogical work in preschool institutions, but also for the kindergarten as an organisation and for its integration in the communal environment (Wüst, 1998; Stoltenberg, 2005). An integration of ESD into the pedagogical work requires that the kindergarten itself as an organisation is analysed. It should become a location where the children - as well as their teachers and their parents - can experience sustainability. This requires a sustainable organisation of the institution "kindergarten"; the central question is about how to handle the existing resources. In addition, structures need to be created that permit a true participation of the children.

Furthermore, the external relations of the kindergarten and thus its integration into the communal environment need to be analysed. Kindergartens should take responsibility for the community and contribute to a sustainable development on the communal level. This is possible, e.g., by participating in a Local Agenda 21 process, or by taking part in other communal planning processes relevant for sustainability. Conjoint projects with communal partners enable participative experiences in "serious situations". Such freedoms and possibilities may hardly be provided by a kindergarten alone, without any co-operation.

A fundamental prerequisite for the integration of the concept of sustainability into preschool educational practice is finally the complementary training of skilled employees in the preschool education. ESD should become a fundamental part of education and further education in order to enable the kindergarten instructors to integrate the concept of sustainability into their work.

Model Project in Schleswig-Holstein

At the end of 2003, the Institute for Environmental and Sustainability Communication of the University of Lüneburg (INFU) was assigned by the Ministry for the Environment, Nature Conservation and Agriculture of Schleswig-Holstein to develop a practice-relevant further education offer about ESD for multipliers, to conduct an exemplary education seminar, and to evaluate this.

The development of a concept for the further education offer (Stoltenberg et al., 2004) was supposed to promote the implementation of ESD in preschool education. In the summer 2004, a two-part model seminar was offered for teachers of vocational schools for social pedagogy (who themselves educate kindergarten instructors), directors of preschool institutions and expert advisors for kindergartens.

The model seminar was offered in two parts with a duration of three days each. The first part took place from April 21st to April 23rd 2004 in the Nordseeakademie in Leck. After a six-week gap, the second part took place from June 9th to June 11th 2004 in the Umweltakademie in Neumünster. The gap between the two seminar parts was considered appropriate to enable the participants to reflect on the ideas and approaches introduced in the first seminar part, and to test them in their own workspace. In addition, the project work group had time to organise a meeting in order to critically analyse the first part (fig.1).

The seminar was planned for 20-25 participants; finally, more than thirty persons took part. Every interested vocational school should send at least two persons. Thus, the reflection of the concepts introduced should take place in small groups in every institution. Then, via a common engagement, a larger multiplier effect was to be created.

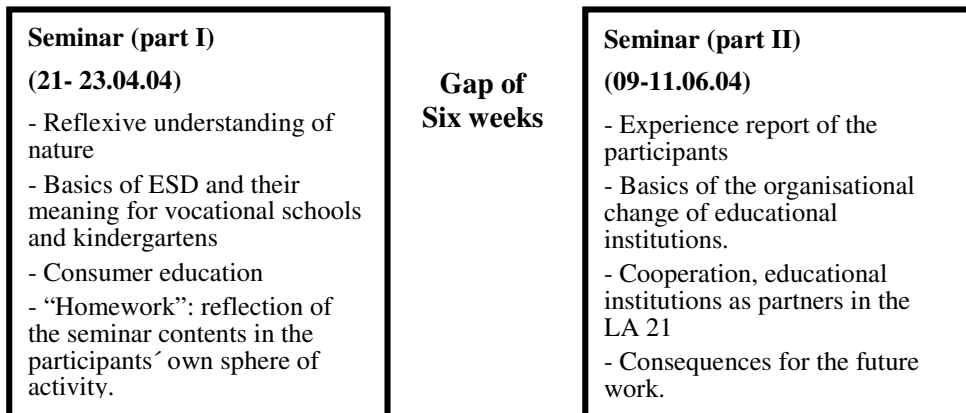


Fig. 1. structure of the model seminar

Fig. 1 shows the rough structure of the seminar. After an introduction and after getting to know the other participants, the module “reflexive understanding of nature” formed the first lead into the seminar contents. Afterwards, the group dealt with the “basics of ESD and their meaning for vocational schools and kindergartens” as well as with the “consumer education”. At the end of the first seminar part, possible approaches for the implementation of the seminar contents into the participants’ own sphere of activity were addressed and discussed. The participants were assigned the “homework” to carry the seminar contents back into their institutions, and to consider the possibilities for an implementation of ESD into their organisation. The second part of the seminar started with the experience reports concerning the “homework”. The participants presented their experiences and put them down for discussion. Subsequently, the modules “basics of the organisational change of educational institutions” and “cooperation and educational institutions as partners in the Local Agenda 21” were introduced, considering the examples of vocational schools and kindergartens. The seminar closed with a discussion about the consequences of the seminar contents for the participants’ future work in their respective institutions (vocational training, specialist counselling). Throughout the entire seminar, aspects of gender, participation, and of course the one-world-aspect (which is an inherent part of the concept of sustainability) were taken into account as cross-sectional topics.

Results and Recommendations

The contents brought up in the seminar were met with interest by the participants and could well be connected to their existing knowledge and experiences. The vast majority of the participants carried the seminar contents back into their own institutions and - via the topics and methods covered in the seminar - received inspirations for their own education practice and for the reflection of own behaviour patterns, too. In addition, they started new projects in their institutions against the background of education for sustainable development, or they made modifications to their own educational practice, respectively.

The seminar succeeded in carrying the concept of education for sustainable development into the preschool education system of Schleswig-Holstein, particularly into the vocational schools of which almost every one was reached. Additionally, the project served as an innovative contribution for the integration of ESD into the preschool education, even across the borders of Schleswig-Holstein.

Now it is necessary to put the effects of the model seminar on an ongoing basis and to broaden them. This first realisation of the model seminar leads to the following recommendations concerning a further implementation of ESD in preschool education:

- More training about ESD in preschool education should be offered. Such additional trainings are necessary to enable a wide implementation of this educational concept.
- Possibilities for exchanges, e.g. work groups “education for sustainable development in preschool education” should be created on the Federal State level.
- Model projects for the realisation of ESD in preschool education should be promoted.
- The guidelines for the education of kindergarten educators should be revised, and the concepts of ESD should be integrated in those guidelines.
- Consulting services and scientific monitoring for the implementation of ESD should be accessible for kindergartens, concerning financing possibilities as well as regarding information.

The world decade “Education for Sustainable Development” (2005-2014) offers perspectives for an intensified perception of ESD, for the networking of different educational levels and their actors, and thus finally for an establishment of ESD all over the country. Finally, one hopes that the activities carried out in the framework of the UN decade will lead to a further progress concerning the implementation of ESD, particularly in the preschool education.

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LEARNING BIODIVERSITY: THE “GREEN CLASSROOM”

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Since 1997 the Pangea Institute, within the framework of the “Labnet Lazio” Project, is carrying out a training programme on biodiversity and landscape conservation in Protected Areas of Lazio Region. The training activities involve pupils and schoolteachers of all grades.

Training is considered fundamental for the success of every Environmental Education project; it gives an effective answer to the most recent international recommendations, such as those of “Parks for Life”, “Agenda 21” and “Education for Sustainable Development”, as well as to the pan-European initiative “Countdown 2010”, promoted by governments and NGOs and aimed to halt the loss of biodiversity within 2010 with concrete actions. Actually, this international framework encourages the promotion and development of education programmes aimed to better the integration of Protected Areas with local communities, enhancing public awareness on conservation and sustainable development policies.

In the project hereby presented, training of schoolteachers was organized into two steps: first, both theoretical and practical training courses were realized; then the tutoring of designing and field activities was undertaken, aimed to create a green classroom.

Why have we decided to educate on biodiversity values and conservation through the creation of a green classroom? Because our green classroom is a space designed to run concrete field work, to get in touch with the environment (of which it reflects the essential features), to experience nature processes, to open to children and adults a wide variety of discoveries, surprises and different activities that will continue after the two years needed to build it up. Thanks to a green classroom, the school and its teachers become permanent promoters of training, encouraging the development of the green classroom from a simple space for study and research into a “laboratory of relationship”, where ideas and behaviours gather together and can be compared. Training is particularly important as the creation and the enjoyment/use of a green classroom can involve, by the mean of the schools, the citizens of all ages, developing their interest toward the territory and bringing them in the “core” of the local biodiversity conservation issues.

The activities carried out within the project

Training activities were developed into two consecutive steps: ten basic courses on environmental education, followed by six advanced

courses, three about “Parks and Biodiversity” and three about “Landscape as a Bank for the Future”. Schoolteachers of all grades from Lazio Region participated in the courses; the courses, which were residential and lasted forty hours, were held in Sabaudia, within the Circeo National Park, where it is possible to carry out many field activities.

These courses were followed by seven afternoon short courses of twenty-four hours, each intended for schoolteachers of single schools, on the specific theme of Designing and creating a Green Classroom.

Most of the schoolteachers followed the entire training programme; some others were involved by their colleagues and had part in the process at different level afterwards.

At the end of the training the schoolteachers gained motivation, knowledge, and specific techniques and methodologies for conducting environmental studies. Putting into practice the methods learnt they also acquired skills to work together and were able to turn problems into opportunities.

The training activities were followed by the participatory design of educational programmes on biodiversity, then by the tutoring of the programmes. The Local Administrations, the Protected Areas and the National Forest Corps were involved; the Forest Corps also provided some of the plants needed from its nurseries.

Moreover, before starting to build up a green classroom, an evaluation system of the environmental education programme was developed.

Usually, before starting to build up a green classroom it is necessary to study the surrounding gathering a bibliography, making up proper field instruments and running field activities aimed to know the natural environment where the green classroom will be created. The following step consists in making a map with: the habitats to be reproduced (meadow, wood, hedge, rocky garden, pond, kitchen-garden, garden of “senses”); the space to be settled down (walls, corridors, structures for wheelchairs); the “furniture”, such as greenhouses, nests for birds, weather station, compost bin, water tanks.

To complete the design of the green classroom a list of the plants to be planted is needed, as well as a list of the needed materials (garden equipments, pots) and the estimate of costs. Finally, it is possible to start the planting phase.

When the green classroom has been built up, the project is not finished but it starts right then. Maintenance must be provided and, since this time, the natural processes will start and biological cycles can begin to be observed, the animals will arrive and the biodiversity will increase by the time.

The “Labnet Lazio” project, within which the schoolteachers were trained and several environmental education projects were developed, also provided the production of the booklets *Reading the Nature*, full of educational ideas, worksheets and deepening. Besides other titles, the series contains the handbook for schoolteachers “A lesson in a green classroom” and an exercise book for pupils “Budding students”.

The results

Thanks to the continuous assistance and expertise of the Pangea Institute's educators and to the help provided by ad hoc educational materials, the training programme made the schoolteachers more independent and self-confident. In slightly more than three years more than fifty green classrooms were built up, 500 schoolteachers and 5000 pupils were involved. Moreover, through the participation of local communities, the biodiversity conservation policies were enhanced.

Some pupils who were involved in the building up of a green classroom had a very rich experience and defined this special space like "a classroom with an everyday changing ceiling, with walls made up of soft or thorny leaves, and a floor on which everything falling down can grow up, provoking the pleasure of the observation and discovery".

The "Istituto Pangea ONLUS".

Pangea Institute-European Institute for Environmental Education and Training

The Pangea Institute, located in the Circeo National Park, is an Italian NGO specifically founded to provide and carry out environmental education and training for protected areas and nature reserves. Its mission consists in developing innovative actions for the enhancement of the national system of protected areas, throughout strategic programmes in the field of continuous training and education for sustainable development.

The Institute manages "Labnet Lazio", an Environmental Education Centre, one of the national networks promoted by the Ministries of the Environment and of the Public Education. The Centre is located in Sabaudia, of which the Municipality is a member of Pangea; its mission is to enhance the role of the Circeo National Park and of the Protected Areas System of Lazio Region for educational purposes.

The activities of Pangea Institute are organized into two Departments:

- One is responsible for naturalistic and environmental education activities, particularly the training of schoolteachers of all grades, the production of educational materials, the training of trainers, the design and management of Environmental Education Centres and Laboratories.
- The second is specialised in training activities for sustainable development and conservation of natural resources, particularly the management of protected areas.

Since 2003 Pangea Institute is officially recognised by the Italian Ministry of University and Public Education as a training centre for schoolteachers. The Institute is member of the IUCN-The World Conservation Union, and participates to the activities of its World

Commission on Protected Areas (WCPA); it is responsible of the training unit of the Italian Federation of Parks and Nature Reserves (Federparchi) and it is member of EUROPARC, the European Federation of Parks.

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A SCUOLA DI BIODIVERSITÀ: LE AULE VERDI

Giulia Sirgiovanni

Collaboratore dell'Istituto Pangea ONLUS

Dal 1997 l'Istituto Pangea ONLUS, nell'ambito del progetto Labnet-Lazio (laboratorio territoriale della rete INFEA), ha promosso nelle Aree Protette del Lazio attività formative, rivolte agli insegnanti di ogni ordine e grado, sulle tematiche della biodiversità e della tutela del paesaggio.

La formazione, infatti, è un elemento essenziale per la buona riuscita di qualsiasi progetto di educazione ambientale e permette di rispondere in modo efficace alle più recenti indicazioni internazionali contenute in documenti quali "Parks for Life", "Agenda 21" ed in "Education for Sustainable Development", nonché all'iniziativa pan-europea denominata "Countdown 2010", finalizzata ad arrestare la perdita di biodiversità entro il 2010 con azioni concrete intraprese da governi e ONG. Questo quadro internazionale di riferimento, infatti, auspica la promozione e la realizzazione di programmi educativi tendenti a migliorare l'integrazione delle aree protette con le comunità locali, e ad ampliare il consenso e la comprensione delle politiche di conservazione e gestione sostenibile del territorio.

Nel progetto presentato in questa sede le azioni formative rivolte agli insegnanti sono state realizzate, in un primo momento, attraverso percorsi teorico pratici in aula e sul campo e, in un secondo tempo, attraverso il tutoraggio permanente sia delle attività di progettazione, sia di quelle di ricerca d'ambiente, che hanno portato alla realizzazione di un'aula verde.

La scelta di educare ai valori della biodiversità e di condividere i principi della sua conservazione attraverso la realizzazione di un'aula verde è scaturita dalla sua particolare connotazione. La nostra aula verde, infatti, è stata concepita come uno spazio progettato per entrare in relazione diretta con l'ambiente circostante di cui rispecchia le caratteristiche essenziali e organizzato per fare esperienze concrete sulla natura e sui suoi meccanismi, nonché per aprire a ragazzi e adulti un orizzonte vastissimo fatto di scoperte, sorprese ed attività di ogni genere che non possono certo esaurirsi nei due anni necessari per l'allestimento. In questo modo la scuola e gli insegnanti continueranno, nel tempo, ad essere soggetti di formazione permanente, capaci d'innescare l'evoluzione dell'aula verde da spazio di studio e di ricerca a laboratorio di relazione, in cui possano essere messi a confronto convinzioni e comportamenti. L'aspetto della formazione è tanto più qualificante in quanto la creazione, e in seguito la fruizione, di un'aula verde è in grado di coinvolgere, attraverso la mediazione della scuola, i cittadini di tutte le età interessandoli concretamente alla conoscenza del loro territorio e guidandoli nel cuore del problema della conservazione della biodiversità locale.

Le azioni intraprese per la realizzazione del progetto

La formazione ha seguito gradi di approfondimento successivi: sono stati realizzati prima dieci corsi sui temi di base dell'educazione ambientale e in seguito sei corsi di approfondimento, di cui tre sul tema "I Parchi e la tutela della biodiversità" e tre su "Il Paesaggio come Banca per il Futuro". Alle attività didattiche, della durata di quaranta ore ognuna, hanno partecipato insegnanti provenienti da istituti di ogni ordine e grado della regione Lazio; i corsi hanno avuto carattere residenziale e si sono svolti a Sabaudia, nel Parco Nazionale del Circeo, dove è stato possibile svolgere numerose attività sul campo.

A questi percorsi formativi hanno fatto seguito sette corsi pomeridiani, della durata di ventiquattro ore, dedicati agli insegnanti di singoli istituti scolastici che hanno affrontato il tema specifico relativo alla Progettazione e realizzazione di un'Aula Verde. Molti degli insegnanti interessati hanno partecipato all'intero percorso formativo, mentre altri sono stati coinvolti successivamente rispetto ai colleghi e si sono inseriti a diversi livelli del percorso.

I corsi hanno permesso agli insegnanti, oltre ad accrescere la propria motivazione, di acquisire conoscenze, tecniche e metodologie specifiche idonee alla realizzazione di ricerche d'ambiente. Dalla metodologia di lavoro applicata sono derivati, inoltre, valori aggiunti quali la capacità di lavorare insieme e di trasformare i problemi in opportunità.

Alla formazione è seguita la progettazione partecipata di percorsi educativi sulla biodiversità e il successivo tutoraggio dei progetti. Sono stati coinvolti anche Enti Locali, Aree protette e il Corpo Forestale dello Stato che ha donato anche piante provenienti dai propri vivai.

Prima di procedere alla creazione di un'aula verde è stato messo a punto, infine, un sistema di verifica dei percorsi di educazione ambientale intrapresi.

La realizzazione dell'aula verde generalmente è preceduta dallo studio del territorio effettuata attraverso una ricerca bibliografica, la realizzazione di strumenti di indagini e la conduzione di una ricerca d'ambiente mirante a conoscere le caratteristiche dell'ambiente naturale in cui l'aula si andrà a inserire. Il passaggio successivo consiste nel realizzare una mappa che illustri: gli ambienti da riprodurre quali prato, bosco, siepe, giardino roccioso, stagno, orto, giardino sensoriale; gli spazi da sistemare con muretti a secco, vialetti, strutture per portatori di disabilità motorie; eventuali "arredi" come serre, nidi artificiali, stazioni meteorologiche, bidoni per il compost, serbatoi per l'acqua.

La compilazione di un elenco delle piante da mettere nell'aula verde, dei materiali occorrenti (attrezzi da giardino, vasi ecc.) e di un preventivo, concludono la fase progettuale e permettono di passare alla messa a dimora delle piante.

Il progetto, tuttavia, non si conclude con la realizzazione di un'aula verde ma, al contrario, prende il via proprio da questo momento: non solo perché è necessario provvedere alla sua manutenzione, ma anche e

soprattutto perché finalmente si possono cominciare ad osservare i processi naturali e cicli biologici che vi s'instaurano, gli animali che ne sono attirati, la biodiversità che si accresce giorno per giorno.

Il progetto Labnet Lazio, che ha fatto da cornice al percorso educativo comprendente la formazione degli insegnanti e la formulazione di specifici progetti di educazione ambientale, ha previsto anche la produzione della collana editoriale "Leggere la natura", ricca di spunti didattici, schede di lavoro, approfondimenti. Fra gli altri titoli, essa comprende il manuale per insegnanti "A lezione in un'aula verde" e il corrispondente quaderno per ragazzi, "Studenti in erba".

I risultati

Questo programma ha dato maggiore autonomia e sicurezza ai docenti grazie al supporto continuo e specializzato degli esperti dell'Istituto Pangea e all'ausilio di specifico materiale didattico e ha permesso, in poco più di tre anni, di realizzare sul territorio oltre cinquanta aule verdi, interessando cinquecento insegnanti e cinquemila alunni. Grazie al coinvolgimento della comunità locale, inoltre, ha rinforzato anche la politica di conservazione della biodiversità sul territorio.

Alcuni dei ragazzi che hanno contribuito a creare una delle aule verdi realizzate nell'ambito del progetto hanno arricchito di particolare significato la loro esperienza e hanno definito così questo spazio un po' speciale: un'aula con il soffitto che cambia tonalità ogni giorno, con le pareti fatte di foglie morbide o spinose e con un pavimento sul quale tutto ciò che cade può crescere, suscitando il piacere dell'osservazione e della scoperta.

L'Istituto Pangea ONLUS, Istituto Europeo per l'Educazione e la Formazione Professionale per l'ambiente.

L'Istituto Pangea è una ONLUS italiana (Organizzazione Non Lucrativa di Utilità Sociale) specializzata nel campo dell'educazione ambientale e della formazione professionale per i parchi e le riserve naturali, con sede nel Parco Nazionale del Circeo; la sua mission consiste nello sviluppo di azioni sperimentali ed innovative volte a promuovere e consolidare il sistema nazionale delle aree protette, anche attraverso programmi e progetti strategici di formazione permanente e di educazione allo sviluppo sostenibile.

L'organizzazione, che tra i propri soci fondatori annovera il Comune di Sabaudia, gestisce Labnet-Lazio, uno dei Laboratori Territoriali Nazionali di Educazione Ambientale inseriti nella Rete Planet prevista dai Ministeri dell'Ambiente e della Pubblica Istruzione. Il Laboratorio ha sede a Sabaudia e si caratterizza per una proposta di Educazione Ambientale rivolta in primo luogo alla valorizzazione delle potenzialità didattiche del territorio del Parco Nazionale del Circeo e delle Aree Protette del Lazio.

Le attività didattiche dell'Istituto Pangea sono organizzate all'interno di due Dipartimenti:

- Un Dipartimento promuove e svolge iniziative di Educazione Naturalistica ed Ambientale, curando in particolar modo l'aggiornamento professionale degli insegnanti delle scuole di ogni ordine e grado sulle tematiche dell'Educazione Ambientale, la progettazione di materiale didattico, la formazione dei formatori, la progettazione e gestione di centri e laboratori di Educazione Ambientale.
- Un Dipartimento è dedicato alla formazione professionale specializzata per i "mestieri della natura", con particolare riferimento a quelli per la gestione tecnica ed amministrativa delle Aree Protette e per la tutela e la valorizzazione delle risorse naturali.

Dal 2003 il Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR) - Dipartimento per lo sviluppo dell'Istruzione - ha accreditato l'Istituto Pangea come soggetto formativo del personale della scuola, come previsto dal D. M. 177/2000, art. 2-c.4.

L'Istituto Pangea aderisce in qualità di membro effettivo allo IUCN - The World Conservation Union, partecipando attivamente ai lavori della Commissione Mondiale per le Aree Protette (WCPA); cura il settore formativo della Federparchi - Federazione Italiana dei Parchi e delle Riserve Naturali; è membro di EUROPARC, la Federazione Europea dei Parchi.

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EDUCARE IN UN CONTESTO NATURALE: UN'ESPERIENZA FORMATIVA PER I FUTURI INSEGNANTI DI SCUOLA PRIMARIA)

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Abstract

A field activity is highly involving, both for teachers and pupils. It enriches the teaching-learning relationship with an emotional experience and is remembered as a relevant event. The external world discovery is the discovery of the environment, but also of us in relation to it. A natural fieldtrip on the Cuneo's mountains (at St. Anna di Bellino, Varaita Valley) has been included in the curriculum for primary school teachers in order to demonstrate its potential cognitive, affective and psychomotor impact.

It is an opportunity to realize that geological and biological events are dynamic and last their own time, to realize that some of them are cyclical and others are often unpredictable. Students learn to detect the natural resources and the signs of abrupt changes and of slow evolution in the territory, they get conscious of the conceptual obstacle of geological time, compared to biological time and the related connection between the history of Life and that of Earth. For these reasons the didactic fieldtrip is such a useful tool in Environmental Science teaching, making pupils aware of the various factors interacting in the environment.

Students with different skills in Natural Sciences discuss problems and results of a fieldtrip, reflect on the complexity of the environment, make a project and experience it. The fieldtrip is an opportunity for meta-reflection and self-evaluation for the professional role of teachers.

Contesto

Le Alpi cuneesi e i suoi rilievi collinari occupano più di metà del territorio regionale e costituiscono per il Piemonte un paesaggio d'inestimabile ricchezza. Allo scopo di valorizzare quest'ampia parte del territorio regionale, inteso come complesso intreccio di relazioni fra componenti sociali, economiche e aspetti naturali, può rivelarsi utile attuare interventi educativi atti a promuovere la cultura del territorio, inteso come spazio da cui ricavare risorse ma anche di cui prendersi cura.

Questa dimensione territoriale della sostenibilità è estremamente preziosa in termini educativi in quanto è quella che più facilmente può ricomporre la dicotomia natura - società. Per questo, a partire dal 2004, abbiamo voluto progettare un laboratorio per il Corso di Laurea in Scienze della Formazione Primaria che desse la possibilità agli studenti di avere un'esperienza di contatto diretto con questo ambiente naturale al fine di esplorarne gli elementi costitutivi e coglierne la complessità delle relazioni.

Prima di partecipare al soggiorno, ai venticinque studenti frequentanti il laboratorio sono state fornite (in tre incontri preliminari di tre ore ciascuno) informazioni e strumenti atti a sviluppare abilità progettuali per effettuare la programmazione di un'escursione didattica. Questo laboratorio, realizzato al di fuori delle usuali strutture accademiche, ha rappresentato per alcuni partecipanti una novità assoluta, non solo nell'ambito universitario, ma più in generale in tutto il loro percorso formativo.

Finalità ed obiettivi

Le esperienze dirette hanno un ruolo centrale nei processi cognitivi, soprattutto se costituiscono momenti di problematizzazione, di analisi di situazioni reali e di verifica in itinere del percorso intrapreso. Considerando che la persona in sé, e non esclusivamente la sua conoscenza, va valutata e rispettata nella sua globalità, nell'esperienza didattica da noi progettata abbiamo voluto favorire l'integrazione della sfera cognitiva con quella affettiva e quella psicomotoria, simultaneamente coinvolte nei processi educativi.

Riportiamo di seguito gli obiettivi specifici che ci siamo posti nella realizzazione di questa proposta educativa:

- Far sperimentare modalità di interazione con l'ambiente che aiutino a riconoscere i processi messi in atto per osservare, investigare, interpretare la realtà (Mortari, 2001), anche migliorando le capacità di percezione sensoriale e di raccolta dati.
- Sviluppare alcuni organizzatori concettuali delle Scienze della Terra e delle Scienze della Vita: a partire dalla complessità dei fenomeni osservati e inferiti, dai rapporti dimensionali degli oggetti studiati e dalla loro evoluzione dinamica, legata ai tempi geologici e a quelli biologici.
- Applicare le conoscenze teoriche acquisite precedentemente in un contesto reale e quotidiano, allo scopo di interpretare la complessa realtà del territorio regionale sul quale viviamo, mettendo in relazione (in un contesto dinamico) fenomeni naturali e modificazioni antropiche.
- Far riflettere gli studenti sul concetto di ambiente inteso come sistema complesso e dinamico in cui s'intrecciano e interagiscono componenti "naturali" (flussi di materia ed energia), sociali e culturali, stimolando un approccio di tipo sistemico.
- Far riflettere sulla necessità di riorientare in senso ecologico il nostro modo di pensare, agire ed educare per affrontare e

risolvere una crisi che è culturale prima ancora che ambientale (Orr, 1992).

La proposta educativa

Le attività proposte durante lo stage hanno avuto il merito di valorizzare gli aspetti ludici e percettivo-sensoriali, mostrando il carattere formativo di tale approccio in un'ottica di formazione professionale dei futuri insegnanti di scuola primaria.

L'importanza di ciò è evidente se si tiene conto che molti bambini hanno una scarsa consuetudine al contatto fisico con l'ambiente naturale: camminare su un sentiero, giocare in un bosco, ascoltarne i suoni, percepirne gli odori, le forme, i colori, i mutamenti sono esperienze importanti che permettono di scoprire la propria identità ecologica (Thomashow, 1996) intesa come il modo che ciascuno di noi percepisce se stessa in relazione alla natura (Orion e Hofstein, 1994). Gli studenti hanno potuto sperimentare personalmente esperienze riproducibili con i loro futuri allievi, affrontando e superando diversi tipi di difficoltà, alcune più evidenti, altre inattese.

Alcune delle attività proposte si sono ispirate ai soggiorni del Laboratorio Didattico sull'Ambiente di Pracatinat (Fenestrelle, Torino), altre invece si basano sulle esperienze maturate in altri contesti didattici del Corso di Laurea e riguardano l'elaborazione di mappe pittoriche a diverse scale e quindi grado di dettaglio.

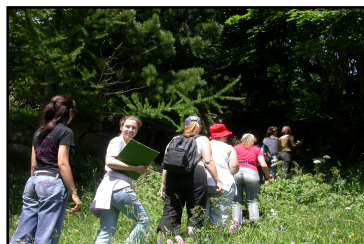
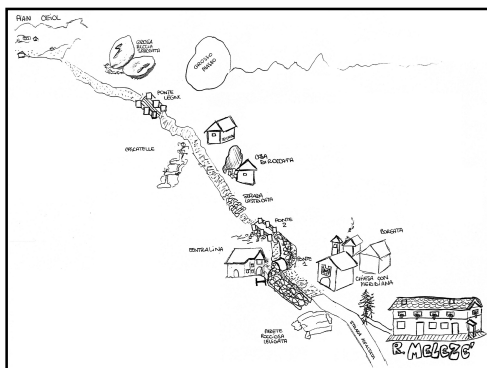
Costruire mappe di piccole porzioni di territorio, carte pittoriche di percorsi che si snodano in paesaggi diversificati, rappresentare graficamente quanto si riesce a distinguere a grande distanza sotto la linea di orizzonte significa non solo imparare ad osservare a scala diversa quanto ci circonda ma anche riflettere sul nostro modo di conoscere e percepire la realtà (Garcia de la Torre, 1994).

Le attività qui sotto illustrate hanno aiutato gli studenti ad arricchire anche dal punto di vista emotivo la loro rappresentazione della realtà e in particolare gli hanno permesso di:

- Distinguere - a seconda degli obiettivi che ci si pone - il superfluo dal rilevante.
- Comprendere il senso del classificare e del determinare gli oggetti.
- Riflettere sulle relazioni spazio-temporali.
- Allargare la percezione agli altri sensi (mappe sonore, ...).

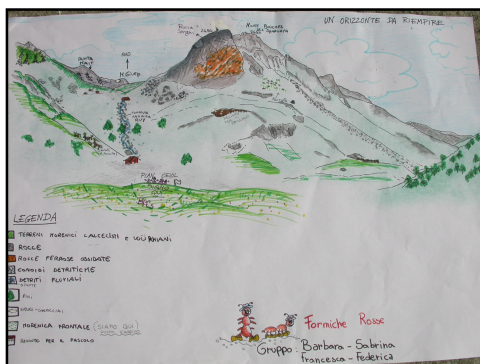
Carta pittorica del percorso

Mappa del percorso escursionistico dal rifugio Melezé (1812 m) a Pian Ceiol (2074 m). La mappa è stata realizzata a piccoli gruppi individuando e rappresentando gli elementi ritenuti particolarmente evidenti e/o interessanti soprattutto nella prospettiva di un suo utilizzo con allievi della scuola primaria.



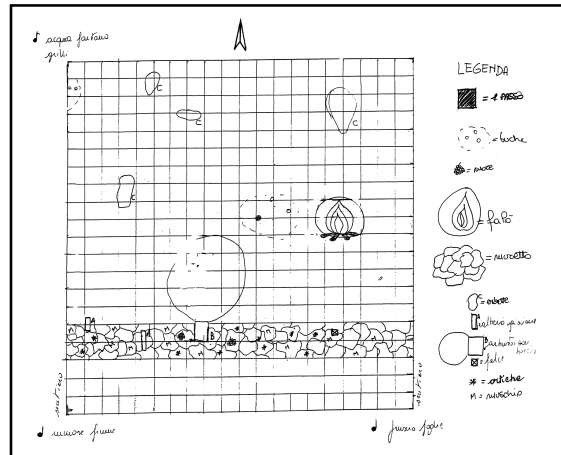
Un orizzonte da riempire

Completamento cromatico e didascalico di un profilo panoramico rappresentante la linea d'orizzonte a 180°, entro il quale sono state identificate le componenti ambientali significative.



20 Passi x 20 Passi

Suddivisi in piccoli gruppi gli studenti hanno individuato e rappresentato in scala una piccola porzione di territorio indicando i punti cardinali e l'ubicazione degli "oggetti" (alberi, arbusti, erbe, rocce, formicai, tracce animali, ...) contenuti nell'area considerata. La rappresentazione è stata poi completata con la corrispondente mappa sonora diurna e notturna.



Conclusioni

Il lavoro sul campo rappresenta un'opportunità per riflettere attraverso l'osservazione guidata, sistematica e integrata sulla complessità dei processi naturali (Ferrero et al., 2004). Un approccio empirico ai sistemi complessi aiuta gli studenti ad individuare e separare le variabili che interagiscono tra loro a determinare un evento naturale di cui essi sono stati testimoni diretti o di cui hanno colto le testimonianze/evidenze: nessun campione (roccia, fossile o preparato biologico), modello, esperimento o libro di testo riuscirà a rappresentarne altrettanto bene l'interesse e la specificità. Il contatto diretto con l'ambiente da scoprire fornisce inoltre motivazioni all'apprendimento rendendolo significativo grazie alla simultanea messa in gioco delle sfere cognitiva, affettiva e psico-motoria (Colombies, 1997).

Al termine dello stage è stato chiesto ai partecipanti di scrivere su un foglio, in maniera anonima, una frase che sintetizzasse l'esperienza vissuta. Dall'analisi di tali scritti si evince che le finalità del laboratorio sono state condivise da tutti gli studenti, che hanno ben compreso le potenzialità di un'attività pratica a contatto con la realtà territoriale locale. Tutti i lavori svolti, sia le attività di tipo più disciplinare sia quelle che coinvolgevano maggiormente la percezione e la sfera emotiva, sono state giudicate non soltanto utili dal punto di vista personale ma importanti anche sul piano

professionale, in quanto considerate interessanti stimoli facilmente riadattabili ad un contesto di formazione primaria

Questo lavoro è dedicato ad una delle autrici, Angela, che con entusiasmo manifestato in modo per lei insolito ci ha aiutato e sollecitato a raccontare l'esperienza di tre giorni coinvolgenti sul piano emotivo anche per noi.

Purtroppo nel riproporre questa esperienza ad altri studenti non potremmo più giovare del suo contributo, ma se siamo così convinti dell'opportunità di farlo è principalmente grazie a lei.

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LA GESTION INTEGREE DES DECHETS SOLIDES URBAINS ET L'EDUCATION EN VUE DU DEVELOPPEMENT DURABLE DANS L'ACTION LOCAL AU MAROC

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Au Maroc, la gestion des déchets solides (GDS) au niveau urbain est devenue une préoccupation majeure alors que les activités socio-économiques de production et de consommation ont généré une augmentation importante des quantités de déchets solides.

Les modes de gestion, de traitement et d'évacuation de l'amont à l'aval sont, malheureusement, loin de résoudre les problèmes provoqués dans ce cycle de gestion. La production actuelle des déchets au Maroc s'élève à environ 17.413 tonnes/jours et varie d'une région à l'autre.

Depuis le 1976, la gestion des déchets ménagers au Maroc est une responsabilité reconnue par la Charte Communale aux collectivités locales, mais celles-ci se trouvent en difficulté pour l'assumer pleinement. Dans les grandes villes, l'État s'est souvent substitué aux communes, passant directement des marchés de concession avec l'aide des financements internationaux. Les villes moyennes et de petite taille, livrées à elles-mêmes, essayent sans grand succès de faire face à des besoins qui ne cessent de croître.

La privatisation de la collecte des ordures ménagères et de la gestion des décharges est à l'ordre du jour, la cadence s'accélère pour les concessions publiques à travers les projets de gestion déléguée. Après les six opérations réalisées en 2004, et qui ont concerné six villes (Oujda, Berkane, Kénitra, Safi, Casablanca et Sidi Bennour), seize autres seront concrétisées avant la fin de l'an 2005. La privatisation de la collecte a entraîné une amélioration très nette du service dans les communes urbaines où elle est en vigueur.

En fait, la gestion actuelle de ce secteur se caractérise par un certain nombre de défaillances et de contraintes. Celles-ci ont été listées en 1999 par les collectivités locales et le Secrétariat d'Etat chargé de l'Environnement :

- Faiblesse des moyens financiers et, souvent, l'absence de ligne budgétaire spécifique à la gestion de déchets au niveau des collectivités locales.
- Défaillances des systèmes de collecte qui se soldent par un très faible taux de collecte et par des rejets dans décharges sauvages.
- Multiplicité des organismes intervenants.
- Absence de filières spécialisées de déchets.
- Absence de normes et d'outils réglementaires de contrôle des différentes étapes d'acheminement des déchets.

- Dilution et chevauchement des responsabilités des différents générateurs de déchets.
- Schémas Directeurs d'assainissement ne concernant que les grands centres urbains et n'incluant pas toujours des centres péri-urbains ; ce qui conduit à un risque sanitaire et à une pollution accrue des milieux récepteurs (dépôts dans les lits d'Oueds, décharges sauvages sur des terrains perméables, etc.).

Les directives récentes émanant du secrétariat d'Etat chargé de l'Environnement, en collaboration avec la Direction des collectivités Locales, ont été focalisées sur la priorité d'instauration d'une gestion rationnelle des déchets solides basée sur des normes et prescriptions techniques de production, de transport, de stockage, de recyclage et de traitement. Ces mêmes directives ont appelé à une coopération horizontale des acteurs locaux publics et privés à travers des partenariats avec des autres acteurs nationaux et internationaux.

La problématique de la gestion des déchets urbains présente des enjeux économiques, environnementaux et sociaux et se situe parmi les interactions des paramètres du développement durable. L'étude des déchets fait appel à ces paramètres qui permettent la compréhension des déchets non seulement à travers les composantes physico-chimiques et le mode technique de leur collecte, évacuation et mise en décharge ; plutôt, il nous permettra à comprendre les différentes interactions et enjeux à une de tout le système de gestion en liaison avec le contexte local. Les déchets reflètent la société, le mode de vie de la population. De par leur nature et leur composition, les déchets solides urbains des villes des pays en développement peuvent constituer une matière première pour diverses activités économiques, agricoles, artisanales ou industrielles. L'exploitation de ce gisement peut avoir des impacts positifs sur toute la chaîne de gestion des déchets et au-delà (génération d'emplois et de ressources). Malheureusement, cet aspect de la gestion des déchets est resté longtemps ignoré par les gestionnaires urbains d'abord préoccupés par la collecte et l'évacuation des déchets. C'est au secteur informel que reviennent les activités de récupération, de recyclage et de transformation des déchets. Mais, les marges bénéficiaires sont faibles, en raison de contraintes techniques (tri manuel, déchets centralisés à la décharge) et économiques (méconnaissance des produits finis, coûts de production).

Cette conception restreinte de la gestion des déchets évolue : les déchets sont de plus en plus considérés comme une ressource, bien que l'impact économique de la valorisation soit encore mal connu, et la gestion des déchets tend à s'élargir à la valorisation. Celle-ci devient alors une composante d'un schéma global et cohérent de gestion des déchets, selon une approche qui, à l'idéal, prend en compte d'autres objectifs (économiques, sanitaires et sociaux, environnementaux).

S'ajoute à ces dimensions, l'aspect de la « gouvernance des déchets » ; cette tentative d'analyse en matière de la gestion des déchets

suppose de pouvoir délimiter les rôles de tous les acteurs participants à cette gestion (communes, secteur public, élus, associations, secteur privé, population locale...), ainsi d'évaluer l'efficacité et l'efficacité de divers types de partenariats entre les secteurs publics, privé et communautaires aux fins de la gestion des déchets urbains, qui impliquent des nouveaux acteurs, notamment la société civile et la coopération internationale. Ce type de gestion renvoi au concept de « gestion intégrée et durable des déchets » qui ne pourra pas être abordé sans une prise en considération des aspects environnementaux, socioculturels, politiques et institutionnels, techniques, économiques et financiers.

Le Centre Interdépartemental IDEAS, dans le cadre de l'ouverture de l'Université Ca' Foscari sur son environnement socio-économique, a démarré une collaboration avec l'ONG Enda Maghreb pour développer une action pilote en matière de la gestion intégrée des déchets urbains. Enda Maghreb (ENDA) est une organisation marocaine à caractère associatif et à but non lucratif. Les activités de cette ONG remontent au 1990, la mission que s'est assignée consiste à lutter contre la pauvreté et à soutenir un processus de développement humain respectueux de l'environnement. Depuis 1996, ENDA a mis en œuvre des programmes de développement, en milieux urbain et rural défavorisés, contribuant à améliorer les conditions de vie des communautés les plus vulnérables, à assurer une gestion durable des ressources naturelles et de l'environnement et à renforcer la participation et les capacités d'action des acteurs dans l'identification et la gestion des priorités du développement local.

La valorisation et la gestion intégrée des déchets

Le déversement anarchique des déchets solides dans le milieu naturel, avec un ensemble de retombées néfastes sur l'environnement et la santé publique, a été effectué pour dizaines d'années par un grand nombre des collectivités locales marocaines.

ENDA a démarré ses activités avec la mise en place d'initiatives permettant de diminuer le taux de mise en décharge et la valorisation du potentiel que représentent les fractions organiques et recyclables des déchets ménagers. Un procédé alternatif de gestion et de traitement des déchets solides, à la fois adapté aux capacités techniques et financières des petites et moyennes collectivités locales et de l'environnement, a été développé par ENDA en collaboration avec l'équipe interdisciplinaire du Centre IDEAS de Venise. A partir du mois de février 2004, IDEAS et ENDA, avec le soutien financier de la Région de Venise, ont mis en œuvre un projet de coopération décentralisée.

En coordination avec les Municipalités, les autres partenaires ont contribué dans l'activité de tri à la source des déchets, la gestion de la collecte, le traitement et donc la valorisation des déchets ménagers à travers la technique du compostage et la pulvérisation du PVC pour la filière du recyclage de la plastique.

L'Université Ca' Foscari de Venise a donc mis en réseau les laboratoires de recherche et les entreprises de son territoire avec les universités, les organisations à but non lucratif et les collectivités locales au Maroc, garantissant leur contribution à la durabilité économique, environnementale et sociale.

A partir de l'analyse de cette expérience, des actions intégrées pour l'amélioration de la gestion des déchets solides (GDS) ont été identifiées par les équipes de ENDA et celle du centre IDEAS, selon l'articulation suivante:

- Recherches et actions sur la gestion des déchets solides en adéquation avec le contexte local.
- Sensibilisation médiatique et publique sur la problématique de la GDS.
- Démonstrations pratiques d'alternatives techniques de GDS.
- Positionnement fort de la femme en tant qu'acteur privilégié de la GDS.
- Assurer la correcte mise en œuvre technique des nouveaux dispositifs de traitement des déchets ménagers des communes.
- Déterminer la qualité agronomique du compost produit pour une correcte utilisation en réponse aux besoins agricoles locaux.
- Etudier et formaliser les modalités adaptées aux communes pour la gestion financière et administrative.

L'éducation en vue du développement durable

Dans le cadre de la coopération décentralisée proposé par le Centre Interdépartemental IDEAS avec les acteurs locaux marocains, l'éducation environnementale a été une partie fondamentale pour l'aboutissement des objectifs du projet.

La sensibilisation de la population sur l'importance du recyclage a été réalisée dans les écoles primaires avec les élèves et les associations parentales, par contre la formation au tri à la source des déchets a été possible dans les quartiers avec la collaboration des associations amicales.

La distribution d'affiches, d'autocollants et de t-shirts, la décoration de murs des écoles primaires par des fresques avec des messages de sensibilisation à l'environnement, la mobilisation des jeunes pour la réalisation de chantiers de nettoyage dans la ville sont parmi les activités réalisées dans le projet. Cette initiative a contribué à une transformation bénéfique de la société locale, suite au changement des comportements et de la perception de l'environnement de la part des citoyens et des décideurs locaux. Cette expérience dans le domaine de l'éducation environnementale peut continuer avec l'éducation pour le développement durable, pour faire valoir l'importance de traiter ces questions comme des éléments du vaste agenda du développement durable à niveau local et urbain. Les liens des thématiques environnementales avec les considérations sociétales et économiques permettront aux apprenants d'adopter une attitude nouvelle à l'égard de la protection des ressources naturelles, la sauvegarde de la santé

publique et durabilité économique, qui sont indispensables au développement de l'homme et à la survie de la planète.

En décembre 2002, l'Assemblée Générale des Nations Unies a adopté la résolution 57/254 relative à la Décennie des Nations Unies pour l'éducation en vue du développement durable (2005-2014) et désigné l'UNESCO comme organe responsable de la promotion de la Décennie. La Décennie des Nations Unies pour l'éducation en vue du développement durable a comme objectif de voir l'éducation pour le développement durable mis en application dans des milliers de situations locales sur le terrain, comportant l'intégration des principes du développement durable dans une multitude de différentes situations d'apprentissage. Ces initiatives peuvent être des catalyseurs pour l'action et contribuer aux buts et objectifs de la Décennie; et ainsi, les organismes et les individus peuvent être des acteurs du mouvement global pour le développement durable.

Dans cette perspective, le Centre Interdépartemental IDEAS a travaillé pour faciliter la liaison et la mise en réseaux et l'interaction entre ses partenaires scientifiques, les collectivités locales, les entreprises de la Région de Venise et les Universités, les ONG et les autres parties prenantes de l'Education pour le développement durable au Maroc. Cette stratégie de partenariat entre secteur public et privé peut donner à l'éducation en vue développement durable ses meilleures chances de voir les acteurs locaux participer pleinement à l'élaboration des politiques publiques qui visent le développement durable et la bonne gouvernance.

Le Centre IDEAS désire continuer à promouvoir la transition vers le développement durable au Maroc, par tous les canaux de l'apprentissage et de la sensibilisation du public, pour créer des chances prometteuses de progrès social et économique et de redressement de l'environnement, aux échelons local et national.

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WATER EDUCATION THAT WORKS

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Abstract: introduction

Many years have elapsed since environmental education was pointed out in Rio as a priority. Little has been achieved since then. The brand new Decades for Education on Sustainable Development and Water for Life will hopefully push to take action in this regard. If we really aim to achieve sustainable development or to reach the millennium goals, environmental education - and specially water education - shall have a major role.

Many water education efforts and programs have been displayed worldwide. Though, few have proved to be effective and even less have lasted. Many of them have been disconnected from teachers and have ended as frugal and expensive media campaigns. Project WET (Water Education for Teachers) stands as an exception.

Started as a local water education project in North Dakota in 1984 as a means to reduce public health problems caused by groundwater pollution, Project WET was developed by teachers, for teachers, with the guidance of water specialists. It soon became a national program in the United States and then grew internationally. Today, it is being used in more than seventeen countries. Its curriculum has been localized to different countries and translated to Spanish, Japanese and French. Over 200 thousand educators have been trained in this program, finding it to be a solid and useful water education tool. Besides its original and main program, Project WET has specialized in developing education materials on a variety of water topics.

Abstract: Methods

Its curriculum and main tool comprises more than ninety educational activities to be used with children and young people. The activities are science based, fun and creative, making learning relevant and long lasting. Topics range from water physical and chemical characteristics to social and cultural constructs. This crosscutting multidisciplinary curriculum is useful

for formal and non-formal educators teaching subjects such as natural science, chemistry, geography, literature, history, government, math, art, biology.

Abstract: Results and conclusion

Project WET International Foundation facilitates and promotes awareness, appreciation, knowledge and stewardship of water resources through the dissemination of classroom-ready teaching aids and the establishment of internationally sponsored programs. Here we will describe the major accomplishments of its international network. Its experience is already an example of international cooperation and understanding of water resource issues through education, irrespective of political boundaries.

Background

The need for environmental education is increasingly being recognized worldwide and water education has a major role to play in it. Our common future is tightly bound to water. The global water crisis must be addressed through greater public involvement at all socio-economic levels, among all water users, and across all borders. Sustainability can only be achieved as a result of cooperation and commitment to education. Good will is not enough. Knowledge and understanding are required as well. Young people should be provided with a deeper comprehension of the complex environmental issues they will soon be facing and with the skills required to take positive appropriate action. Sustainable water management will be crucial to reach social and economical stability within a healthy environment. The basis to achieve this aim relies heavily on education.

In this regard, Project WET International is a highly useful and relevant non-profit water education program and publisher for educators and young people, aged 5/18 years. Its mission is to reach children, parents, educators, and communities of the world with water education.

Curriculum features

Two main tools define Project WET: the Project WET Curriculum and Activity Guide, and the network of Project WET coordinators. The 516-page guide contains ninety fun and classroom-ready activities, cross-reference tables, indexes and a glossary. Its main features are the following.

- Conceptual areas: Project WET activities address the following conceptual areas: Teaching strategies, Water physical and chemical characteristics, Water and life, Water and Earth systems, Water as a natural resource, Water management, Water and social constructs, Water and cultural constructs. This Curriculum and Activity Guide was translated to Spanish and adapted to Mexico's culture, history, issues and teaching methods.

- Interdisciplinary: the curriculum and activity guide can be used by teachers of different disciplines such as art, physics, language, literature, biology, history, geography, government, mathematics, chemistry, environmental science, ecology, health. The activities can also be used by no formal educators, community organizations, government agencies, NGOs (non-government organizations), museums and parks.
- Diversified teaching strategies: Project WET provides a wide range of constructivist teaching methods, from hands-on to role playing, debate, demonstration, inquiry, reading, writing, whole body, field and library research, and technology applications.
- Complement to educational programs: Project WET activities are designed to satisfy the goals of educational programs by complementing existing curricula rather than displacing or adding more concepts.
- Friendly format: the guide was written and designed to respect the time and resources of educators. All of the activities have been extensively field tested and developed by water resources leaders, educators and students. The book's organization and appearance all have the teacher's needs in mind, from clarity of topic to suggested teaching units. Photos, maps, illustrations, and graphs highlight key concepts, and student pages are ready for copying and distribution.

Believes

Throughout all activities of Project WET we can find three main premises, which are:

- Water is important for all water users (e.g., rural and urban communities, energy production, farming and ranching, fish and wildlife, manufacturing, navigation, recreation).
- Wise water management is crucial for providing tomorrow's children social and economic stability in a healthy environment.
- Education can encourage a lifelong commitment to responsible and positive community participation toward water.

Development of Project WET International Network

Project WET has proved to be a sound, creative, useful and fun tool to educate people on water issues regardless of country, culture or language. This can be attested by the recent development of its international network. The program has grown considerably during the last five years in the international arena. Interest in water education is increasingly expanding in many countries and Project WET International is becoming a vehicle to make it happen as well as becoming a link among these countries. From 1984 to 1996 Project WET USA was set in place. On 1996 Canada joined the program. Samoa and Palau followed on 1998. Mexico got started on 1999;

Philippines on 2001; Ukraine on 2002, Nigeria, Japan, Uganda, Cameroon and Togo on 2003, Costa Rica and Argentina on 2004. Agreements to establish Project WET in Jamaica, Panama and South Africa are underway. Project WET International has granted these countries permission to use and adapt its materials, methodologies and know how, so they can implement a program that is appropriate and relevant to their countries.

Project WET International has recently become a Foundation. Since the program's inception in North Dakota in 1984, it has trained over 200.000 educators to use Project WET with students. We know that some of these teachers never use Project WET, but we also know that some use it with many more than thirty students per year. So, if we make the assumption that each teacher trained has used the materials with thirty students each year since they were trained, then we can calculate that over the life of the program, more than 20 million students have learned about some aspect of water through the efforts of the Project WET network.

Adaptation process

Although Project WET was not developed to be an international, nor even a national program, it soon was clear that the methods used could be successfully applied in other States and Nations. This was confirmed by the educator's evaluations at many workshops in different countries. Many of the curriculum activities do not need adaptation at all. That is the case of the ones about physical and chemical characteristics, water and Earth systems, water and life and water as a natural resource. Nevertheless, some adaptation is required when we talk about water management or water and social and cultural constructs. Some countries, like Canada, decided to use the original guide and added a supplement with information about Canada and conversions to metric system. Mexico translated and adapted the guide, added three activities and an appendix about water in Mexico. Japan translated the guide and is currently adapting it. The Philippines used the original guide for some years while they developed their adapted guide. Costa Rica and Argentina are currently using the Mexican guide, while they adapt their own too.

Other water education materials

Besides the Project WET Curriculum and Activity Guide, the educator's network of Project WET also takes advantage of other great publications such as "WOW!," "The Wonders of Wetlands", which comprises around 50 activities on wetlands; "Healthy Water", "Healthy People", which teaches about water quality parameters and issues; "Discover a Watershed Series", which aims to facilitate and promote the awareness, appreciation, knowledge, stewardship, and understanding of watershed topics and issues through materials, training, and network support services. Among the printed titles are: "The Everglades", "The Rio

Grande/Rio Bravo” (English and Spanish), “The Watershed Manager”, “The Missouri”, “The Colorado” (English and Spanish), and “The Mexican Lake of Patzcuaro, Michoacan” (Spanish), developed by the Mexican Institute of Water Technology (IMTA), using Project WET methodology. The volumes corresponding to the Rio Grande/Rio Bravo and Colorado rivers were the result of bi national projects developed in partnership with IMTA, who coordinates and sponsors Project WET-Mexico. The volume corresponding to The Missouri was also a bi-national project in collaboration with Project WET Canada. All the projects under this series are developed in close collaboration with educators from each region. Thus, these publications are done by the watershed, for the watershed.

A final reflection

Attention should be paid to the increasing interest on water education topics all over the world. This could be seen as a result of the global water crisis, but it could also be seen as a breakthrough opportunity to make progress, not only on environmental education but also on international cooperation and better understanding among nations. Water’s conflict potential is usually remarked, but little attention is paid to water’s cooperation potential. Governments, private organizations, citizens, students and non governmental organizations can play a major role in fostering water education and building a strong international network of committed people. The United Nations Decades Water for Life and Education on Sustainable Development are good opportunities to get started.

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EDUCACIÓN AMBIENTAL PARA UN DESARROLLO SOSTENIBLE: ANÁLISIS DE UNA ESTRATEGIA DIDÁCTICA PARA LA FORMACIÓN INICIAL DEL PROFESORADO

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Introducción

Vivimos en un mundo complejo, sumergido en una profunda crisis ambiental y la atención a un futuro sostenible no puede seguir ausente de la Educación, así la ONU declaró el período 2005-2014 como la Década de la Educación para un Desarrollo Sostenible. Ante este reto, la Educación Ambiental (EA) se configura como “instrumento” indispensable para preparar a los ciudadanos a fin de que apliquen criterios de sostenibilidad a sus comportamientos y actúen, tanto a nivel local como global (“glocalmente”), a favor del medio. Ello implica el diseño de estrategias educativas que superen: por un lado, el abismo existente entre el discurso teórico de la EA y la práctica educativa, y por otro abarquen la dimensión del desarrollo sostenible (Vega y Álvarez, 2005).

Hay un cierto consenso en cuanto a considerar el desarrollo sostenible como una concepción que intenta asociar aspectos hasta ahora disociados: el desarrollo económico, la conservación del patrimonio cultural y natural, la calidad de vida para la humanidad actual y futura; superando así la tradicional confusión entre sostenibilidad y conservación de la naturaleza. En cualquier caso, cualquiera que sea la perspectiva asumida, ésta debe contemplar propuestas educativo-ambientales a fin de preparar ciudadanos bien informados (alfabetizados ambientalmente) (Kramer, 2003), y con suficiente capacidad para tomar decisiones sobre la problemática socioambiental.

Por otra parte, para que el proceso ambientalizador funcione se precisa una actuación efectiva del profesorado en la planificación y desarrollo de la enseñanza de la EA, lo que, lógicamente, estará condicionado por su capacitación para actuar sosteniblemente; ya que, aunque existiese una adecuada configuración del currículo y se dispusiese de materiales bien planteados en cuanto a los objetivos de la EA, sin la adecuada competencia del profesorado para su desarrollo no se producirá una efectiva EA (Álvarez y Vega, 2002). Pero, desde un punto de vista operativo, como paso previo a la modificación de sus patrones básicos de

conducta ecológica, es imprescindible que los futuros docentes puedan analizar el estilo de vida característico de su grupo social.

En consecuencia, como responsables de la formación inicial de profesores en EA, hemos diseñado una estrategia didáctica “investigativa”, de carácter constructivista, basada en diversas problemáticas, tanto de carácter local como global, que presentamos en este trabajo, junto con los resultados obtenidos en un estudio piloto para valorar su eficacia frente a la metodología “tradicional” (expositivo-transmisiva), en cuanto a la modificación de la conducta ambiental de los docentes en formación.

Material estimular

Los alumnos reciben un breve texto introductorio sobre la problemática a trabajar, los objetivos de la “investigación” y las consideraciones previas que deberán tenerse en cuenta. Tras la realización de las actividades programadas, en grupo pequeño, se realiza la puesta en común sobre los resultados obtenidos, que incluye la elaboración de un “mapa conceptual” consensuado sobre los conceptos trabajados y las propuestas de intervención para una “solución sostenible” de la problemática tratada.

Como ejemplo de las actividades realizadas por los alumnos de acuerdo con la estrategia didáctica diseñada, presentamos de forma resumida las relativas al Impacto ambiental del modelo de alimentación imperante en los países occidentales (centrado en el consumo masivo de productos cárnicos), que se abordan desde una perspectiva interdisciplinar, mediante “investigaciones” sobre los impactos ambientales de nuestra forma de vida y hábitos de consumo, relacionándolo, por tanto, con los conceptos de equidad y sostenibilidad.

El debate sobre las conclusiones obtenidas implicó el análisis de la situación en sus dimensiones reales, valorando la incidencia de los condicionantes externos (estilo de vida predominante, publicidad, responsabilidad de las grandes multinacionales) e internos (gustos alimenticios, consumismo); culminando la puesta en común con la elaboración del “mapa conceptual”. Todo ello, los llevará a la toma de posición, individual y colectiva, frente al problema estudiado y a la propuesta de acciones sostenibles para modificar los hábitos y consumos alimenticios por una dieta más tradicional y equilibrada.

Metodo

Participantes

Participaron en la investigación 137 sujetos, profesores en formación de la Universidad de Granada, de los cuales 109 (79,56%) eran mujeres y 28 (20,44%) eran hombres, con una edad media de 21,19 años (desviación típica: 0,746).

Variables, diseño y procedimiento

La comprobación del funcionamiento del modelo de intervención ha implicado la utilización de un diseño cuasi experimental (Campbell y Stanley, 1982), con dos grupos - experimental y control, a los que se aplican tres cuestionarios, elaborados ad hoc, en dos momentos (pre-test y post-test). Se evalúan Conocimientos Conceptuales sobre el medio ambiente, Actitudes Ambientales e Intención de Conducta a favor del medio mediante escalas elaboradas ad hoc. Así como la Deseabilidad Social mediante la escala de Marlowe y Crowe (Avila y Tomé, 1989), a fin de comprobar si se producen diferencias entre los sujetos de los grupos experimental y de control respecto a estas variables y si estas diferencias son estadísticamente significativas. En el grupo experimental se utiliza el modelo didáctico propuesto, que incluye el material estimular relativo a las problemáticas indicadas. En el grupo control se utiliza una metodología “tradicional”.

Se registra, por tanto, una variable independiente: la metodología didáctica utilizada, con dos niveles: experimental (capacitación para la acción a favor del medio) y expositivo-transmisiva; utilizándose tres variables dependientes: actitudes proambientales, conocimientos conceptuales sobre la problemática ambiental e intención de conducta a favor del medio; se controlan la homogeneidad de los grupos en cuanto a estas variables en el pretest y la deseabilidad social de los sujetos.

Análisis de datos y discusión de resultados

En primer lugar, comprobamos la homogeneidad de ambos grupos - experimental y de control - en el pretest, en cuanto a las variables personales (sexo y edad) y variables dependientes. Los resultados obtenidos en el pretest indican que no existen diferencias estadísticamente significativas entre los dos grupos considerados (Tabla 1).

Tabla 1

Variable	Prueba realizada	Chi-cuadrado	F	Sig.
Edad	ANOVA	2,516	1,643	0,1347
Sexo	Kruskal-Wallis			0,396
Actitudes	ANOVA		7,485	0,382
Conocimientos	ANOVA		45,731	0,253
Intención de conducta	ANOVA		13,164	0,186

En cuanto a sus conocimientos conceptuales sobre medio ambiente y la problemática ambiental destaca el que, en su mayor parte, los sujetos desconocen los conceptos básicos relativos al medio ambiente y manifiestan

ideas confusas (sobre todo en lo relativo a las relaciones causa-efecto) acerca de los principales problemas que le afectan; respecto a sus actitudes hacia el medio, de nuevo, los universitarios españoles muestran un elevado nivel actitudinal (Álvarez et al., 1997), aunque también se pone de manifiesto la “función defensiva” que se atribuye a las actitudes, en el sentido de evitar la implicación personal y culpar a las instituciones de los problemas de degradación del medio. Por su parte, la preocupación ambiental percibida no se corresponde con la intención de conducta a favor del medio, que es muy inferior; pudiéndose señalar respecto a esta última que existe una mayor disposición a realizar comportamientos de carácter individual y en escenarios cotidianos, antes que otros comportamientos que implican una acción grupal.

De los datos obtenidos en el postest, se puede concluir que los sujetos del grupo experimental modifican significativamente sus conocimientos ($F=37,902$; $p=0,000$) (figura 1), mejoran sus actitudes (apertura al pensamiento biocéntrico) ($F=48,256$; $p=0,000$) - a pesar del alto nivel de partida - (figura 2) y, sobre todo, manifiestan su disposición a realizar acciones, tanto individual como grupalmente, con criterios de sustentabilidad. Con especial énfasis en la solidaridad y equidad intra e intergeneracional a fin de garantizar el desarrollo y calidad ambiental de las generaciones futuras en este mundo globalizado, para lo que la metodología experimental les habrá capacitado (figura 3) ($F=40,712$; $p=0,000$).

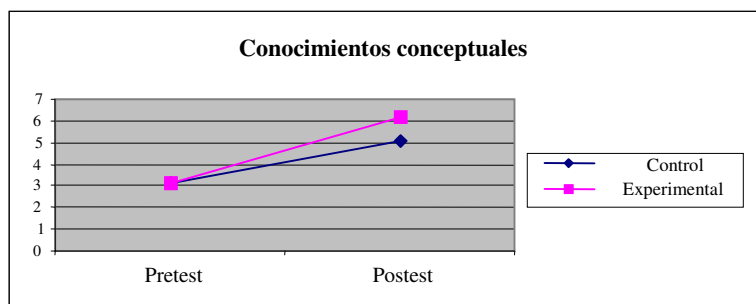


Fig. 1.

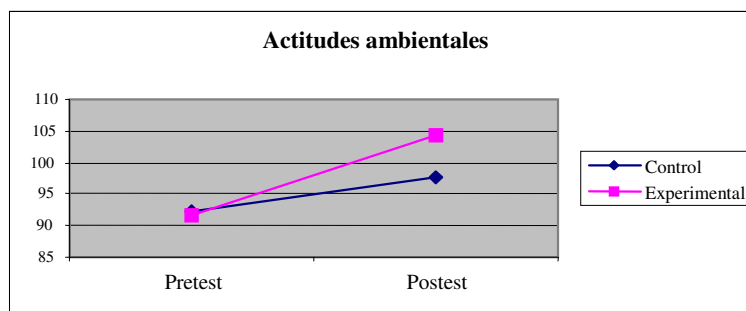


Fig. 2.

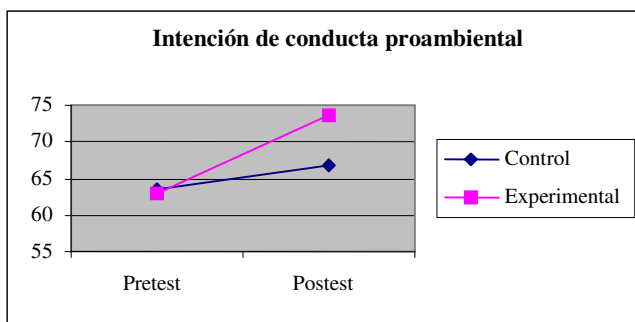


Fig. 3.

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Sub-session 3.2

AN INNOVATIVE EXPERIENCE OF TRAINING IN SUSTAINABILITY, ADDRESSED TO PhD STUDENTS INVOLVED IN ENVIRONMENTAL RESEARCH

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A two-year course in “sustainability literacy”

This experience stems from a former collaboration between IRIS and Regione Piemonte (Assessorato Tutela Ambientale) aimed at developing knowledge and raising consciousness of sustainability issues, through educational activities. A two-year course on “sustainability literacy”, planned by the IRIS members and now partially implemented, was addressed to graduate students, winners of grants from Regione Piemonte to carry out institutional research (local Universities and Polytechnique) on environmental problems. Thirty-two students enrolled on a voluntary basis, and from a variety of curricula: from Economic Policy to Natural Sciences, from Engineering to Chemistry.

Aims of the course

The IRIS staff identified a plurality of aims:

- To present an interdisciplinary approach to issues of sustainability.
- To promote a reflexive attitude towards scientific data, research methodologies and epistemological aspects of the involved academic disciplines.
- To help students to critically reflect on the links and feedbacks between their own research and the local and global eco-socio-systems.
- To provide opportunities of dialogue and collaboration amongst the participants, in view of future synergies and joint research.

Some crucial points were also identified, which worked as seeds for further reflection:

- To develop awareness of the complexity of the systems under study; of the ambiguity of language use when communicating between different disciplines; of the presence of controversies and conflicts, and the need for sustainable, non-violent means to cope with them.

- To interiorise a conceptual frame and a value-system in tune with the idea that our Planet is a closed system, and that ecology and equity issues are not separable.

The structure of the Course

The Course consisted of three independent modules (total eighty hours):

I module: lectures and seminars. Year 2005

II module: a residential stage. Year 2005

III module: lectures and seminars. Year 2006

During the first year the main topics proposed to the participants were:

- The Earth system and its functioning: the carbon cycle: respiration and photosynthesis; the Net Primary Production (NPP)
- Contrasting visions offered by Economics and Ecology: the classical economics' idea of unlimited growth and the externalisation of burdens on ecosystems, was compared and contrasted with the need to recycle matter and to preserve ecosystems' services in a closed, finite system.
- Human use of natural resources: local vs. global resources; traditional vs. "modern" resources.

The titles of the lectures

- 1.Dynamics of biochemical cycles
- 2.Economics - ecology: in search of a balance
- 3.Elements of environmental macroeconomics
- 4.A socio-ecological interpretative key: an experiment of collective management of natural resources
- 5.Methods of environmental accounting
- 6.The territorial approach to environmental sustainability
- 7.Environmental criteria in politics and in public institutions
- 8.From interdisciplinary to trans-disciplinary research: epistemological, methodological and linguistic perspectives.
- 9.Primary Net Productivity and natural resources. Students' seminars
- 10.Linguistic analysis and non-formal strategies in dealing with complex socio-environmental issues.

During the lectures the teachers paid special attention to underlining their conceptual frameworks and tools; for example:

- Bases of environmental macro-economy: how to measure economic and ecological wealth; how to include natural capital within economic calculations.
- Methods and politics for environmental accounts.
- The territorial approach to environmental sustainability.

Moreover students were introduced to a dimension of meta-reflection about one's way of thinking, and about different disciplinary approaches.

Some cues were also offered to stimulate students' thinking about the changing nature of the scientific endeavour, and on the role of natural and iconic language in describing and interpreting events and processes

Methodology

In order to offer a pleasant and informal atmosphere, which would encourage exchanges of ideas, and which would also be consistent with our shared views on sustainability, special care was given to the quality of the context and the relationships: coffee breaks were organized by a local cooperative, which supplied local and fair trade products.

Most of the teachers attended all lectures, sharing with the students the role of learners and actively contributing with questions and comments on issues with which they were unfamiliar. The lectures were organized so to actively involve the students, by alternating traditional lessons with tasks, group work, individual reflections and plenary discussions.

Some lectures were held by two teachers, each one bringing forth different, contrasting views on sustainability, and engaging in discussion about controversial interpretations. All the relevant information offered by the teachers (including interactive activities and suggestions for reading) was provided to the students at the end of each lecture, and through the web site www.iris.unito.it.

As the students were engaged in personal and group activities, their products were timely examined and some feedback was offered to them on the following week. In such a way we could easily link the topics as we went along and through the various disciplines' views, and we were able to adapt language and degree of detail according to the students' levels of understanding.

The stage

In September a residential stage of three days was organized up in the Alps, in a hut at 1800 meters of altitude. Participants were offered a variety of experiences: from the excursion in the natural environment to the reflection on "local" sustainability, from the perceptual approach to the artistic interpretation of nature. In such an informal context, great attention was devoted to offering opportunities for dialogue between students, and amongst teachers and students. This module was characterized by a deep emotional involvement and meta-reflection about one's position (personal

and professional) within the natural systems, as it emerged from the comments expressed by the participants in the following weeks.

Assessment

After the conclusion of the first two modules it is now possible to analyse reflectively some aspects of this experience. A first point concerns the role played by the IRIS members in the preparation and implementation of the course: did we succeed in offering students some conceptual tools useful to approach sustainability issues with an interdisciplinary view?

A second point regards the involvement of the students: did they appreciate being solicited not only on the cognitive aspects (new knowledge and competences), but also at the relational and emotional levels (degree and quality of inner involvement)?

A third aspect refers to the extent of integration: did the experience of multiple learning contexts (from lectures in university halls to open air routes) help the participants to find connections between the natural systems and the research activities they are engaged in?

Some answers to these questions were found in the questionnaires we administered to the students: one questionnaire was distributed after the first module, and another one after the stage. Moreover there were several opportunities for the students to exchange ideas in a more relaxed and informal way.

The feedback from the students cast lights on some positive aspects as well as critical points:

- The richness of the interdisciplinary approach offered such a variety of view points, that allowed them to grasp complexity and interdependence of events and processes.
- A sense of “displacement” was pointed out by the participants during the first module, as regards to both approaching other disciplines and carrying out meta - reflection.
- Group working proved to be very useful, because it stimulated discussion and interaction between participants. However, time constraints were perceived as a significant obstacle.

Some notes written by the participants after the first module

By reflecting on energy and matter flows, on direct / in direct use of ecosystems in human activities, on the life-cycle of products, enlarged my world vision.

I received some illuminating ideas about possible consequences of human actions on ecosystems.

It is the only PhD course where I was offered the opportunity to share ideas with my colleagues.

I understood how difficult it is to find a common language: there is really a need for integrating individual approaches in order to develop a deeper understanding.

Comments at the end of the stage

Bridges have been built between my scientific work and the personal, artistic sphere.

I think this experience with IRIS allows us to understand what it means to live within a sustainable world...

The language of art: a new way to approach sustainability topics.

Sustainability cannot be only a word to give to a project on which you work few hours a day... You must be within the process in order to understand it.

Conclusions

This experience is considered from all IRIS members as a work in progress. It has been a shared experience in our search for sustainability, based on discussion, dialogue and mutual understanding. It involved people engaged in different disciplines, professional priorities, and world views, with the progressive inclusion of young researchers interested in developing a new and more sustainable approach in their research, reflection and action.

ENVIRONMENTAL EDUCATION OF FUTURE TEACHERS: A SYSTEMIC APPROACH

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Introduction

This presentation describes an effort of the Faculty of Education at the Technical University in Liberec (The Czech Republic) in the field of environmental education. The Faculty is focused on preparing future teachers at elementary and high schools; a new, currently preparing programme is dedicated to leisure time education. Environmental education plays a significant role in all those programmes. In this presentation I would like to introduce three topics:

- A theoretical framework that forms the basis of our environmental education approach.
- The system of gradational preparation of students in the field of environmental education.
- The Course of Global Education, as an example of our activities.

Theoretical Framework

Firstly I would like to briefly analyse the weak points of environmental education in the Czech Republic. Despite having a high number of environmental education centres that operate in this region, the efficiency of their work is sometimes not at an appropriate level. There are areas that might be improved:

- Better declaring and clarifying the goals of environmental education. These goals should be taken as the basis for whole curricula. Nowadays, environmental education in our country suffers from being fragmented, activities are usually chosen out of any system, just because somebody knows and likes them. Projects and programmes are also usually too short, what underscores the fragmentation.
- Games and activities, which play an important role in achieving these goals, should not be used apart of relevant educational theories. Very often we can see exciting games whose educational impact is diminished by poor organization of follow-up discussions or by their inappropriate sequencing.
- Better differentiation between various approaches in this field. The question is not whether a given approach is good or bad (Earth

Education better than Ecology education, for example), but whether we understand the background (ideas and methodology) of the work we do. A mixture of methods and approaches may undermine strong points of all of them.

- The efficiency of the projects is usually measured only by a number of their participants. However, a really efficient programme should change awareness, attitudes or skills and actions of participants. An invention of a good system for measuring such changes is a big challenge for everybody in this field.

In this part of the presentation I would like to mention the way we work with the first two problems.

We tried to redefine the goals of environmental education to make them more useful for curricula designers. Our main idea is a systemic approach. One of reasons for mentioned fragmentation is that the number of goals is too high. In praxis cognitive goals, based on data transmission, are superior. The principle of the systemic approach is to start with a few most important terms connected with awareness, attitudes and skills. The next principle is not to think information as data but as challenges for changing our horizons. We have identified seven such challenges: awareness of interdependency, reverence and accepting of intrinsic value of life, recognizing beauty of nature and life, recognizing poverty and suffering in the world, active citizenship, diminishing our ecological footprint, critical thinking. In our approach we try to design projects that start with these areas (we call them thesis), which are further elaborated to a form of brief messages. During a project students are firstly asked to formulate their opinion on problems connected with a thesis. Then they are confronted with activities that describe topics that show various aspects of the thesis. Finally, they are faced with the message of the thesis and asked to express the way the thesis is linked to their own lives and life - style. The benefit of such an approach is that all activities have their place and sense in the structure of a project, they are logically organized, what may improve its efficiency.

The described methodology is influenced by Earth Education and by constructivist educational theories. The same painstaking attention must be dedicated for designing of selected activities. There we are highly influenced by the constructivism and experiential education. Constructivism is an educational theory that declares that all learners have some kind of preconception of any taught topic. During education these preconceptions should be challenged by new information. It causes a disequilibrium that should finally give students to a new awareness of the problem. As a consequence, an activity (or a block of activities) should be organized in such a way that promotes this process. Experiential education is based on the Experiential Learning Cycle. It deals with learning by experiences. A methodology that was invented by the organization Project Adventure divides an activity in three parts: briefing, activity and debriefing. When briefing is the time for introducing a metaphor for the activity, debriefing is the time for rational processing an experience. It is

further divided into periods of reflection, generalization and transference of the experience into improving students' skills. Generally speaking, we feel that the constructivist methodology works better for activities that have cognitive goals and the Experiential Learning Cycle is more useful for activities with behavioural goals. Actually, there is also an opportunity for the combination of both methodologies. It works well for some kind of activities, like are simulation or role-playing games, which can be used for a mixture of behavioural and cognitive goals.

The system of gradational preparation of students

Although environmental education is declared as an important area of education, there are many opportunities for increasing efficiency of teacher's training and preparation in this field. Although it is common that students of education may choose environmental education as a voluntary subject during their university study, opportunities for environmental education methodology are very often limited by including ecological and environmental topics in curricula of these subjects. That is why we decided to separate subjects concerned on ecology and environmentalism from subjects dedicated to environmental education. As a result, students now may choose from a large scale of subjects, including Global problems, Ecology, Environmental Education, Global Education, Course of Global Education, etc. The key principle is a chance for step-by-step improvement of knowledge and skills in both environmentalism and the environmental education methodology. Participating in the Environmental Education subject, students achieve basic awareness of goals, approaches and methods, most of them they experience themselves. After finishing the subject Global Education, they will be able to lead activities and design simple projects. The voluntary Course of Global Education - a ten-day experiential outdoor course - plays a special role, which will be described in the next chapter. Although all of the subjects are voluntary, we have regularly about one hundred students at the Environmental Education and at the Global Problems, subjects that represent a basic level of the whole system.

The Course of Global Education.

The Course of Global Education is a voluntary subject for students of education at three Czech universities and for leaders working in non-profit organizations. It is based on a ten-year tradition, continuously enriched by new theoretical impetuses. The Course is prepared in close cooperation with non-profit organizations and other volunteers. The Course plays three important roles:

- A lab for testing new methods and activities.
- A training course for improving teaching skills of participants in this area.
- A shaping of environmental thinking of its participants.

As the lab, the Course offers a natural setting for testing the mentioned methodology in praxis. Although the Courses are shaped in a similar way, every year is unique and slightly different from previous years. The Courses have highly intensive programme that starts at eight 'o clock and ends about ten p.m. This intensity helps to create a joyful, friendly atmosphere of sharing and trust, which is crucial for open discussion about values, attitudes and life-styles. Our effort is to get an impetus for new projects based on our methodology. That is one of reasons why we so appreciate a close cooperation of partners from other organizations: it helps us share our ideas out of our regional borders. As training facility, the Course is based on participants - apprentices - tutors hierarchy. Participants are the students who take a part at the Course for the first time. It is a set of students from three universities and from non-profit organizations, with different experiences and skills. All participants get their direct experiences from taking part at the programme, they get information brochure about its methodology and they have an opportunity to lead a selected activity for the others. The participants who are interested to go on are encouraged to take a place in an organizational team as apprentices. Being the apprentices, students get experiences from the whole process of designing a new course and they get responsibility for some parts of its programme. Each of activities is managed by one tutor and two or three apprentices. A tutor leads his/her group of apprentices and shares his/her responsibility for an activity with them. Skilful apprentices may become tutors during next years. Last but not least, the Course is an opportunity for shaping awareness, values and skills connected with all of its thesis and also for sharing ideas about environmental education.

Conclusion

In the presentation I have introduced three areas of activities we do at the Technical University in Liberec (Czech Republic) in the field of environmental education. Although we have been working on this for a couple of years, a long way is still ahead. The system of teacher education, as well as the methodology of environmental education, must be more scrutinized and further invented. The systemic approach, which was briefly introduced in this article, should be carefully evaluated. Our successes in disseminating our methodology out of our regional borders are still very limited. We must find out a transparent way for evaluating of efficiency of environmental education programmes. These are challenges we have to face during next years.

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THE EDUCATION OF TEACHERS. OPPORTUNITIES, CAUTIONS, METHODS

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The comments in this paper come from an experience of educational research on the problems concerning the education of adults, which characterizes the proposal of CREDIA WWF. The CREDIA is the first Centre of Education Research, Intercultural and Environmental Documentation of WWF Italy for the Mediterranean Ecoregion, which is specialized in childhood and adult age (National Park of Monti Sibillini, Contrada Vallato di San Ginesio, MC). It is recognized by the region Marche as a Centre of Experience, inside the system I.n.f.e.a., and as an Education Farm; it is a member of the national system of CEA WWF (Centres of Environmental Education) and of the Italian Network of Open-air Ecology Schools (R.I.S.E.A.), promoted by the national association "Civiltà Contadina".

The education of teachers today is an increasingly complicated question. We have to face the school as a mirror and a fragment of our society, a contemporary multicultural and multiethnic reality, the changes based on the new reforms of the school, increasingly multimedia, interlocked and fast educational programmes. The idea of children and boys and girls is also changing: they are qualified from birth, with their own interests and rights, not only duties, devisers of possible futures and changes.

The proposal of "refresher courses" as places or moments, where theory is the principal matter and techniques and methods are secondary matters, is totally inadequate. We are facing a lack of reference educational models, from which we can get reliable answers (the same idea of rationality and accuracy might seem unsuitable); we cannot refer to a national historical archive for education, which is able to collect multiple variables and to answer to the contemporary questions and uncertainties of teachers. The education received by teachers is even questioned.

Perhaps it is necessary to start from the analysis of what teachers actually and constantly do, from the necessary skills, from the research of their educational needs, from the redefinition of their role compared to the other educators and from the reassessment of the education of adults and for adults

(How is the education, the adult, the teacher and the educator of the contemporary school?).

Adult age is the natural and cultural period of maturity; it is a complex web of continuity and discontinuity at a personal, social, historical level; it is a sequence of innovations and repetitions (our educational history retraces and reintroduces our educational models antithetically or coherently); it is an archive of experiences in the world of emotional relationships (love and friendship), operative relationships (work, social commitment), playful relationships and relations with death (mourning, abandonment, separation).

It is necessary to overcome the idea that adult age is a terminal phase of life, a quality, an attitude, a mood, a target or a missing model. On the contrary, it is multiform, stratified with different levels of complexity, tangled with the past and open to future, to research and new knowledge.

A questioning idea of the adult age seems more appropriate, namely a partial and temporarily condition of our existence, which is open to any change and chance (Duccio Demetrio). We do not become and remain adult always and everywhere, fortunately.

Despite the good intentions, the introduction of new disciplines and the opening to local structures, the school very often is a context, where the dimension of control, the linear teaching of notions, the binary relation between the adult, who is the absolute holder of knowledge, and the passive student, who must receive it, are widespread. This model has been strongly questioned by several parts and was made worse by the increasing feeling of inadequacy of the teachers (but even of parents and other educators) and by the anxiety to play a role, which concerns education as well as new technical, relational and organizing skills.

The concept of education is also a strongly questioned matter, which refers to its epistemological and philosophical roots and is linked to learning and knowledge. If education and self-education are necessary to learn, they concern the exploration, transmission and building of knowledge and the relation with knowledge. Knowledge is increasingly specialized, technological, refined, and it refers less and less to definitive theories.

In this context, education can be research of meaning, of reflectiveness about the self, the others and the environment, of "care", of listening to the body-mind, of communication and knowledge. "It is an experience of action and mind" (Bernard Honoré). It is a process that accompanies and characterizes adult life as an existential project, as far as permanent education is concerned, because it implies a new awareness of one's action and becoming.

But in which fields education grows intertwined with adult age? The idea of education asserted until here is mostly self-education, because it is a project of building, enrichment and organization of one's knowledge. In the evolutionary process of the individual, it is formativity (Honoré), namely understanding of existence. In this endless research of meaning, action and reflection grow intertwined in a recursive cycle. In an educational process,

the others are a source of exchange and sharing, their eyes are mirrors: they offer suggestions, help to rebuild one's identity, to recognize it through distinctions and significations.

The theories of adult learning suggest that in the educational field it is fundamental to consider concepts such as the following: the importance of personal relations (Rogers), motivations and needs (Maslow), experience (Dewey), willingness to learn (Bruner), identification and imitation (Bandura). It is fundamental to pay particular attention to the initial phase of an educational project: educational setting, recognition of the individual and the developing group and attention even for the smallest details. The initial phase is not a banal moment, because it is very tense, full of emotions, of expectations and conflicts. It is the social phase of building of the group. On the one hand, the whole group can often become the absolute protagonist, risking a process of standardization and stereotyping. On the other hand, some individuals can prevail and suffocate the meaning of an education, which considers the dimension of the group as a benefit.

The educational contract, as "a deliberate, shared, purposeful, aware of responsibilities (explicit, as far as possible) agreement to what we are doing and consequently decide to do..." (Paolo Guidoni) is an appropriate instrument. This contract supports and allows deciding roles, times, working methods, questions of research, personal narratives and focused enlargements of fragments of life (autobiographical approach). It can become a regulating factor to handle conflicts.

The theme of the travel, as educational approach, is an ideal metaphor. All the travels are opportunities of encounters, explorations, recognitions, acquisitions and loans of knowledge, pauses, advancements and setbacks, accumulations, as well as deconstruction of one's knowledge to leave some empty space. During a travel, we abandon and lose something; we work hard (resistance to change, experiential density) but we learn and leave our mark. Education helps to build potential learning opportunities and to give a meaning to the architecture of a travel.

The most appropriate kind of learning for this approach is the systemic-rational, net-like and non-linear learning. The quality of experience is directly connected with the quality of learning. We cannot learn an experience but we can learn from experience. The learning of experience produce mental pain, because it concerns our mental order, destructures certainties, forces to constantly revise our self, to suffer anxiety in front of novelties. It is clashing and upsetting. It is an emotionally difficult learning, but it is the only one that can produce the development of the mind. Every place expresses culture. A rich, fascinating, aesthetically interesting, uncomfortable, diverging, polisensory space stimulates exploration, creativity, opportunities of choice and complexity of mind in the educational and formative field. If an environment can host both individual stories and the working process of the group, it becomes narration. The environment as a community of practice and research is a place of constructivism for mind and body, a great atelier. Therefore, it is

not a monological space but has its identity, it is open to indeterminacy and to diversity; it is a hybrid and cross environment.

In our educative approach, nature with its complexity, variability and inflexibility is a challenge and an open question. The natural environments are sources of emotions and meanings, which have an influence beyond culture. They suggest educative actions, the choice of materials, the fanciful-narrative setting, the metaphor.

Within this process, teachers recognize their educational responsibility. They choose, rearrange, exclude, give a meaning to what they have learned and “educate” themselves. Teachers experience, meditate, learn again, research together with the group and the trainer; they are not shaped by experience but they shape the educational experience. The education of teachers does not stop at the end of the course, but it will continue, it will be modified, producing new thoughts and actions.

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FORMARE DOCENTI. OPPORTUNITÀ, ATTENZIONI, METODOLOGIE

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Le riflessioni di questo intervento nascono da un'esperienza di ricerca formativa attorno alle questioni dell'educazione degli adulti e dell'educazione in età adulta, che caratterizzano la proposta del CREDIA WWF. Il CREDIA è il primo Centro di Ricerca Educativa, Documentazione Interculturale ed Ambientale del WWF Italia per l'Ecoregione Mediterraneo, specializzato per infanzia e adulti (Parco Nazionale dei Monti Sibillini, contrada Vallato di San Ginesio, MC). È riconosciuto dalla Regione Marche come Centro di Esperienza, all'interno del sistema I.n.f.e.a., e come Fattoria Didattica; fa parte del sistema nazionale dei CEA WWF (Centri di Educazione Ambientale) e della Rete Italiana di Scuole di Ecologia all'Aperto (R.I.S.E.A.), promossa dall'Associazione Nazionale "Civiltà Contadina".

La formazione dei docenti è oggi una questione sempre più complessa. Siamo di fronte ad una scuola specchio e frammento di società, ad una contemporanea presenza multiculturale e multiethnica, a trasformazioni dettate dalle nuove riforme scolastiche, a percorsi di conoscenza sempre più multimediali, intrecciati e rapidi. Anche l'idea di "bambino", di "bambina" e di "ragazzi" sta cambiando: competenti fin dalla nascita, portatori di interessi e di diritti, oltre che di doveri, ideatori di futuri possibili e, quindi, di cambiamenti.

La proposta di molti "corsi di aggiornamento", caratterizzati come luoghi o momenti in cui si fa sostanzialmente teoria e qualche volta si cerca di far acquisire tecniche o metodologie, è oggi, più che mai, inadeguata. Siamo di fronte alla carenza di modelli educativi di riferimento dai quali attingere risposte certe (e, forse, le stesse idee di razionalità e di esattezza appaiono inappropriate); non c'è un archivio storico educativo al quale riferirsi, capace di tenere dentro molteplici variabili e di rispondere alle attuali domande e alle incertezze degli adulti educatori; vengono, inoltre, rimesse in discussione le stesse educazioni ricevute.

Forse è necessario ripartire dall'analisi di che cosa fa, concretamente e quotidianamente, un insegnante, dalla ricerca dei suoi bisogni formativi, dalle competenze necessarie oggi, dalla ridefinizione del suo ruolo in relazione alle altre figure educative, e dal ripensamento della formazione

dell'adulto e della formazione in età adulta (Quale formazione? Quale adulto? Quale insegnante nella scuola di oggi? Quale formatore?).

L'età adulta è la sede naturale e culturale della maturità; è un intrico di continuità e discontinuità sia a livello personale che sociale, storico, psicologico; è una trama di innovazioni e ripetizioni (basti pensare alla propria storia educativa che ripercorre e ripropone - in antitesi o coerentemente - i modelli educativi ricevuti); è un archivio di esperienze nel mondo delle relazioni affettive (amori ed amicizie), delle relazioni operative (lavoro, impegno sociale), delle relazioni ludiche e di quelle con la morte (lutto, abbandono, distacco). È necessario superare l'idea che l'età adulta sia una fase apicale e terminale della vita, una qualità, un atteggiamento, uno stato d'animo, un modello da raggiungere o mancante. Al contrario essa è multiforme, stratificata su più livelli di complessità, intrecciata al passato ed aperta al futuro, alla ricerca, a nuovi apprendimenti.

Ci sembra, quindi, più opportuna un'idea problematizzante dell'età adulta definibile con il neologismo "adulità"; ovvero, una condizione dell'esistenza parziale e provvisoria, aperta al cambiamento ed al possibile (Duccio Demetrio). Adulti lo si diventa e lo si è non sempre, per nostra fortuna, e non in ogni luogo.

Nonostante le buone intenzioni, l'introduzione di nuove discipline, l'apertura alle risorse del territorio, la scuola, ancora troppo spesso, si caratterizza come un contesto dove è pervasiva la dimensione del controllo, della trasmissione lineare di nozioni, della relazione binaria tra un adulto detentore unico del sapere ed un allievo passivo che deve riceverlo. Questo modello è fortemente messo in discussione da più parti ed è aggravato dal crescente senso di inadeguatezza dei docenti (ma anche dei genitori e di altri educatori) e dall'ansia di sostenere un ruolo che non si riduce nell'istruzione ma mette fortemente in gioco competenze tecniche, relazionali ed organizzative nuove.

Anche la formazione è un concetto molto discusso, che rimanda alle sue radici epistemologiche e filosofiche ed ha legami con il conoscere e l'apprendere. Se formare e formarsi serve ad apprendere, questo ha a che fare con la conoscenza, con la sua esplorazione, la sua trasmissione, la sua costruzione, con il rapporto che noi abbiamo con essa. Il sapere è poi sempre più specialistico, tecnologico, ricercato, meno riferito a teorie definitive. In questo contesto la formazione può essere luogo di ricerca di senso, di riflessività sul sé, sugli altri, sull'ambiente, di "cura", di ascolto del corpo-mente, di comunicazione e di conoscenza. "È un'esperienza dell'azione e del pensiero" (Bernard Honoré). È un processo che accompagna la vita adulta e che la caratterizza come progetto esistenziale, nell'ottica della formazione permanente, poiché presuppone una presa di coscienza sul proprio agire e divenire.

Ma in quali ambiti la formazione s'intreccia alla "adulità"? L'idea di formazione fin qui sostenuta è innanzitutto autoformazione in quanto progetto di costruzione, di arricchimento e di sistemazione delle proprie conoscenze; nella funzione evolutiva dell'individuo è quindi formatività

(Honorè), cioè comprensione dell'esistere. In questa infinita ricerca di senso, l'agire, l'apprendere ed il riflettere s'intrecciano in un circolo ricorsivo.

Dentro ad un processo formativo l'altro consente scambio, condivisione, l'altrui sguardo è uno specchio: offre rimandi, aiuta a ricostruire la propria identità, a riconoscerla attraverso distinzioni e significazioni.

Le teorie dell'apprendimento adulto ci indicano che in ambito formativo è fondamentale tener dentro concetti quali: l'importanza della relazione personale (Rogers), le motivazioni ed i bisogni (Maslow), l'esperienza (Dewey), la volontà di apprendere (Bruner), l'identificazione e l'imitazione (Bandura).

Riteniamo, dunque, che nell'incipit di un progetto formativo si debba porre particolare attenzione alla predisposizione del contesto (setting formativo), al riconoscimento del singolo e del gruppo che va formandosi, alla cura anche del più piccolo dettaglio. L'avvio è un momento non banale perché carico di tensioni, di emozioni, di attese-aspettative e di conflitti; rappresenta la fase sociale di creazione del gruppo. Spesso il gruppo nel suo insieme finisce per diventare l'unico protagonista, col rischio di omologazione e stereotipizzazione.

Viceversa, alcune individualità possono prevalere soffocando il senso di una formazione che ha un valore aggiunto proprio nella dimensione del gruppo. Pertanto l'accoglienza, o meglio l'ospitalità, nel senso di ricettività e di ascolto, diventa attenzione progettuale per il formatore ma anche condizione per l'adulto in formazione. In fondo, porsi in relazione permanente con la conoscenza, con l'apprendimento, con l'autoformazione è un po' come accettare di arrivare più volte stranieri in un luogo, aperti all'accoglienza ed alla condivisione, seppur provvisoria, di un terreno comune.

Il contratto formativo come "l'adesione cosciente, condivisa, finalizzata, responsabilizzante (esplicita, per quanto possibile) a quello che si sta a fare ed a quello che conseguentemente si decide di fare" (Paolo Guidoni) rappresenta uno strumento adeguato. Il contratto sostiene e permette di dichiarare ruoli, tempi, modalità di lavoro, domande di ricerca, narrative personali ed ingrandimenti focalizzati di frammenti di vita (approccio autobiografico). Può diventare regolatore nella gestione dei conflitti.

Anche la tematica del viaggio, come approccio formativo, è una metafora ideale. Ogni viaggio è un'opportunità di incontro, esplorazione, riconoscimento, acquisto e prestito di conoscenze, sosta, avanzamento e ritorno, accumulazione, ma anche di de-costruzione dei propri saperi per lasciar posto a spazi vuoti. Nel viaggio si abbandona e perde qualcosa, si fatica (resistenze al cambiamento, densità esperienziale) ma si apprende e si lascia traccia di sé. La formazione aiuta a costruire spazi potenziali di apprendimento e a dare un senso all'architettura del viaggio.

L'idea di apprendimento più coerente a tale approccio è di tipo sistemico-relazionale, reticolare, quindi, e non lineare. La qualità dell'esperienza è direttamente connessa alla qualità dell'apprendimento. Non si apprende un'esperienza ma si può imparare da essa. L'apprendimento dall'esperienza determina dolore mentale poiché mette in gioco i propri

assetto mentali, destruttura le certezze, obbliga a rivedersi continuamente, a sostenere l'ansia di accogliere il nuovo, è dissonante, scuote. È quindi un apprendimento emotivamente faticoso ma l'unico che può realmente determinare lo sviluppo della mente.

Esiste, tuttavia, una notevole difficoltà a definire oggi che cos'è un'esperienza e quando ci sono le condizioni per un'esperienza. È un fare? È un riflettere? È un intreccio tra fare e riflettere? Rispetto al fare, infatti, possiamo affermare che quotidianamente siamo impegnati nell'operatività, nel produrre, nel realizzare; anche in ambito formativo sempre di più si sente l'esigenza di proporre modalità attive; facciamo quasi troppo, con tempi stretti e accelerati. Bisogna restituire senso al nostro fare come vissuto, come processo, prima ancora che come prodotto, come un tempo più lento.

Se fino a poco tempo fa l'esperienza era imprescindibile da un contatto diretto con la realtà, oggi la dimensione del virtuale ha messo in discussione anche questo, poiché le tecnologie digitali stanno trasformando le forme comunicative, le strutture di conoscenza, l'apprendimento. Disponiamo di macchine e strumenti che non solo accelerano i tempi e fanno divertire, ma aiutano anche a costruire e a dare senso al mondo. Quindi, si fa esperienza anche dentro alla multimedialità; non è casuale l'attrazione esercitata dai media nei bambini e nei ragazzi - ma anche nell'adulto - per la loro capacità di creare scenari illusori, immaginativi, artificiali ma concreti, dove si può osare, dove l'errore è reversibile perché si può tornare indietro o cancellare tutto.

L'impulso che stanno avendo i progetti *e.learning*, ovvero di formazione e scambio a distanza, vanno in questa direzione. Il problema, forse, è la rapidità con cui si sta sviluppando questa nuova forma di elaborazione culturale e l'eccedenza delle tecnologie per le quali costruiamo nuovi usi, nuovi bisogni, nuovi consumi.

Il ruolo delle tecnologie digitali dentro ai processi di apprendimento e di formazione in età adulta è, quindi, una frontiera aperta e sulla quale ricercare. Non possiamo non tenerne conto.

Progettare per la formazione dei docenti luoghi complessi, capaci di parlare da soli perché densi di opportunità, è un'altra grande attenzione culturale e metodologica. Ogni luogo esprime cultura. Uno spazio ricco, coinvolgente, esteticamente interessante, spaesante, divergente, polisensoriale, sollecita in ambito educativo e formativo l'esplorazione, la creatività, la possibilità di scelta, la complessità del pensiero. Se un ambiente è capace di accogliere le storie individuali ed i processi di lavoro del gruppo, diventa narrazione. L'ambiente come comunità di pratica e di ricerca è luogo di costruttivismo per la mente e per il corpo, un sorta di grande atelier. Non è, quindi, uno spazio monologico, ma con identità: più aperto all'indeterminazione, alla diversità, è un ambiente ibrido e meticcio, più coerente all'idea di sostenibilità.

Nel nostro approccio formativo la natura con la sua complessità, la variabilità e l'irriducibilità costituisce una sfida, una domanda anch'essa aperta. I luoghi naturali sono portatori di emozioni e significati che

influenzano al di là della cultura. Da essi vengono suggerimenti per le azioni educative, l'uso di alcuni materiali, l'ideazione fantastica-narrativa, la metafora. La natura mantiene la sua intensa capacità di generare conoscenza, ricerca, suggestione, emozione ma fa anche paura (ad es., un bosco di notte); la si conosce poco, è sempre più minata nella sua bellezza, nell'integrità degli equilibri ecologici, nella sua conservazione, tanto che è necessario parlare di gestione sostenibile, di pianificazione, di parchi e riserve. Quale idea di natura sostenere allora nella formazione? Con quale approccio porre in relazione l'uomo adulto con la natura?

I presupposti epistemologici del binomio uomo-natura influenzano agiti, stili di vita ed impronte ecologiche. La natura è un luogo in cui, innanzitutto, bisogna andare, percorrere, toccare, sentire, soprattutto in una proposta formativa.

Il dentro ed il fuori hanno funzioni e potenzialità diverse. L'educazione della scuola è ancora troppo pensata ed agita dentro alla mura scolastiche, in spazi con poca identità, strutturati senza intenzionalità pedagogica, poveri di sensorialità, di fascino e di estetica. In natura, invece, complessità, relazione, ordine e caos, matericità, empatia, ci sono tutti nelle massime espressioni. È necessario, quindi, ripartire da lì: riappropriandoci della natura come sistema, come paesaggio, con un'identità anche umana, come storia, geografia, biologia, cultura, economia; indagandola nei suoi meccanismi, nelle invisibili trame relazionali, nelle rotture e negli squilibri indotti dall'uomo trasformatore; portandola dentro alle scuole, alle città, e lasciando spazi affinché i luoghi chiusi accolgano anche la dimensione naturale in un dialogo continuo, quasi osmotico tra il dentro ed il fuori.

Dentro a tale processo, dunque, è l'insegnante che riconosce la propria responsabilità formativa. È lui/lei a scegliere, ricombinare, scartare, dare senso a ciò che ha appreso, a "formarsi". Fa esperienza, riflette, riapprende, ricerca insieme al gruppo ed al formatore; non prende forma dall'esperienza ma dà forma all'esperienza formativa. La formazione del docente non si esaurisce al termine del corso ma continuerà a trasformarsi in lui, generando nuovi pensieri ed azioni.

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**LES FACTEURS DE MOTIVATION EXTERNES
QUI PERMETTENT DE STIMULER
LES PROJETS EN EEDD SONT À RECHERCHER
DANS L'ANALYSE ET LA VALORISATION
DES PRATIQUES PÉDAGOGIQUES ET
DES FORMATIONS, QUI SONT INNOVANTES,
SYSTÉMIQUES ET ONT DU SENS POUR L'APPRENANT**

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Abstract

Alors que bon nombre de chercheurs dénoncent les freins et obstacles au désir d'apprendre, les praticiens voudraient orienter les recherches plus positivement vers plusieurs éléments négligés jusqu'ici :

- Recherche des facteurs de motivation externes pouvant induire les apprentissages et dans le cadre de l'EEDD dresser un état des lieux de l'existant.
- Recherche de sens par la détection de situations- problèmes, porteuses d'intérêts collectifs et de solidarité (problématiques transversales créant des liens avec l'apprenant).
- Recherche d'une dynamique de projet, dirigée vers la création, le décloisonnement ou la recherche des divers moyens d'action.

Même si l'on sait que l'EEDD en tant que telle n'est pas encore mentionnée dans nos programmes de formation ,quelques contenus pouvant s'y inclure, sont déjà présents dans l'éducation à l'environnement en formation initiale d'enseignants. En voulant attirer l'attention de mes futurs enseignants sur les facteurs de motivation externes, j'ai conçu un questionnaire permettant d'identifier leurs conceptions et d'appréhender leur affectivité face aux sciences. Les résultats partiels présentés ici ne ciblent que quelques facteurs de motivation qui leur semblent prioritaires et qui pourraient être pris en compte et valorisés pour l'EEDD :

- Le lien, la relation prof-élève

Le professeur « idéal » a une approche sensible ou créative, il a de l'humour, est souriant. Il les « séduit », les bouleverse, s'il a un certain charisme il déclenche de l'émotionnel et touche leur affectivité. Il les écoute, essaie de répondre à leurs questions, est ouvert, en interaction, en dialogue. Le prof « passionnant », est celui qui arrive à donner du sens au savoir utile pour leur vie en lien avec leur quotidien. On comprend de suite l'importance d'une formation initiale performante des enseignants si on veut susciter la motivation des élèves.

- Le choix des activités menées

Ils plébiscitent les démarches actives, participatives, non frontales ou subies, ils citent les manipulations, expérimentations, apprentissages par le jeu, jeux de rôle, activités ludiques et sensorielles. Les étudiants citent les démarches de terrain (sorties, classes de mer, de forêt, réserves naturelles) ou l'utilisation des technologies comme les activités les plus motivantes car elles répondent bien à ces critères. On peut se baser sur les ouvrages de Dominique Cottureau qui font référence dans le domaine de l'écoformation et qui confirment l'importance de cette création de liens affectifs entre les enfants et le milieu, avec l'environnement (pour induire le respect, comprendre des démarches de gestion, de préservation). Celle-ci est donc à la base d'une éducation environnementale et de l'induction des valeurs et de l'éthique qui y sont associées.

- Les contenus

Ils souhaitent du concret, de la structure, des savoirs « certains » et qui ont du sens, et sont mis en lien avec leur quotidien. Ils veulent aussi de l'originalité, de la créativité, de l'actualité. Et une bonne vulgarisation. Or avec l'EEDD, on doit apprendre à nager dans le complexe, dans les questionnements, dans les incertitudes, (prévention des risques et avenir des générations futures). La démarche classique constructiviste devra donc s'allier à un premier temps de déconstruction, nous rejoignons en cela le professeur André Giordan et son modèle d'apprentissage allostérique.

Notre pratique réflexive a amené cette recherche sur les motivations dans l'éducation formelle (didactique des sciences pour la formation initiale des enseignants) et a permis la création d'une formation complémentaire continuée non formelle (CERISE, centre d'éducation relative aux interactions environnement et santé, <http://www.formation-cerise.be>). Cette innovation en éducation est systémique par l'ensemble des modules qui la compose et leur mise en lien avec des problématiques qui prennent en compte les besoins sociétaux et environnementaux. Elle teste de nouveaux outils, films, documentaires (vache folle, cauchemar de Darwin) et allie deux méthodologies :

- Partir du complexe pour se poser des questions et comprendre pourquoi il est nécessaire de s'ap-proprier les connaissances de base

- Partir du simple pour construire du complexe, adjoindre des activités en fonction des besoins pour créer des projets ou des actions.

La formation permet l'intégration de multiples concepts en interactions (santé, environnement, méthodologie et éthique) et elle utilise les technologies pour la création de compétences d'éducation vers un avenir durable et solidaire.

Elle permet la mise en place de multiples partenariats avec les collectivités locales et les associations et implique un travail en équipe et en réseau. Cependant il reste des difficultés car ces partenariats ne sont pas faciles à envisager et peuvent poser quelques questions, que vous introduis pour le temps de débat qui suivra nos interventions.

Pour construire des liens scolaire/associatif/entreprises, qui paie ? Comment échanger ? Certains se plaignent de ce trop de bénévolat ? Les réseaux de compétences ou d'expertise qui peuvent s'établir intègrent - ils aussi les experts praticiens ? Ils sont souvent les oubliés des systèmes, notamment lors des financements des recherches collaboratives. N'y a-t-il pas danger d'une dérive marketing des partenaires (Les tarifs sont variables et les associations en concurrence) ? Les formations sont-elles privées, /subventionnées/publiques ? Les critères qualitatifs et budgétaires devraient être accessibles pour tous. Comment développer l'EEDD en milieu rural africain par exemple ? Le temps est trop court pour aborder ces différentes questions mais les autres interventions de ce congrès y feront sans doute une place lors des débats qui seront menés.

En conclusion, il nous apparaît opportun :

- de mettre en place des complémentarités de formations fonctionnelles (PUZZLES) dirigées vers les actions (y compris sociales) et des espaces de formations, décloisonnés, espaces où les projets interdisciplinaires pourront se construire.
- de donner les moyens aux institutions d'intégrer de telles formations dans les formations initiales ou sous forme de formations complémentaires, pour tous les publics qui en ont besoin: scolaires tous niveaux, associations, médias, entreprises.
- de valoriser ce qui se fait déjà, les projets d'ERE (vers un DD appuyé par les Etats) ; c'est à dire impliquer, écouter les besoins, (variables selon les contextes) pour pouvoir innover ou améliorer les démarches entreprises.

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FORMAZIONE A DISTANZA (FAD), USO DI INTERNET E COMPLESSITÀ NELLA E.A. PROGETTO: UNO STRUMENTO PER LA DIDATTICA DEL PAESAGGIO

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La Sezione della Ciociaria di Italia Nostra gestisce, per conto della Provincia di Frosinone, due Laboratori di Educazione Ambientale, ad Isola del Liri e ad Acuto. Nell'ambito delle attività del Laboratorio e in accordo con il Settore Educazione Ambiente di Italia Nostra stiamo sviluppando un progetto di Formazione a Distanza sulla Lettura del Paesaggio, destinata ad insegnanti delle scuole Primarie e Secondarie.

Il testo base da cui si partirà per la costruzione del progetto è "L'ambiente e i segni della memoria", a cura di Titti Braggion, Giorgio Chelidonio e Ugo Poce, Carocci Editore. Sulla base del materiale storico di Italia Nostra sulla lettura del paesaggio - materiale derivante soprattutto da articoli e dalla pubblicazione citata, oltre che fotografico - si tenterà una traduzione multimediale che possa permettere il raggiungimento del seguente obiettivo: fornire una metodologia *on line* che possa permettere la costruzione di un percorso di lettura locale del paesaggio, attraverso l'uso dei cinque sensi degli alunni dei gruppi classe coinvolti.

La scelta della lettura del paesaggio deriva dalla consapevolezza che il termine "paesaggio" in pochi decenni ha rapidamente cambiato significato: moltiplicando le sue valenze si è progressivamente arricchito in complessità fino ad assumere valenza di documento storico delle relazioni avute dall'uomo con i luoghi in cui è vissuto. "Paesaggio" ha oggi un significato ben più dinamico e "vivo" rispetto a quello romantico ed estetico del passato, perché la percezione delle trasformazioni apportate dall'uomo, nel tempo, allo stato e al senso dei luoghi lo fanno diventare luogo della memoria, scenario per gli attori che vi abitano, laboratorio di verifica della sostenibilità, microcosmo del mondo." (dalla Premessa del libro "L'ambiente e i segni della memoria").

La metodologia per la "traduzione" dalla forma scritta di un libro ad uno strumento multimediale di formazione a distanza si baserà su alcuni capisaldi:

- L'esplicitazione di alcuni elementi basilari della lettura del paesaggio (l'ecosistema, l'antropizzazione, il valore storico dell'apporto umano, le criticità nel rapporto collettività ambiente).
- Il passaggio di competenze specifiche al docente, sia in termini di metodologie di approccio, sia in termini di contenuti specifici.

- Il coinvolgimento del gruppo classe, proponendo un approccio al gruppo e con il gruppo, piuttosto che attraverso il tradizionale veicolo di valutazione di assolvimento di un compito individuale.
- La partecipazione attiva dei docenti e degli allievi, attraverso la proposizione di metodologie di autopromozione e di assunzione di una responsabilità collettiva di valorizzazione dell'ambiente, del concetto di "sviluppo sostenibile", di tutela del territorio.
- La trasversalità didattica dell'esperienza.
- Lo sviluppo di un progetto di tutela, controllo e valorizzazione delle potenzialità paesaggistiche che vada al di là del progetto FAD e che duri nel tempo.
- La possibilità di creare una rete virtuale di valorizzazione del paesaggio locale, tramite la costruzione di una "mappa" e la pubblicazione delle esperienze di ricerca in un sito internet di riferimento.

L'elemento innovativo, rispetto ad altre esperienze FAD e, soprattutto, rispetto alla metodologia INDIRE, è rappresentato dall'attenzione verso aspetti di partecipazione attiva dei partecipanti alla FAD e alle metodologie proposte.

Sarà data grande attenzione al trasferimento di competenze ai docenti, rispetto alla capacità di trasportare nella classe quanto appreso, attraverso la proposta di schede di rilevazione, ricerche sul campo, verifiche in itinere; questi aspetti costituiranno gli elementi di valutazione dell'apprendimento, mediato attraverso il coinvolgimento diretto del gruppo classe.

Punti qualificanti del processo di trasferimento delle competenze.

- La visione del paesaggio è un atto percettivo che coinvolge i cinque sensi, ma soprattutto è un atto emozionale.
- La trasmissione via internet dei contenuti avviene attraverso uno strumento che non ha in sé la possibilità di esprimere "emozionalità".
- Uso del testo "emozionalmente", e uso di immagini "emozionali".
- L'emozione, la passione, viene trasferita tramite un "compito" da proporre al gruppo classe.
- La modalità della verifica dell'apprendimento, di solito espresso tramite un compito individuale, avviene mediante la trasposizione dell'esperienza diretta con il coinvolgimento attivo del gruppo classe.

Di conseguenza, l'altro elemento qualificante della formazione proposta è l'attenzione alla partecipazione diretta degli alunni al processo di apprendimento dell'insegnante: la verifica di quanto appreso dal docente avverrà tramite la verifica del coinvolgimento diretto del gruppo classe all'azione proposta.

Punti qualificanti del processo di Promozione della partecipazione.

- Favorire la partecipazione attiva dei docenti e degli allievi, attraverso la proposizione di metodologie di autopromozione e di

assunzione di una responsabilità collettiva di valorizzazione dell'ambiente, del concetto di “sviluppo sostenibile”, di tutela del territorio.

- La FAD diviene uno strumento interattivo tra i promotori dell'iniziativa, il gruppo locale che realizza l'iniziativa, gli altri gruppi coinvolti nell'esperienza.

ENVIRONMENTAL THEME, ENVIRONMENTAL EDUCATION AND TEACHING: FROM THE LIMITS OF FORMAL LOGIC TO DIALECTIC MEDIATION

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Abstract

This study has been guided by the following research problem: how is the organization of knowledge (method) of a novice teacher processed, in logical terms, for educational work with the environmental theme at school-training technicians in environment? The leading hypothesis has been that underlying the methodological organization of the content worked by the novice teacher there is a logical principle directing the methodological organization of this content in the classroom, having such organization a formal or dialectic character. For Lefebvre (1975), there are two possible ways of structuring teaching through mediation, that is, the formal Aristotelian logic and the dialectic logic. We have observed that the educational work carried out by the novice teacher has been structured through a principle of methodological organization of teaching ruled by the formal Aristotelian logic. We have reached the conclusion that the educational work, mainly regarding the ones working with the environmental theme and environmental education, conceived in a critical perspective, requires the exact articulation of these two principles of logical and methodological organization, that is, the formal Aristotelian logic and the dialectic logic, through an analytical category of mediation (Lukács, 1979), in the Ontology perspective of the social being. The experiences undergone by the novice teacher result from an attachment to the formal Aristotelian logical principle in her methodological organization of the teaching content, evidencing the influence of this model derived from her graduation background (License in Biology), which has this logical principle as its main foundation.

Keywords: Educational Work, Environmental Theme, Environmental Education, Novice Teacher, Dialectic, Mediation.

LEARNING PARTNERSHIPS IN SUSTAINABILITY EDUCATION: OPPORTUNITIES FOR POSTGRADUATE ACTION RESEARCH

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The purpose of this paper is to discuss the opportunities for creating learning partnerships between researchers and practitioners, through the use of an action research methodology. Particularly, this paper will address the potential for postgraduate researchers to utilise this method of inquiry in a way that empowers teachers and practitioners who are involved in sustainability education. This paper will give a short account of my own experience as a postgraduate student doing action research. Links will be made between the lessons learnt from my own experience with this methodology and the objectives and strategies proposed by the United Nations Decade of Education for Sustainable Development (DESD). The paper will conclude by highlighting the unique position of postgraduate students in making contributions to on-ground sustainability initiatives that promote sustainability education.

My own postgraduate research project took place in Tasmania, Australia, for the duration of the 2004 school year. This project explored ways that the Tasmanian State curriculum could be implemented through the integrative tool of a whole school sustainability program. At the time of my research, three schools had been chosen by the Department of Education Tasmania to plan and implement whole school sustainability programs within their school communities. It was these three schools that made up the case studies for my larger research project. It was my initial intention to observe the ways that each school planned and implemented a whole school sustainability program in order to identify the critical success factors for whole school sustainability in Tasmania. However, after meeting with staff and students from one of my case study schools, a tension began to develop between my role as a researcher and my desire to encourage and empower practices in sustainability education. In this particular school, the notion of a whole school program had not attracted whole school interest. In fact, only two out of thirteen teachers and twenty-four out of three hundred students had volunteered to explore sustainability education as an option for their school. Furthermore, those who were interested in this project had little previous experience or knowledge about the theories that underpin learning for sustainability as an integrative educational tool. I didn't want my research to undermine the commitment of this small but passionate group by simply observing them in an uphill battle to introduce a whole-school program to a resistant community. I wanted my research to support and motivate their hope to bring sustainability education to

their school. I decided that my role as a researcher needed to reflect my role as a partner in learning for sustainability and I approached my research community about the potential of creating a collaborative learning partnership.

Diverging from my initial research design, I sat down with the participants from this school, which included both students and teachers, and we discussed our ideas about learning for sustainability. In particular, we discussed the visions they had for their school, as well as the visions that I had for my research and my own learning. It soon became quite clear that we shared a common vision that linked our projects and ambitions. We shared a common goal to achieve an understanding of sustainability education and how a whole school program would best deliver the desired outcomes of this community. We also shared a common commitment to explore this topic as students within a learning framework. There was also a shared interest in how research might support and encourage the achievement of these visions. Joining together these three objectives, we decided to use Kurt Lewin's spiralling steps approach to action research as a research design that would recognise and empower all participants as co-learners and co-researchers within this process (Lewin, 1946).

Lewin's spiralling step approach to action research exists as a series of four steps that spiral forward in a constant state of critical reflexivity (Kemmis and McTaggart, 1988). The model attempts to empower people to recognise their current situation, create a shared vision for change, plan and implement this action for change, and critically reflect on the process in a way that enables them to re-vision, re-plan and re-act to their learning. The notion of a spiral highlights the reflexive process of action research, in which constant observation and reflection of a situation requires that any progression of a group's actions be responsive and innovative to accommodate new learning. In this way, the research design assists the research community to become aware of, and critically reflect on, their actions and changing perceptions.

Using this research design, we embarked on a series of actions that were inspired by our collaborative vision. The preliminary steps of our project attempted to ground our vision in a theoretical framework of sustainability education that included learning from examples of whole school sustainability programs from around the world. From this grounding we went on to assess the school's current situation in regard to behaviours in school ground and resource management and we began to vision and plan ways that this school might re-address these management issues in a more sustainable manner. Once a plan for action was developed, our actions were then implemented. Throughout this process there was a constant desire to increase the participation of the rest of the school community. By constantly observing and reflecting on our own actions, we were able to witness how the rest of the school's perceptions of our program were changing throughout the course of the project, and which forms of communication were effective in increasing participation. While some actions that were upon observation and reflection, did not promote a whole school program Our partnership was encouraged when, in the third semester of the school year, we planned and implemented to great success the restoration of a

45-metre bank at the front of the school. By reflecting on our actions, a new plan was developed and implemented that responded to our learning, which in turn led to a process that saw every student in the school contributing to this project by planting at least one native plant in the ground. Using a method of collaborative inquiry, we empowered a mixed group of participants to become co-researchers and co-learners within the research process. Most importantly, each participant gained experience and skills in research, practice and cooperation. Furthermore, the spiralling approach of action research empowered a learning framework that will enable this group's learning to progress indefinitely.

In my experience, action research offered an emancipatory approach to research in which I was able to combine my own learning journey with the learning journey of my research community. Through a collaborative learning approach, we were able to explore and ultimately design a program for sustainability education that was informed by, and supportive of, our collaborative learning experience. Through this process it became apparent that collaborative action research promotes a number of the same objectives endorsed by concepts of sustainable development. By engaging all research participants as co-learners within the research process, action research for sustainable development promotes the social dimensions of learning for sustainability and empowers people to participate in planning for, and creating, change. For these reasons action research aligns with the objectives, and strategies, of learning for sustainability and the DESD.

In regards to the seven interlinked strategies proposed for the implementation of the DESD, many of these approaches can be seen to parallel the action research approach. Such strategies as vision building, shared ownership, partnerships and networks, capacity building, innovation, monitoring and evaluation (UNESCO, 2003) are all significant parts of the action research process. In the midst of a collaborative partnership, action research offers an approach to multidimensional learning that enables these strategies to function in a flowing matrix. Furthermore, the collaborative nature of action research promotes the partnership framework that the rhetoric of the DESD recognises as necessary to building social capital in on-ground sustainability initiatives. A number of benefits emerged through the use of this approach that held advantages for my own learning, and for the learning of my research community and the academic communities in which my study was based. Some of these benefits are common to any partnership where resources and responsibilities are shared, however a number of advantages also show the unique position of postgraduate partnerships for progressing on-ground sustainability initiatives by creating partnerships through research. One of the most prominent roles for a postgraduate researcher that remains active throughout the course of their work is an immersion within the literature of their topic. Through collaborative action research postgraduate students are given the opportunity to share their growing theoretical knowledge. From this contribution, practitioners receive a partner whose primary focus is to engage with the diversity of theoretical perspectives within their shared field. In

addition, by building a connection with practitioners through action research, postgraduate researchers are given a first hand experience within which to apply theory, offering case studies that trial, and challenge, some of the ideas in the academic literature. This amalgamation of theory and practice will produce postgraduate researchers capable of bridging theory and practice during and after the completion of their study.

Postgraduate partnerships also offer partners with a dedicated focus to a particular project, which can offer relief for many practitioners who may be experiencing an overcrowded schedule. Other advantages of postgraduate partners include the ability to link university networks to on-ground sustainability initiatives. Because postgraduates are students of higher education, they are often perceived as the middle ground between community and universities and can offer a valuable meeting place for university community engagement. With a postgraduate partner, a number of university resources also become more readily available to on-ground initiatives, such as a large a literature resource base, laboratory facilities, and feedback from professionals with a diversity of backgrounds. Above all, the most advantageous role of postgraduate partnerships in enhancing on-ground sustainability education initiatives can be seen in the learning component that links action research, postgraduate students and learning for sustainability. As postgraduates, we must always recognise our learning role within our research. Action research offers a methodology, which enables this learning to be recognised and re-visited throughout the course of a project. The collaborative approach of action research recognises that as postgraduate students we are part of a learning community cooperating to enable change, which is a fundamental concept of learning for sustainability in any on-ground initiative. A process such as action research promotes learning for the individual and learning for the community, which for many postgraduate researchers, is the primary objective of doing research for sustainability in the first place. By using a learning framework to link postgraduate research with the goals and motivations of an on-ground sustainability initiative, a collaborative research design such as action research creates the learning partnerships that are necessary for achieving the outcomes of the United Nations Decade of Education for Sustainable Development, in which we are all recognised as partners engaged in learning together for the future.

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PROMOTION OF SUSTAINABLE DEVELOPMENT IN VOCATIONAL EDUCATION AND TRAINING IN FINLAND

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Introduction

It is essential to increase competence related to sustainable development and environmental issues in order to survive challenges involved in aspects such as prevention of climate change, increasing consumption of natural resources, reduction in biodiversity and development issues. Schools and other educational establishments play a key role in creating these abilities. One of the objectives of education is to educate responsible and contributing citizens, who are able to take the perspectives of sustainable development into account in their work and everyday choices.

A responsible citizen is aware of the ecological, social and cultural dimensions of sustainable development, aiming to reconcile them in everyday decisions. It is essential to be aware of change needs at both individual and community levels, be able and motivated to contribute and participate, and be committed to a sustainable lifestyle.

National policy concerning sustainable development Sustainable development in legislation

According to the Finnish constitution, every individual is responsible for nature and its biodiversity, the environment and cultural heritage. It is the task of public authorities to assure everybody's right to a healthy environment and opportunities to participate in decision-making concerning the environment in which they live. Sector legislation defines the areas of responsibility of different branches of business in respect to implementing sustainable development.

The systematic policy for preparing laws relating to the environment and producing and circulating information about the environment belongs to the Ministry for the Environment, the Finnish Environment Institute and the regional environment centres. Each administrative sector is responsible for environmental matters in their own field.

In Finland, there are many inter-ministerial boards and committees. Joint projects are a natural way of working in environmental issues. The Finnish National Commission on Sustainable Development is the main joint organisation at the national level. The chairman of the group is the Prime

Minister. Many ministers and civil servants of various sectors are members in this organisation.

The programme of the Finnish Government for sustainable development

The Government Programme for Sustainable Development (1998) outlines national measures to be taken to promote sustainable development. It is the third in a line of comprehensive documents on sustainable development since 1990. The programme is designed to promote ecological sustainability and the economic, social and cultural preconditions for achieving this end. The Government Decision-in-Principle defines the strategic objectives and lines of action for key sectors of sustainable development. In respect of ecological sustainability, the primary goals defined in the programme are to reduce the use of non-renewable resources, to preserve nature's generative capacity and ecological values and to generally improve the condition of the environment. The programme also proposes lines of action for solving far-reaching environmental problems through international cooperation. Improving the condition of the natural environment and living environments also has beneficial effects for human health.

In respect of social and cultural sustainability, the aim is to disseminate knowledge and skills needed to ensure sustainable development, thereby also improving social well being in general. In respect of economic sustainability, the aim is to improve Finland's competitiveness and employment, and to reduce the environmental burden of production and consumption.

The programme steers planning, decision-making and other activities within the central government. In addition, it provides a basis for a dialogue with other parties concerned, and a framework for planning activities and actions with them.

National goals for sd in education Development scheme of Ministry of Education

Every four years, the Finnish Government approves the Development Plan for Education and Research. The most recent one, "Education and Research 2003-2008", begins by defining the principles underlying educational provision. One of the important principles is sustainable development: "The principles of sustainable development will be taken into account in the educational provision and other activities of different school forms."

Framework curricula in VET

In Finland, the Government determines the common national objectives of education. National Board of Education decides the national

core curricula. They define the objectives and core contents of education, also providing advice on assessment and the design of local curricula.

The norms of framework curricula were made less detailed. More emphasis was put on the objectives being of current interest, and on developing learning skills. There was a general wish to shift decision-making power from a national level to the level of individual educational provider.

Sustainable development has been included in the common emphases of the National Core Curricula as follows: “The objective of the promotion of sustainable development shall be for students to know the principles of sustainable development and become motivated to promote them when studying, at work and as citizens. They shall know environmentally positive working and operating methods and act accordingly and shall, in particular, recognise common hazardous wastes and be able to treat them accordingly. They shall value the diversity of nature, understand the economic, social and cultural dimensions of sustainable development and know how to promote them.”

Optional advanced studies in core subjects include Environmental Studies, 0-4 credits. “The core content comprises preservation of biodiversity, ecological consumption and functioning so as to promote sustainable development.” Sustainable development is also included in the vocational study modules of different National Core Curricula according to field-specific emphases.

Sustainable development in VET

The project to concretise SD in practice

Between 2002 and 2004, the Finnish National Board of Education carried out an “SD in VET” (Ammatti-KEKE) project to provide more detail on the learning objectives and contents of the National Core Curricula relevant to the level of individual vocational institutions’ own curricula. The objective of the project was to promote inclusion of the perspectives of sustainable development and environmental issues in vocational education and training and to produce related support material and operating models.

Its mission was to:

- Create models for inclusion of environmental and sustainable development perspectives in local curricula, implementation of instruction, on-the-job learning and skills demonstrations in different fields of vocational education and training.
- Promote communication of the environmental requirements, occupational practices and competence needs of working life to vocational education and training.
- Produce field-specific support, teaching and on-line materials on sustainable development for education and training in the fields in question.

- Co-operate with and promote networking between vocational institutions providing education and training in the field and with other key partners.

The SD in VET project included five education providers/educational establishments during 2002-2005. These covered more than twenty upper secondary vocational qualifications.

Concrete outputs included:

- Elaboration of sustainable development in curricula.
- Sustainable Development Guide for Education Providers.

Incorporating sustainable development as part of everyday school life

The credibility of education for and instruction in sustainable development depends on the way in which its value basis is reflected in an educational establishment's everyday life and operational culture. The learning community should set an example of a sustainable lifestyle. It is therefore important that the staff and students are jointly involved in planning and implementation of sustainable development issues and in continuous improvement of operations. Another essential aspect is co-operation with external parties to develop instruction and everyday practices. As vocational skills demonstrations become established, sustainable development will also be incorporated in working life functions.

Issues relating to sustainable development should be integrated as part of the educational establishment's values and management. The first step in this work is an initial review to chart consideration of sustainable development issues in instruction and daily functions. Objectives and measures should be recorded in the school's own environmental or sustainable development programme. It is important to evaluate implementation of this programme and update it as part of the school's annual planning cycle.

A sustainable development programme enables educational establishments to reduce consumption of materials and energy and amounts of waste, for example, while also saving hard cash. In addition, their image and the quality of instruction will also improve. Various systems and tools have been developed to support the sustainable development work of educational establishments. These include the Eco-Schools programme and the Environmental Criteria and Certification for Schools and Educational Establishments.

The Eco-Schools programme

The Eco-Schools programme is an international programme for environmental education, co-ordinated in Finland by the Finnish Association for Environmental Education (SYKSE). The Eco-Schools programme is an operating model, which provides participants with a concrete way to reduce the environmental effects of their operations, link sustainable development

issues as part of their everyday instruction and operations, and mobilise students and staff. Programme participants receive support materials and regular feedback on their actions. Participants include day-care centres, comprehensive schools, upper secondary schools, vocational institutions and other organisations operating in the field of education.

The Eco-School Programme is organised to progress one theme at a time. Basic themes include water, energy and waste reduction. Later on, participants may choose a local environment theme or a theme they have developed themselves. Each theme is always dealt with for a period of one year, at the end of which the educational establishment may apply to the national Green Flag Committee for the Eco-Schools Green Flag. The idea is for the project to continue with a new theme in the next school year.

Further information about the Eco-Schools programme is available at www.eco-schools.org (www.vihrealippu.fi in Finnish).

Environmental criteria focus on management, instruction and daily functions

The Environmental Criteria for Schools and Educational Establishments set a target level for exemplary environmental management. The criteria have been prepared as a tool and incentive for improvement of educational establishments' operations and quality of instruction. They consist of three elements: inclusion of environmental issues in management, instruction and maintenance functions. The criteria are applicable for use by comprehensive schools, upper secondary schools and vocational institutions, but they can also be exploited in other educational organisations.

The criteria focus on the ecological dimension of sustainable development, but they will later be extended to cover the economic, social and cultural dimensions of sustainability as well. The criteria support curricular work, because sustainable development is implemented in instruction in the form of cross-curricular themes or common emphases. In addition, the criteria also lead establishments towards a learning and operational culture that supports the objectives of environmental education.

Next step: Environmental Certification of Educational Establishments

Educational establishments may apply for an environmental certificate from the OKKA Foundation. Certificates are awarded on the basis of the Environmental Criteria for Schools and Educational Establishments. Certification requires an educational establishment to carry out self-assessment and draw up a report on this. In addition, an external auditor will verify that the educational establishment fulfils the environmental criteria.

In order to be awarded a certificate, the educational establishment has to meet the compulsory requirements set out in the assessment criteria and achieve certain scores for scored criteria.

The OKKA Foundation and SYKLI Environmental School of Finland provide materials, advice and training to support use of the environmental criteria, preparation of a sustainable development programme, self-assessment and application for a certificate. Further information is available at www.koulujaymparisto.fi and www.sykli.fi.

The Finnish National Board of Education also encourages vocational institutions to take up the criteria and certification system through financial incentives. Educational establishments may apply for grants for external audits from the National Board of Education. The environmental criteria and certification system for educational establishments were developed as part of the Envedu project, co-funded by the European Community's LIFE Programme and the Finnish Ministry of the Environment. Project partners included the Trade Union of Education in Finland (OAJ), the OKKA Foundation, the Finnish National Board of Education, the Hyvinkää-Riihimäki Vocational Adult Education Centre, the University of Oulu, the University of Joensuu Department of Applied Education and Eco-One.

Conclusions

Sustainable development is the greatest challenge facing humankind. When schools commit themselves to practising the principles of sustainable development in their work, this will gradually radiate to all sectors of society through young and adult people. It is extremely important that there is nationwide support available to schools in the instruction of sustainable development. Sustainable development needs to be clearly recorded in national documents setting objectives for education. Core curricula have to lay the foundation for including sustainable development in different school subjects and study fields. Schools also need guidelines for the planning and implementation of environmental programmes.

Changes are needed in teachers' initial and in-service training. Since environmental issues are interdisciplinary and relate to lifestyles, dealing with them in a varied way requires cooperation within in the school community and with partners outside the school. This line of action requires further development and structural solutions. Entire work communities should be trained in these matters. In addition, it is still needed to produce teaching and learning materials for teaching sustainable development. Collecting that material personally takes too much time and effort.

Network cooperation has proved to be a good way of promoting solutions, which are in keeping with sustainable development. Networks are platforms for sharing experiences and further developing established lines of action. Cooperation with environmental experts and organisations has also helped schools to find new solutions.

L'E-LEARNING COME STRUMENTO PER CORSI DI AGGIORNAMENTO PER INSEGNANTI

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Il Centro di Educazione all'Ambiente Marino (C.E.A.M.) della Riserva Marina di Miramare (Trieste)

La Riserva Marina di Miramare, facente parte del sistema delle aree marine protette italiane, è stata istituita dal Ministero dell'Ambiente e della Tutela del Territorio nel 1986 (D.M. 12/11/86). Annovera da sempre tra le sue finalità istitutive anche quella di fornire opportunità per la realizzazione di programmi di educazione ambientale e per questo ha avviato al suo interno fin dal 1989 un Centro di Educazione all'Ambiente Marino (C.E.A.M.) con lo scopo di progettare e svolgere attività didattiche per scuole di ogni ordine e grado, consentendo la scoperta e lo studio dell'ecosistema mare. L'esperienza del C.E.A.M. di Miramare è maturata, quindi, all'interno di un'area marina protetta, contraddistinguendosi pertanto per una doppia specializzazione: la specificità delle attività proposte soddisfa l'esigenza di elaborare uno strumento culturale per la gestione dell'area marina e, contestualmente, esse sono un sussidio didattico ad argomenti relativi all'ecosistema marino (Tempesta e Zuppa, 2002).

Nei molti anni in cui la Riserva Marina di Miramare è stata impegnata in attività di didattica e di sensibilizzazione verso l'ambiente che protegge, una delle richieste avanzate dagli insegnanti che hanno avuto modo di partecipare alle attività di interpretazione e educazione ambientale, è stata quella di avere la possibilità di preparare preventivamente loro stessi e la classe per la visita e successivamente di continuare il percorso intrapreso sul campo, richiedendo nuovo materiale di approfondimento, condividendo le metodologie con gli operatori della Riserva o con altri colleghi. Questa richiesta finora si scontrava con il fatto che dei circa 7.000 studenti che annualmente usufruiscono degli oltre venti percorsi didattici diversi proposti dal C.E.A.M., solo una piccola parte proviene da scuole del territorio. Per questo motivo si è subito posto il problema dell'impossibilità degli insegnanti provenienti da istituti lontani a raggiungere la Riserva per eventuali corsi preparatori alle successive attività con la classe. Per risolvere questo problema si è deciso quindi di sfruttare le opportunità offerte dalla rete Internet, che coniuga il facile accesso con la possibilità di scaricare e condividere materiali di vario tipo: web fiction sulla Riserva, brevi video con i suoi abitanti, foto e disegni sugli organismi macro e microscopici, lezioni e

presentazioni multimediali; tutti strumenti utili per organizzare un lavoro in classe di preparazione all'eventuale visita programmata.

La piattaforma di e-learning

È stata, quindi, approntata una piattaforma di apprendimento a distanza (e-learning) opportunamente personalizzata ed è stato allestito un corso completamente gratuito, grazie al contributo della Direzione Centrale Risorse Agricole, Naturali, Forestali e Montagna della Regione Friuli-Venezia Giulia, rivolto ai docenti di scuola elementare, media e superiore del territorio regionale.

L'accesso alla piattaforma è stato attivato attraverso uno spazio dedicato alla voce "Area Insegnanti" sul sito web della Riserva Marina di Miramare (www.riservamarinamiramare.it), grazie ad un accesso limitato da una password d'entrata. La pagina iniziale (Fig. 1) mostra un menù dal quale si accede alle diverse lezioni ma anche alle altre funzionalità della piattaforma e cioè la possibilità di comunicare attraverso una chat o di lasciare le proprie impressioni su un forum dedicato a vari argomenti. È presente inoltre uno spazio per scaricare e/o inserire propri files, per lasciare il profilo personale o creare un proprio desktop. Inoltre attraverso lo spazio news e links si ottengono direttamente informazioni utili sull'inizio dei corsi o sul rendimento delle singole unità.

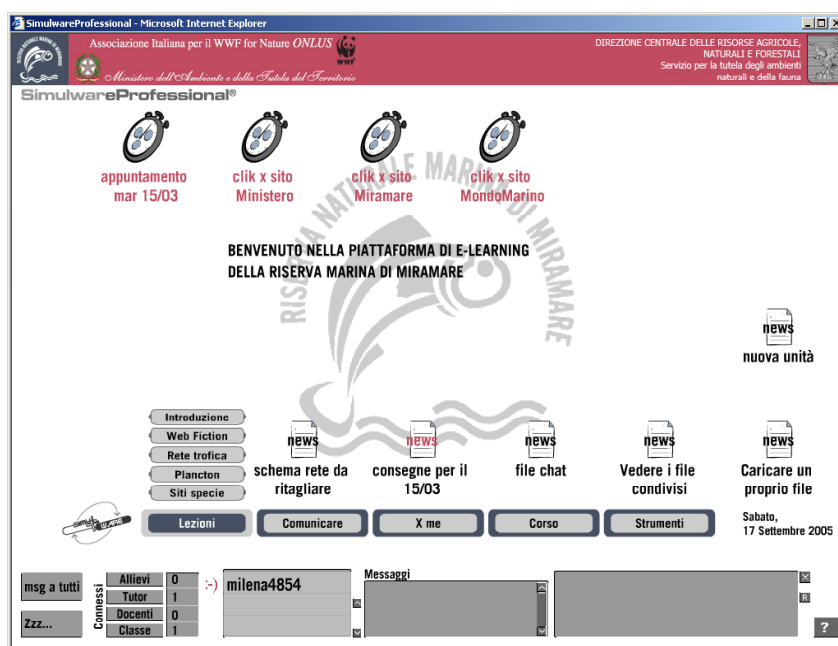


Fig. 1. Schermata iniziale della piattaforma di e-learning della Riserva Marina di Miramare

Cliccando alla voce “Lezioni” (Fig. 1) sulla schermata di entrata si accede ai singoli moduli, ognuno organizzato in Unità, Risorse, Esercitazioni e Test finale. La sezione Unità comprende lezioni di approfondimento sul modulo attraverso l’uso di web fiction, testi da poter stampare, presentazioni in power point da poter scaricare e salvare. Nella parte Risorse, invece, si trovano gli approfondimenti sul tema attraverso riferimenti bibliografici, links a siti web collegati all’argomento, brevi video, schede specifiche di riconoscimento degli organismi, ecc. Alla voce Esercitazioni vengono proposte attività sul tema trattato, quali ad esempio: ricostruzioni di reti alimentari attraverso semplici puzzle o riconoscimento di organismi planctonici attraverso la presentazione di fotografie al microscopio. L’ultima parte è quella destinata alla verifica e autovalutazione del modulo con test a risposte multiple che possono essere a tempo prestabilito o a punteggio minimo da superare.

Tutte le statistiche relative ai singoli allievi e all’uso della piattaforma (accesso, funzionalità, ecc.) sono accessibili ai soli tutor del corso, che possono in questo modo verificare quale lezione è stata particolarmente seguita, quale test è risultato più ostico e/o quale esercitazione è sembrata più gradita. Tutte queste informazioni, sommate anche ai tempi di accesso dedicati dai singoli discenti all’uso della piattaforma - e di conseguenza al corso -, servono per migliorare il corso stesso, tarandolo sulle esigenze specifiche evidenziate dai corsisti.

Il corso di aggiornamento a distanza

Il corso di aggiornamento a distanza denominato “Il Mare nella Rete” si è svolto nell’arco di un mese e mezzo tra febbraio e marzo 2005. Sono stati organizzati cinque incontri in apprendimento sincrono on-line durante i quali due tutor del C.E.A.M. erano a disposizione in chat sia per coadiuvare nell’uso della piattaforma sia per moderare discussioni e aprire nuovi forum. Il corso era comunque fruibile 24 ore su 24 nell’arco di tempo prefissato per l’accesso in autoformazione off-line (apprendimento asincrono) con la consultazione del materiale disponibile in rete.

Il corso è stato organizzato in quattro moduli ognuno riferito ad un diverso argomento sempre relativo alla conservazione e alla conoscenza dell’ecosistema marino, con una prima parte introduttiva all’uso dello strumento. I moduli trattati sono stati:

- Introduzione all’uso della piattaforma
- Presentazione della Riserva Marina di Miramare
- La Rete Trofica
- Il Plancton

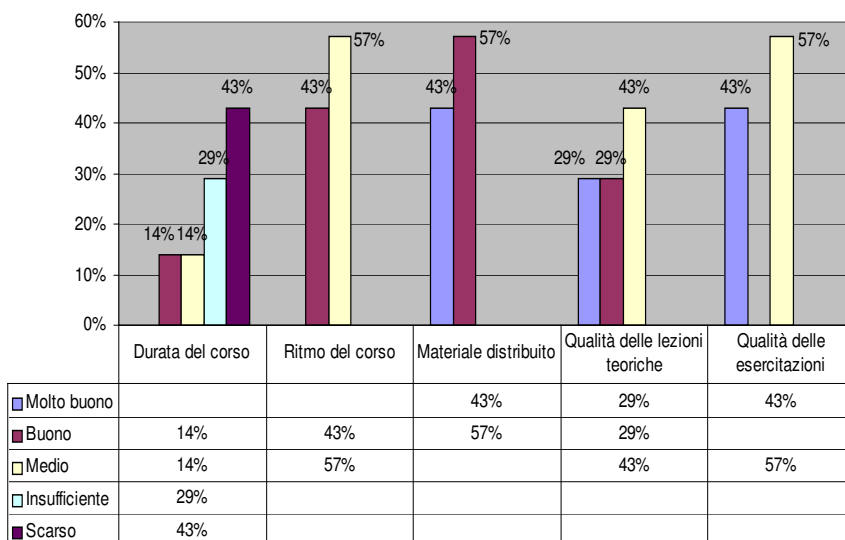
Gli iscritti al corso sono stati trentaquattro, di cui quattordici insegnanti di scuola superiore, undici di scuola media e nove di scuola elementare. Dalle statistiche ottenute si è visto che il 70% degli iscritti ha seguito il primo dei quattro moduli, percentuale che si è ridotta al 60% nel

seguire anche la seconda e la terza unità formativa, mentre solo il 30% ha portato a termine tutto il corso fino alla valutazione finale.

La valutazione del corso da parte degli insegnanti/allievi

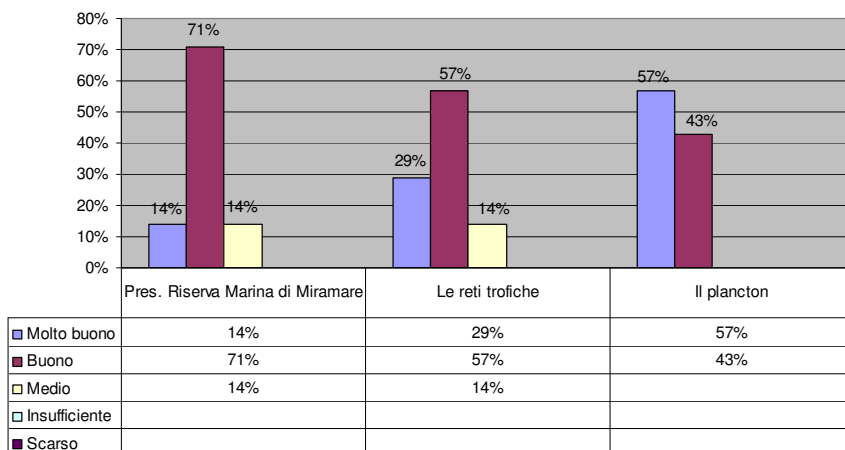
Alla fine del percorso formativo è stato approntato un questionario specifico con lo scopo di avere una valutazione sia del corso che dello strumento usato da parte degli insegnanti iscritti. Dall'analisi delle risposte ottenute si è notato che:

- In generale la durata del corso è stata definita troppo breve e si auspica una maggiore fruibilità della piattaforma nel tempo. Il materiale messo a disposizione in rete è risultato buono o molto buono, così come la qualità delle lezioni teoriche, delle esercitazioni e dei test che è stata valutata medio-alta (Tab. 1).



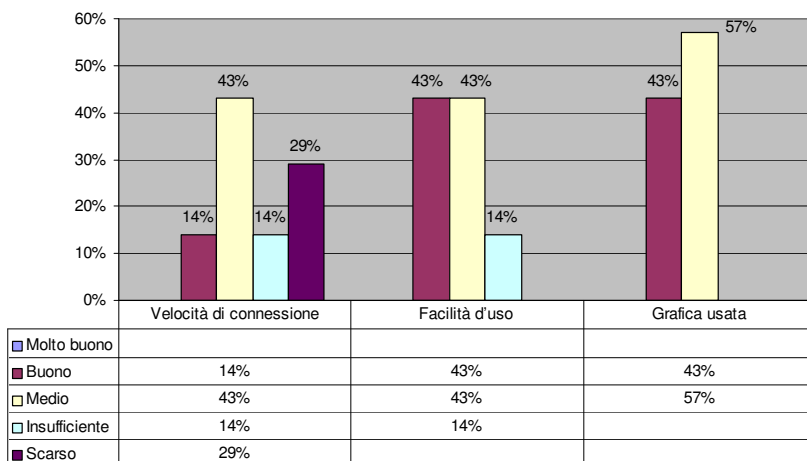
Tab. 1. tabella con relative percentuali di risposta riguardo al corso

- Dalla Tab. 2 si nota come le lezioni proposte siano state valutate sempre molto positivamente con una preferenza verso l'unità che trattava il plancton che più della metà degli intervistati ritiene di livello molto buono.



Tab. 2. tabella con relative percentuali di risposta riguardo ai diversi moduli proposti

- Si sono evidenziati, comunque, dei problemi legati all'uso della piattaforma soprattutto relativamente alla velocità di connessione che non sempre era tale da supportare una veloce apertura dei documenti (Tab. 3). Più della metà degli insegnanti che hanno risposto al questionario, inoltre, non aveva mai partecipato ad un corso on-line per cui si sono avute anche difficoltà iniziali nel maneggiare lo strumento.



Tab. 3. tabella con relative percentuali di risposta riguardo all'uso della piattaforma

- Alla fine comunque le aspettative iniziali riguardo ai contenuti del corso sono state raggiunte totalmente per il 47% degli insegnanti mentre per altrettanti si è avuta una soddisfazione parziale. Al 71% degli intervistati il corso ha dato nuove idee da applicare in classe e

si auspica un prosieguo della fruibilità della piattaforma con materiali specifici su altre tematiche legate all'ambiente marino.

- E' stata inoltre analizzata quantitativamente la fruizione del corso dai dati ottenuti dal server che ospita la piattaforma di e-learning. Dal dettaglio riportato nella Tab. 4 si evince, su trenta allievi effettivi nel periodo di cinque settimane di durata del corso, quanto appare in tabella :

Totale ore di connessione da parte degli allievi	120
Media ore totali di connessione per allievo	4
Media minuti totali di connessione per settimana per allievo	58
Numero totale di aperture	906
Media di aperture per allievo	30
Media di aperture totali a settimana	181

Tab. 4. statistica descrittiva della fruizione del corso di e-learning

A conclusione di questo primo corso si può comunque dire che lo strumento della piattaforma di apprendimento a distanza si è dimostrato un mezzo utile e di utilizzo relativamente semplice, anche se è stata notata da parte dei tutor una difficoltà degli allievi nel mantenere elevata l'attenzione e l'impegno in termini di tempo da dedicarvi.

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FOSTERING VALUES IN ENVIRONMENTAL EDUCATION AND TEACHERS' TRAINING

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It has been noted that environmental education does not admit reductionism or unilateral approaches, needing to balance within its operative strategies the cognitive aspects (necessary to access information and to interpret it), ethics (related to the capacity to acknowledge, express and share values, and to act on this basis) and participation (connected to the capacity to relate with others and act in the world): in fact education is a condition to access culture, but does not guarantee responsible, prudent behaviours or participation by itself.

Succeeding on changing the horizon of values of individual subjects is a difficult aim to pursue, but necessary for its pedagogical relevance, in any educational context and for every age of life: in particular, in the training of those who have an educational responsibility.

The present contribution proposes to take into account some possible significant passages of such process, using the analysis of texts produced by a group of university students that are preparing to teach, concentrating in particular on the educational value of reflective and self-evaluation practices, activated through autobiographic means.

Such activities, as well as forming a useful, non-selective and self-regulating evaluation factor for the teacher, allow not so much as to "prove" the mutation, but to make visible and relevant a process held to be central in a profession that should be distinguished by a research style, according to a method transferable to other contexts of action.

One of the central problems in environmental education concerns the choice of strategies capable of changing the possible values of individual subjects in terms of consciousness and of critical objectification or revision, in a significant way but always respectful to the identity and the beliefs of the participants.

This problem, already shown in research literature (Bardulla, 1998), that discusses, for example, the weakness of behaviours not anchored to an adequate value system, usually remain on the background of educational action: sometimes a superficial or slogan-based sharing is taken for granted; other times value themes are not examined because of a misunderstanding in respect to the pluralism that borders relativism, with the consequent, unacceptable disorientation that this creates in those that are educated (Brezinka, 1994).

Instead, I believe that dealing with the value question in an explicit way is absolutely necessary for those who do educational action, whatever

the context in which one operates or the age group to which it is intended are. It is important for a series of reasons. First of all, those who educate must be aware of the values which they believe, at least enough not to suggest them in a reflexive or distorted way: awareness is one of the conditions of coherence. In fact, values, more than being “taught,” are “testified to”: ignoring this aspect in the training process of educators and teachers can become problematic with reference to effects of the educational proposal. There is no neutrality in those who choose to ignore this aspect.

Secondly, planning educational action requires the capacity to recognize the values that others uphold: in the case of teachers, they must compare their opinions with the students’ ones, their families’ ones, and with the respective communities to which they belong ones. Contextualizing educational action demands an attentive and continuous analysis of the context.

Lastly, the values shouldn’t become an occasion to argue, but of coming together and of authentic growth: ignoring differences is certainly not a way of teaching tolerance.

As mentioned previously, I am referring to the initial training of about fifty students that are preparing to become teachers in pre-primary school (but I think it is appropriate to proceed in an analogous manner even in the case of training of extra-school educators). I will try to discuss, in exemplifying keys, certain significant passages of didactic action addressed to know, make explicit, discuss, and share values. I will proceed in a synthetic form. For the examination of the qualitative data (open-response), I adopted the technique of ex-post manual structuralizing.⁵

Among the objectives of my teaching course, those more relevant to the topic in discussion regard giving visibility and relevance to the process of value sharing and acquiring competence in the reflective and self-evaluating practices. Furthermore, from my point of view as teacher, I was interested in understanding if and how the students had modified or

5. The indicated procedure permits the construction of interpretive concepts starting from the texts of the *corpus*. Using repeated readings of the texts a structured questionnaire is created, where “every topic can constitute a statistical variable and is reformulated in a question of the questionnaire: the question to which the answer is believed to have been found in the texts. Having fixed the subject (...) the different points of view expressed in the texts (...) represent the modes of the statistical variable, which are the categories” (Tuzzi, 2003). Facing the limits, the simplifications, and the margins of arbitrary connected with any choice, this technique presents indubitable advantages: it permits taking account, in a more complete way than a structured questionnaire, of the *subjective expressions* (something absolutely important for didactic action); of fully redirecting them to the effectuated path, also for that which they *implicitly* contain, thanks to the information held by the code-maker (i.e. the teacher); of allowing the categories of those who research dialogue with those emergent in a particular context, improving their pertinence. More than a statistic point of view, it seems that the choice assumes a particular value on a didactic level, because it permits the activation of self-regulating processes employing easily usable instrument, low technology, transferable to different contexts, even in the absence of written text (by simply making transcripts of the recordings).

consolidated their value options following the didactic activities that I had proposed, to test the efficiency of my action and, in case, to modify it.

After an initial phase of problematicizing, I then proceeded by inviting the students to answer to a questionnaire, planned to investigate their attitudes and personal experiences about nature and environmental education. The questionnaire was presented in an anonymous form (to facilitate communication, encourage sincerity, and not generate evaluation anxiousness), with the explicit invitation to refer to one's personal educational biography.

The first of these questions was: "In your opinion, respecting nature means...", formulated with the double intention of provoking a personal reflection (so that each student could begin testing their own personal reasoning before confronting them with those of the others) and to introduce the following debate, addressed to share the convictions of everyone, to confront them, and to put them to the test of critical intersubjective check; in this way the strength or the weakness of the argumentations began to be tested, better articulating one's own thoughts, listening and pondering. This context of discussion, frequently lively, created the appropriate humus to deal with the study of a few positions pertinent to the area of environmental ethics, proposed as possible answers to the questions raised little by little, and taken in their limited and problematic nature.

At the end of this sequence, I asked the students to answer to the following question: "Why should we respect nature? Explain if and how your opinion has changed in comparison with the beginning of the course." Here, I preferred to focus the attention on the synthesis of the positions of each student and on the reflection upon how each perceived the change within himself. This procedure made a complete review of what the group had elaborated possible; it gave every participant the opportunity to think about their own personal educational process (on an individual level and in collective terms at the moment of the feedback); finally, it underlined the importance of creating such occasions of expression (also of the meta-cognitive sort) using the model of critical discussion.

"Respecting nature means..."

The first answer can be synthesized as such:

- Motivations expressed in positive forms, that substantially regard four contexts of action: knowledge (8 responses), sensitiveness and respect (29), protection and dedication according to an operative modality (28), calls for responsibility (4); specific but partial behaviours (10): an interesting piece of data not to be underestimated because frequently it refers to superficial or limited visions and behaviours.
- There are also numerous indications expressed in negative forms (to avoid..., not to ...) some regarding general attitudes (5); other, much more numerous, indicate concrete behaviours, put

synthetically to avoid dirtying, damaging, polluting, and destroying the environment (38) and the reduction of human interference in nature (10).

It seems clear the existence of two types of problems: the first, of educational nature, suggests to us to reflect on the difficulty on the part of the students to understand the problem of the relationship between humans and nature in cultural terms, not simply in single actions, good or bad. The second induces us to orient the following training course in a way to avoid that the coming teachers consolidate a conception of environmental education made of prohibitions, instead of the promotion of positive behaviours.

“Why should we respect nature?”

These answers demonstrate significant changes:

- The reflection on the human/nature dialectic is very evident: in only one case it is sustained that nature is at the disposition of humans; instead an idea of nature as “mother” that offers us sustenance, and in this sense is a resource, is sound (12); humans are a part of nature (8) but nature does not belong to us, and we are not it’s owners (6); it has a right to continue to exist (3) and humans must preserve it’s integrity and beauty (4), because it is a precious good (2). In consideration of the limited nature of resources (3), we should save the existing ones (3): the understanding of the necessity of not altering equilibria, for the survival of humans and of nature is clear (14), to preserve ourselves (7), but also for the transformative value of nature, for the plurality of possible uses, not necessarily economic (5), or because nature is recognized as a biological and social need (11).
- The conviction that it is necessary to respect life in every form is also very strong (16), with a mention of the so-called intrinsic value ethics and to the conditions of uncertainty and risk, connected with the nature of our knowledge, that invite us to be prudent (14). Lastly, the themes that concerns specifically the primary concept of sustainable development are present in a very significant way, with references towards the future generations being much more evident (20), more than for the fair distribution of resources (2).

A few words should be said about a self-reflective point of view. Although solicited, not all of the participants deal with the theme (some were absent at first survey). Those who answer (around 70%) declare to have maintained their own personal conviction, clarifying and articulating it (10), or comparing it with other positions or authors⁶ (12), or rather

6. Jonas, Passmore and Deep Ecology are the most frequent references.

sustaining that the initial idea had been enriched, becoming less superficial and less partial (9). Finally, some (3) affirm of having examined concepts, problems, and new visions for the first time.

There would be much more to add⁷, but I would like to conclude with the words of one of my students: “Having known the wide outline of different thoughts, now I have the possibility to adopt my position freely.” I think that these words synthesize the sense of value education just as it should be achieved in every environmental education project.

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7. For instance, it should be verified the difference between declared attitudes and real behaviours, and examined the real incidence of social conditioning which induces an individual to adapt himself to the teacher's supposed expectations; and so on.

**Reports of research/Rapports de recherche
Rapporti di ricerca**

DO ENVIRONMENTAL POLICIES NEED STRICT ENVIRONMENTAL EDUCATION?

Franco Becchis

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Introduction

Environmental education and training follows the growing interest in environmental issues among citizens and in the policy agenda. Also, a lot of “environmental profession”, sometimes unlikely, are emerging. Spotting the market labour has been the focus of the research interest.

Our Research

In 2002 Fondazione per l’Ambiente has conducted an inquiry on regional level (Piedmont) on the demand and supply of environmental education and training. The leading idea was starting from competences (to know, to know how, to know to relate), instead of following the short term demands of the labour market.

A questionnaire has been submitted to the demand side, in particular to administrators, directors and fonctionnaires working in the major agencies and institution, directly or indirectly in charge of or involved in environmental policies, both public and private. The analysis was lead in different areas of environmental policies:

- Area 1: Education and research agencies
- Area 2: Public policies and project planning (local authorities)
- Area 3: Environmental public services management (public trustee, park and green areas, local public utilities)
- Area 4: Public agencies in charge of monitoring, control and sanctioning (Local Authorities, Environmental Protection Agencies, Police agencies)
- Area 5: Agencies that issue environments permits
- Area 6: Environmental Management of firm 00

More than 100 interviewed must rank a list of knowledges and competences, to show the perceived quality of education supply. The groups of knowledges and competences to be ranked were:

- Law, Public regulation and administration
- Production processes, products, techniques, natural sciences, environmental assessment
- Regulatory impact analysis

- Economic theory, industrial economics, cost analysis, CBA, financial analysis
- Negotiation and relationship with controlled actors
- Urban and rural planning

The results has showed a strong need for better knowledge and competence in the field of economic analysis and techniques applied to projects and policies assessment, in the broader family of the cost benefit analysis.

For more information on the research and the results:
www.fondazioneambiente.org

TEACHERS' PERCEPTION OF CONSERVATION PRIORITIES: A CASE STUDY WITH THE GLOBAL AMPHIBIANS DECLINE

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Introduction

The rapid biodiversity depletion, which is affecting natural environments, is one of the major challenges to global community, being a worldwide phenomenon that affects species of all taxonomic groups. This appears particularly serious when considering that the majority of earth biodiversity is still undiscovered (Pullin, 2002) and that, also following technical advances, species are described at a growing rate even in the most studied regions of the world (e.g. Veith, 1996; see Figure 1).



Fig. 1. The spectacled salamander, which is the symbol of the Italian Zoological Society, has been recently splitted into two distinct species *Salamandrina terdigitata* and *S. perspicillata* (in the above photo) basing on genetic investigations (Canestrelli et al., in press). (Foto: D. Canestrelli).

Our preliminary investigations suggested that Italian undergraduate student perception of biodiversity conservation priorities is often linked to conservation status of single species, usually big mammals, lacking of geographic context and far from their personal experience. This perception appeared to be at least in

part a by-product of the wide use of flag species in conservation practice. Conservation projects are hardly effective when social perception and interests don't meet conservation targets (e.g. Campbell, 1998 and references therein). Therefore, this perception suggests that didactic pathways based on local environmental realities ought to be developed, also in order to create the necessary background so that future community-based conservation programs can be successful. With this aim, we started developing a didactic pathway by investigating teachers' perception of local aspects of world conservation priorities, using the Global Amphibians Decline as a case study. The Global Amphibians Decline (GAD) is one of the world's major conservation priorities. At the First World Congress of Herpetology in 1989, researchers began gathering largely anecdotal evidence that a global pattern of population decline and species losses was occurring. Since then, burgeoning evidences have suggested that massive amphibian declines are occurring at local scales in many regions of the world, including North and South America, Australia and Europe. The IUCN has recently published a document indicating that 32% of the world's 5743 known amphibian species are threatened by extinction, and at least 43% of all species are declining in populations (IUCN, 2004). By comparison, just 12% of all bird species and 23% of all mammal species are threatened.

The Mediterranean region is one of the main twenty-five biodiversity hot spots of the world (Myers et al., 2000). Within this region, Italy is the country that has the highest amphibian species diversity, with more than forty species, most of which are endemic. Therefore, this phenomenon appears as a suitable starting-point to develop a didactic pathway aimed to introduce Italian students to global conservation priorities through the study of local realities and priorities.

The Method

Preliminary talks were made with fifty science teachers from sixteen secondary schools. To those who referred to know the GAD phenomenon we proposed an household questionnaire aimed at assess: 1) their knowledge of the general GAD phenomenon; 2) their knowledge of Italian amphibian populations conservation status; 3) how many times they spent and, especially, what are the main didactic tools they use to teach issues related to environmental conservation. The questionnaire was prepared and processed following suggestions in White et al. (2005).

Main Results and Conclusion

On the whole, 42% of the teachers interviewed were aware about the GAD. However, they all referred to have read about it on newspapers and/or national periodicals rather than on scientific journals.

Among them, only the 38% were able to cite at least two among the main causes of this phenomenon. Cited GAD causes were: agro-chemical

pollution of freshwater environments, anthropogenic habitat abolition, global warming.



Fig. 2. The Apennine yellow-bellied toad *Bombina pachypus*, a species endemic to peninsular Italy, whose conservation status has been recently cause of concern. (Foto: D. Canestrelli).

Interestingly, only two teachers showed general knowledges about the local amphibian fauna, and only 1 was aware about its present conservation status and recent demographic trends.

All teachers interviewed referred to cite biological conservation issues during their lessons, but only in relation to flag species or key environments (e.g. rain forests, coral reefs, etc.).

This study strongly suggests that presently Italian teachers' knowledge of conservation issues both at a global and local scale is substantially lacking. Therefore, improving teachers' knowledge about local environmental realities and conservation priorities is a fundamental prerequisite of any didactic pathway for biodiversity conservation.

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www.comune.roma.it/ECOAGENDA
LA SOSTENIBILITÀ IN WEB

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Ecoagenda è un progetto di educazione informale del Museo Civico di Zoologia di Roma, per aprire in forma diretta con i cittadini un dialogo sull'ambiente e la sostenibilità. Si tratta di un sito web, che funziona come un'agenda interattiva e multimediale; si rinnova, infatti, ogni giorno, pubblicando per l'intera durata annuale:

- *Ecoitinerari*, reali e virtuali, per la conoscenza di aree (anche rurali e cittadine) di interesse naturalistico-ambientale, ma anche per la conoscenza di problemi di sostenibilità ambientale e sociale.
- *Ecoattività*, proposte di attività nell'ambiente e per l'ambiente, da svolgere online e/o a casa o sul campo.
- *Ecoinformazioni* e concetti ecologici.
- *Ecoconsigli* (risparmio energetico, tecnologie alternative, limitazione dell'inquinamento, salute alimentare, commercio equo, tecnologie alternative).
- *Ecoriflessioni* (pubblicazioni, passi di libri, racconti di esperienze, immagini che stimolano riflessioni sui problemi socio-ambientali).
- *Ecosignalazioni* (eventi, libri, e prodotti mediatici..).
- *Econotizie*.
- *Ecolink* a siti per la formazione e ricerca ambientale, per la pace, la sostenibilità e la solidarietà.
- *Ecopersonaggi*: ritratti, notizie di personaggi impegnati nella difesa dell'ambiente.

Un settore dell'Ecoagenda è dedicato all'Ecoinsegnamento, per offrire strumenti di riflessione ad insegnanti ed educatori ambientali e per mettere in evidenza la complessità dell'Educazione ambientale. Le scuole possono partecipare alla redazione dell'Ecoinsegnamento.

Ecoagenda ha come obiettivi:

- Promuovere il pensiero ecologico, ovvero conoscenze, sensibilità, apprezzamento e comportamenti responsabili verso l'ambiente nella sua totalità.

- Promuovere una coscienza civica basata sulla pace, l'armonia, la solidarietà, il rispetto per tutte le forme di vita e per le diversità.
- Promuovere la presa di coscienza dell'insostenibilità di molte nostre azioni, dei nostri modi di vivere e di produrre e la consapevolezza delle relazioni che esistono tra problemi ecologici e sociali.
- Promuovere il consenso e la partecipazione dei cittadini alle scelte di indirizzo dell'Amministrazione comunale, a tutela dell'ambiente.

Ecoagenda presenta alcuni aspetti originali-innovativi, rispetto ai numerosi siti dedicati all'ambiente, in quanto:

- generalmente i siti istituzionali, sorti dopo Agenda 21, contengono informazioni sulla legislazione ambientale o su uffici e servizi cittadini. Ecoagenda invece è un sito pubblico (Comune di Roma, Museo Civico di Zoologia) per l'Educazione ambientale; nasce per sensibilizzare, per avviare nuove forme di riflessione, promuovere coscienza ambientale e comportamenti sostenibili, in una prospettiva di educazione permanente e di dialogo con tutti i cittadini.
- anche nelle informazioni e nelle notizie tecniche cerca linguaggi ed approcci facilmente comprensibili.
- ha una forma scorrevole, amichevole, dialogata.
- offre una grande varietà di contenuti con l'obiettivo di mettere in evidenza la complessità e la trasversalità dei problemi ambientali.
- utilizza diverse forme e metodologie comunicative (la scheda, il gioco, il dialogo, l'intervista, il filmato).
- la metafora dell'agenda richiama Agenda 21, ma soprattutto mira a far inserire nella vita di ogni giorno degli utenti internet una riflessione sull'ambiente (vari utenti hanno Ecoagenda in homepage del PC) e sottolinea il fatto che i problemi dell'ambiente "sono" parte integrante dei nostri problemi quotidiani.

Ecoagenda ha una casella e-mail. Nel primo anno di funzionamento sono arrivate numerose richieste dei cittadini, per informazioni, ma anche per orientamento professionale (ad esempio: "dove frequentare corsi per educatore ambientale? Dove specializzarsi per lo sviluppo sostenibile?"), per la vita "sostenibile" nella città di Roma (ad esempio: "qual è il pericolo per chi vive vicino alle antenne di...? A chi rivolgersi per ridurre l'inquinamento acustico ed atmosferico prodotto dagli autobus al deposito? Come riutilizzare le potature dei giardini? Quali sono le giornate ecologiche? Perché non lasciare aperti i parchi pubblici anche di sera, affinché ne possano usufruire genitori e bambini?").

NEW TECHNOLOGIES FOR ENVIRONMENTAL EDUCATION AND SCIENCE DIDACTICS

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Abstract

In Europe it is observed a progressive separation of society from science that is put in evidence by the students attitude towards scientific subjects.

The role of school is changed, considering that in the digital era Internet plays an important role as a tool to acquire knowledge. This change has not been well considered, and following to this in the Italian context it's evident a gap between teaching methodologies and learning techniques.

The Internet era made evident the errors of a behaviourist approach in science didactics, proposing a different approach based on constructivism in its different perspectives (cultural, social, etc.).

During this research it has been developed a project of didactics and environmental education that "uses" the environment of the Lagoon of Venice as a mean for the dissemination of environmental sciences and as a tool to increase awareness in the issues related to Venice and its territory, using Internet as medium of communication.

Introduction

All over Europe it has been noticed that students have a different attitude towards science, that leads to a significant decrease of the number of enrolment on scientific faculties. European Community began to take measures to oppose to this tendency. The "Lisbon Strategy", promoted in 2000, stated that it's necessary to improve policies regarding information and research. Besides this, during the meeting of Uppsala (2001) the European Ministries of Research and Education stated that it is fundamental to increase attendances of scientific faculties and improve relationship between Science and Society.

The ideas coming from different European Union meetings and programmes in science field led to the VI Framework Programme (VI FP) and in particular to the Action Plan called "Science and Society", that aims at encouraging harmonious relationships between science and society and sensitising society towards innovation, thanks to new relationships and a conscious dialogue among researchers, enterprises, public authorities and citizens (EC, 1999). Scientific community plays an important role in knowledge dissemination, as stated in the Thessalonica Declaration, considering that it

has to assure that education and communication contents are based on updated data.

The VI FP puts in evidence that it's necessary to improve the development and testing of pedagogical methods addressed to awake the interest of young people in science. The European Standard Reports 55.2 points out that 60% of students say that science lessons are not interesting (EC, 2001): school has lost its contact with students, their way of learning changed a lot, but school seems not to realize it.

At the Istituto Veneto di Scienze, Lettere ed Arti (IVSLA) in Venice it has been started a project whose aim is to organize and to realize an Environmental Database addressed to didactics and restricted to wetlands.

The Database aims to collect information regarding different aspects of wetlands dynamic, with particular attention to Venice Lagoon; to organize in systematic way acquired knowledge; and finally to put these information at everyone's disposal.

Environment can be used as a gym for teaching many different disciplines with direct experiments, for this reason into the environmental database carried out at IVSLA a section for dissemination and environmental education has been planned: it offers information and tools useful to make easier the understanding of the database contents and to promote its use for didactical purpose. It is organized in chapter:

- 1) Environments, with general information about the types of environment in the lagoon and their dynamics;
- 2) Flora and Fauna;
- 3) Didactics, offering educational courses, training experiences, lessons and activities, games and simulation;
- 4) Glossary.

In this research it has been developed a project of environmental didactics and education that uses the lagoon environment as a tool for the dissemination of Environmental Sciences and as a mean to increase consciousness of the issues regarding Venice and its territory.

Developing the project, three aspects have been considered, that are fundamental in order to the realization of a multimedia didactic and educational tool effectively usable and useful: 1) pedagogical characteristics of learning process; 2) potentiality of computer and new technologies as a tool that teachers can use to support science teaching; 3) peculiarities of environmental sciences as study subject.

One of the project aims is to bring constructivism in science didactics as a method to overwhelm the difference between learning methodologies and the teaching ones.

For the planning and the compilation of the didactical section, secondary schools teachers have been involved in order to get a first hand understanding of their requirements and also tap from their on-the-field experience when in came to deciding contents organization.

Results

In order to measure the attitudes of the students towards the Dissemination Section of the Environmental Database, we prepared a Likert questionnaire. The statements were meant to give information about students' attitude and to analyse some constructivist aspects about learning method: collaboration, knowledge as personal construction, use of multiple intelligences. The possibility to use different tools, like cards, quizzes, documents, has been appreciated both by teachers and students. The former think that the Dissemination Section of the Database can help them in the setting up of didactics and environmental education activities, the latter use it as a useful multimedia tool for researches about Venice and its lagoon.

The use of informatics' tools needs the study of their possible didactic relapses, and the survey carried out at secondary schools showed that new technologies can be useful at school, without omit other traditional tools like direct experiences in the environment.

The creation of the Dissemination Section has taken to the establishment of important connection between schools and scientific agencies that work in the Venetian territory.

This kind of multimedia product can help solving the separation between students and science, through the creation of an interesting tool and of a concrete context on which science, society and school can meet in order to work together toward a human and social growth.

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TEACHING ENVIRONMENTAL EDUCATION IN ITALIAN UNIVERSITIES: A QUINQUENNIAL EXPERIENCE

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Introduction

Analogously as in other western countries, at the end of the last century the “environmental problem” was considered at first in a political view (Perussia 1989). In the meantime, Italian naturalistic associations (LIPU, WWF, Italia Nostra, Legambiente, among others) spontaneously started specific educational projects, some of them being of very high quality, mostly employing a pragmatic approach aimed at heightening the environmental knowledge of the new generations (ex: naturalistic oasis of WWF). Later on, this pragmatic approach was included in pilot projects aiming at conjugating both cognitive and emotional approaches, the latter being most important for a permanent modification of attitudes towards the environment, as suggested by the research-action paradigm (Sauvé & Orellana 2002) (ex: WWF’s adoption of a park, among other). In order to induce a thorough cognitive appraisal of the many connections of the “environmental problem” an integrated approach was proposed to students and teachers in primary and secondary schools (Aa.Vv. 1983).

Environmental education became a University subject for future primary teachers at the end of the last century, and the first scholars encharged to draw the programs really had the proviledge to create new programs adapted to Italian reality (Lenti Boero 2004).

Here I present the motivation of the multidisciplinary approach that informed my teaching job from 1999 to 2004 at University of Urbino and University of Valle d’Aosta, Italy. This approach aimed at the integration of different “field of knowledge”, that is different “points of view” of the environment and related arguments, and at the integration of both naturalistic and pragmatic activity to the teaching of theoretical ground knowledge for environmental education.

The course was composed by 30 hours of frontal lessons and 30 hours of laboratory and field activity.

The following subjects were treated:

- cultural evolution and the growth of environmental impact (history, geopolitics, natural sciences, theatre: animation of prehistoric life).
- animal behaviour and ethology (natural sciences, zoology, mathematics).
- plant biodiversity in the school garden.
- history of landscape (geography, geology and art as source of knowledge of landscape in ancient time).
- environmental psychology (exploring the emotional link with the environment), and related techniques (drawing, interviews and questionnaires (language).

Field activity included visits to protected areas in the surroundings (education to movement) and a sensorial approach to environmental exploration (science, human body).

Because environmental education in paedagogical Faculties is aimed to forge teachers for maternal and primary schools, where teaching is mostly carried on by means of projects, the final proof was an original project made by each student. In the project a key activity had to be found (i.e.: life in the sea, animals in a rural factory, visit to a protected area etc.), and links with the most possible subjects taught in primary schools had to be found (i.e. sea project: poetries and literature about the sea (Italian), counting the waves in fixed time periods near the sea (mathematics and movement education), art representation of the sea (drawing, art education), the animal of the sea (biology, zoology), etc.

Independent evaluation of teaching was performed only in Aosta University and demonstrated that the aim of the course were fulfilled.

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