

EU-UNAWWE ITALY



The sky within reach

**A project to get children
and their parents closer
to the starry sky**

**METHODOLOGY, DOCUMENTATION AND
EVALUATION**

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General project's objectives.

Making children curios about the starry sky.

The main objective of the project is that of exposing children to the night sky fascination, firstly through activities made in the schools and secondly also involving their families. In fact we do believe that the work done at school should be followed by an involvement of families because the deepest learning happens when emotions are implicated and families are actually where the emotion flow finds its space in the easiest way.

To get to this objective, as a first step, EU-UNAWE ITALY organized training courses for teachers, as through teachers a bigger number of children can be reached and more continuously (with respect to direct activities with the children).

Different kind of courses have been organised throughout the national territory during the project: in some cases the teachers only participated in training course activity, whereas in other cases the project's experts were directly involved side by side with the teachers in the classroom to carry out many activities with the children. We decided to describe in more depth one of the most complete actions in a primary school and to illustrate the evaluation techniques applied both to children and teachers training activities. After this case study we will anyhow report the analysis of the results from the questionnaires given to the teachers at the end of EU UNAWE the courses.

Highlighting differences between different cosmologies and interpretations of the sky.

As a second step, we believe it is important to highlight, especially in the schools where the children came from different backgrounds, the different ways in which the night sky has been described by different peoples and what different interpretations and stories they have been telling when looking at the same stars, stimulating the use of imagination and phantasy when observing the starry sky. Even though the project mainly uses the scientific language and scientific method, we believe that all the languages and expressivities that children can use have to be protected and used, respecting everyone's individuality.

Every time we had also the objective of **enhancing astronomical knowledge**.

The general objectives where obviously adapted to the different contexts, considering the starting surrounding conditions. In particular we have chosen not to introduce new work methods in the class, but to suggest the achievement of our targets by choosing the methods best suited to achieve them among the already existing ones. This since we believe that the project should become common practice in the school in order to leave a permanent mark and open the doors in a definitive way to astronomy and to interculture also in absence of the EU UNAWE experts.

Our approach

The peculiarity of this project has required a particular study of the evaluation and documentation methods and techniques. Even having as reference a method adopted since long ago in the best

Italian schools, considering the child an active and able individual capable of approaching science and elaborating theories and even believing that in the age range connected with the project (4 – 11 y.o.) it was not of basic importance the evaluation of the project by merely measuring their capabilities in the cognitive area, we have felt the need to elaborate a coherent and quantitative method allowing us to evaluate the project. We have obviously collected anything required by an evaluation at international level but at the same time we have considered important also to act an evaluation referring to our highly peculiar context.



Children at work with the solarscope, an instrument for solar observation

We remind in particular that the method adopted by the nursery schools in Reggio Emilia is worldwide appreciated and known. This has been the approach inspiring us. Also the puppeteer master Mariano Dolci, the municipal puppeteer of Reggio Emilia for over thirty years, has collaborated to this EU UNAWE Italy project.

“The Reggio Approach”¹

The Reggio Approach derives its name from its place of origin, Reggio Emilia, a city located in Emilia Romagna in Northern Italy. Shortly after World War II, Loris Malaguzzi, a young teacher and the founder of this unique system, joined forces with the parents of this region to provide childcare for young children. Inspired by the need for women to return to the workforce, this education system has developed over the last 50 years into a unique program that has caught the attention of early childhood educators worldwide.

Looking at this complex system of education is fascinating and challenging. It invites us, as teachers, to see the possibilities of what can be, if we are willing to take risks and let go of our traditional roles.

¹ Dal sito canadese http://www.reggiokids.com/the_reggio_approach.html

The Reggio Approach is a complex system that respects and puts into practice many of the fundamental aspects of the work of Dewey, Piaget, Vygotsky and many others. It is a system that lends itself to: the role of collaboration among children, teachers and parents; the co-construction of knowledge; the interdependence of individual and social learning; and the role of culture in understanding this interdependence. (Baji Rankin, 2004)

At the heart of this system is the powerful image of the child. Reggio educators do not see children as empty vessels that require filling with facts. Rather they see children as full of potential, competent and capable of building their own theories. The Rights of Children as written by Loris Malaguzzi best describes how children are viewed.”

The evaluation group

The evaluation group is made by: Lara Albanese and Alessandra Zanazzi (National EU UNAWE project manager) and by an external evaluator, James Bradburne².

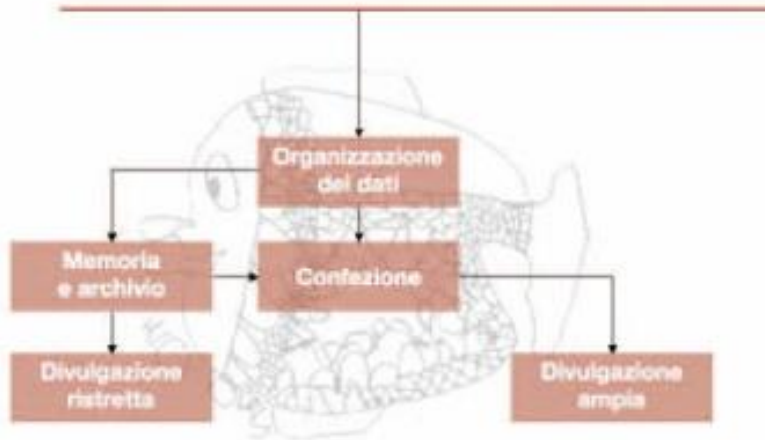
The documentation and evaluation of the Italian project

Our documentation has been inspired by a method commonly adopted in certain schools and suggested in particular by regional directives (see the directives of the Emilia Romagna Region or the INDIRE project of the Tuscany Region).

The here brought example is represented by the “Divulgazione ampia” (i.e. “wide divulgation”) box and therefore, from the restricted memory archive, we have extrapolated a single but significant example and selected exemplar materials.

² James Bradburne Director General. Responsible for concept, strategy and implementation of a foundation to revitalise the public cultural program of the Palazzo Strozzi. He participated in many projects involving museums and temporary exhibitions. He’s one of the major experts actually in Italy in education and evaluation (<http://www.bradburne.org/>)

La documentazione educativa



From: <http://sociale.regione.emilia-romagna.it/documentazione/pubblicazioni/guide/quaderni-del-servizio-politiche-familiari-infanzia-e-adolescenza/7.-documentare-per-documentare>

Before starting with the project's evaluation, we asked ourselves on which groups we wanted to evaluate the impact of the project.

Three main groups were identified:

1. Children (boys and girls)
2. Teachers
3. Parents and generally speaking any adult emotionally connected to the children

In order to evaluate the results we thought it was essential to:

- **Establish the premise, the initial state of each context:** in order to measure the results it is essential that we have a picture of the situation at the beginning, the starting point.
- **Sensible data (indicators and descriptors):** determine for each context which are, among the data gathered for the documentation, the most useful for evaluating the points given above.

Sensible data have always been collected and then documented during all our activities.

The identification of the indicators has been of basic importance in the phase of documentation and evaluation (we remind in particular "Documentare per documentare. Esperienze di documentazione nei servizi educativi dell'Emilia Romagna" edited by Franca Mazzoli A cura di Franca Mazzoli Mazzoli <http://sociale.regione.emilia-romagna.it/documentazione/pubblicazioni/guide/quaderni-del-servizio-politiche-familiari-infanzia-e-adolescenza/7.-documentare-per-documentare>)

“Indicator” means a variable that after being measured gives information on a particular phenomenon or situation. The term “Indicator” refers to a numerical data having a high informative content and having the purpose of putting in evidence (“offer indications”) a given situation in an extremely synthetic way; for instance, referring to the nursery quality, an indicator could be the “average number of children for teacher”. The indicators must respect certain requirements of methodological order and of conceptual nature, and in particular they must be relevant i.e. measure an important characteristic of the situation we want to examine.

“Describer”. When the dimension of the inquiry is qualitative the term “Describer” is better suited than “Indicator”. In this case, in fact we are referring to a “description (based on the use of the alphabetical code) of characteristics and properties having the capability to represent a particular situation” (see Cecconi, 2001).

Why document and evaluate an educational project?

Apart from the reasons linked to the need to evaluate any project financed by the European Community, the evaluation, according to us, has a relevant pedagogical value. A systematic and coherent behaviour is compulsory in order to obtain the evaluation of an educational project.

“The documentation represents a mean allowing the work group to elaborate and turn the experiential life into a cultural data. The documentation brings back the memory of events and paths, allowing to reason and reflect over them, to evaluate the coherence with the educational purposes, to work out again the meanings and to hoard the knowledge acquired through the action. It seems essential in this sense to ensure the systematic aspect and the coherence of the documentation defining criteria, times and methods, ways of archiving and planning the moments devoted to its analysis”. The evaluation is therefore strictly linked to the possibility of evaluating in a scientific and coherent way a project.³

The documentation is thought and calibrated according to its different recipients. Since our project is aimed mainly at teachers, the present documentation has as main aim the sharing of the paths and methods for different schools and considers as recipients teachers, educators and persons working with boys and girls within the EU UNAWE project.

Some indicators of EU UNAWE ITALY

- number of teachers and educators involved in the training courses
- percentage number of teachers and educators introducing the issues suggested by EU UNAWE in their curricula
- number of children participating to the project

³ On the importance of documentation see also Sergio Spaggiari in “Shoe and Meter. Children and measurement” Reggio Children Editions: e.g. “Though documentation may have originated as a way to offer children an opportunity to evaluate their work and to keep parents better informed about school experiences, it was soon discovered to be an extraordinary opportunity for teachers to re-visit and re-examine their own work with children, offering unquestionable benefits in terms of professional development.” (p. 10-13)

- percentage of “scientifically correct” answers in primary schools
- time of attention during the activities in the nursery schools

The describers of the EU UNAWE ITALY project

In order to identify the describers of the activities in connection to the evaluation:

- We have regularly documented the experiences (with photographs, videos, audio recordings of the children’ conversations, drawings, artistic materials)
- We have made an archive of the documentation materials
- Criteria and documentation methods have been shared within the workgroup
- We have made use of the documentation as a tool for thinking over and reintroduce the educational courses
- The documentation must allow the examination of the accomplished experience evaluating its coherence with its educational aims.

We hereunder write the describers used by us in the different categories taken into account.

Describers for Children



Kindergarten children during one of the activities

1. Are children intrigued? do they became curios? do they ask questions? (UNAWE Domains of active learning⁴: motivation)

2. Do children produce materials related to the subjects treated? Do they invent stories? Draw stars? Do they make “space games” or astronaut games? Do they ask to observe the sky? (UNAWE Domains of active learning: Scientific Skills)

3. At the end of the project did the children’s imaginative world and language change? (UNAWE Domains of active learning: Scientific Skills)

4. Did the children acquire a better awareness about the themes desalt with? UNAWE Domains of active learning: Universe Knowledge)

5. Are children curious about the intercultural themes of the project? (UNAWE Domains of active learning: Intercultural)

⁴ See http://www.unawe.org/resources/guides/EU_UNAWE_evaluation/



Teachers at work!

Describers for Teachers:

1. Were the teachers curious about the subjects dealt with? Did they research browsing books or the Internet? Did they write emails to the project's managers in order to ask for materials? (UNAWWE domain: scientific skills)
2. Did the teachers introduce in their curricular activities the themes and methodologies dealt with in the courses? (UNAWWE domain: scientific skills)
3. Did the educational practices related to Astronomy education change? (Unawe domain: intercultural attitude)

Describers for Parents

1. Were parents curious about the subjects dealt with? Are they aware of the project's contents?
2. Were parents involved with their children on the subject dealt with? How much did they talk about the sky? How long did they spend looking at the sky together with their children? And how often?



I took dad to the Planetarium show!



Parents and children together inside the planetarium

Conformity of the Italian evaluation method to the international one

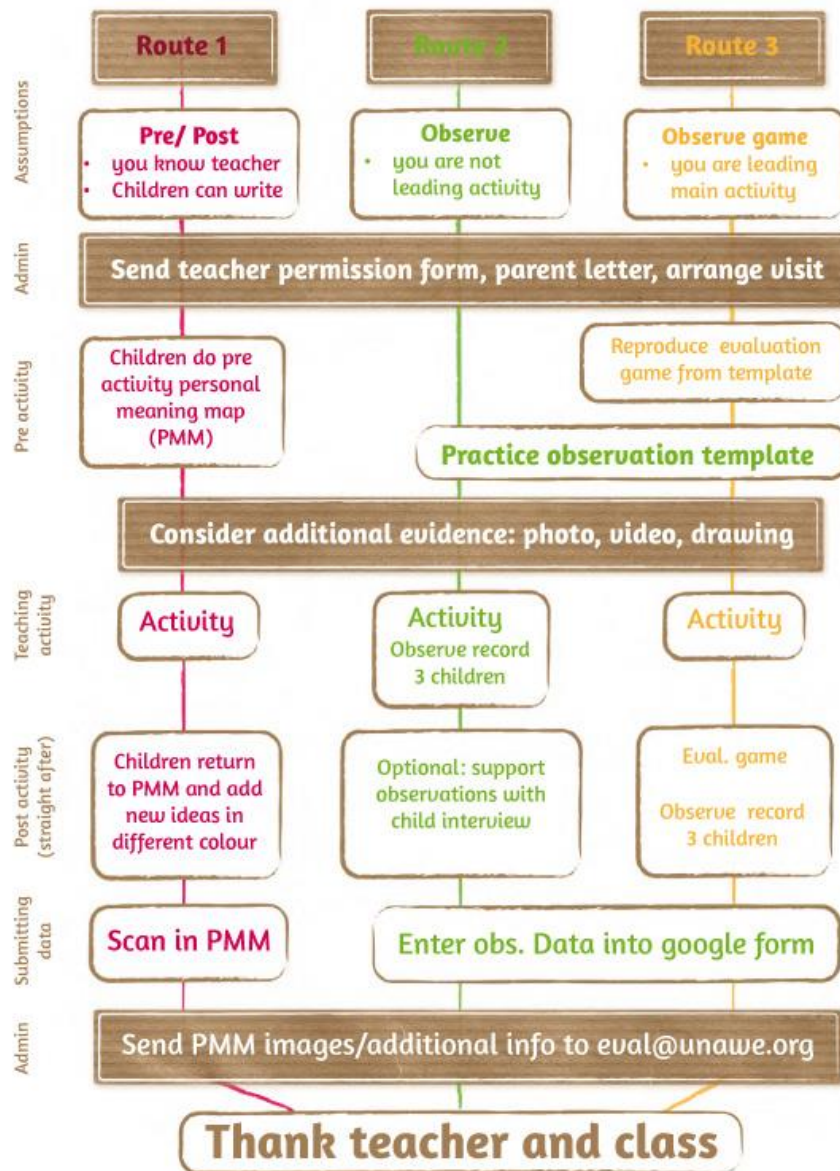
The EU UNAWE project has offered a deep and articulated documentation scheme of the project that can be downloaded directly from the project website:

http://www.unawe.org/static/archives/guides/pdf/EU_UNAWE_evaluation.pdf

Unfortunately the courses developed in the Italian schools have not been concentrated in time and have been diluted across all the nine months of the two school years. This has not allowed to use in a detailed way each grid and material (for instance the astro-cards) given at international level. In February 2013 when the international document for evaluation has been made public the Italian projects were already in an advanced stage of work. But the several meetings and exchanges have rendered the Italian evaluation substantially corresponding to the international one, apart obviously from the part regarding sheets and schemes not available to us.

We therefore hereunder report the converging points and the small differences referring to the suggested model shown in the figure: “Gathering evidence: process diagram”.

Gathering evidence: Process diagram



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Regarding the primary schools joining the project they all belonged to the Route 1. There has in any case been an ex ante evaluation, although not by means of the PMM suggested by the project. Nevertheless the scientific games and the suggested activities are not too far from the “official” ones.

Schemes, questionnaires and activities for the evaluation

Regarding instead the nursery schools we always have been in the Route 3 but we did not have the availability of the templates. Even in this case we have used materials very similar to the suggested ones. We have made use of the “Child observation template” but the compilation has been written by us at a second stage watching the videos and the photographic material.

Evaluation materials: Astro-Cards classification games

The international project evaluation suggests to use papers with images of the astronomical objects. During the carrying out of our activities the astro cards were not yet available to us but we have made use of photographic books allowing us to extrapolate the same data of our colleagues from other countries. We have anyway offered also games and classification activities.



Classification games

The questionnaires submitted to the teachers have instead been to a great extent coincident with the ones suggested by the international project.

Case study: the 3rd classes of the Primary school of Ronco Briantino

We have chosen as sample case the carried out in the third classes of the primary school of Ronco Briantino, a municipality close to Milan. This because children in the third class apart from verbalizing are also using written communication with a certain precision. This has allowed us to have more indicators for our evaluation. Furthermore in these classes the educational paths proposed by the teachers have been particularly full of hints and activities. As a matter of fact the training course for the science teachers has consisted in eight meetings for a total of 18 hours, spread across the whole school year, during which have been considered issues on astronomy, pedagogy, didactics, interculturality, curricula connections and interdisciplinarity but have been discussed also planning and programming of the activities of the course that the teachers would have followed in the class. Between each training meeting with the EU UNAWE experts and the following one, the teachers have kept working with the children both with the activities and the UNAWE materials displayed during the course and both with the materials and the activities autonomously suggested by the teachers themselves. Additionally the accomplished course has included a huge variety of languages, methods and stimuli: film and video watching, making of multi-material pictures, reading myths and legends, inventing stories, dramatizing, scientific experiments, construction of observational instruments, collective conversations, construction of models, reading and writing of texts, poems, rhymes, metaphors, acrostics, songs on stars' issues, deepening and research and so forth⁵.

We shall hereunder briefly describe the main steps of the course brought ahead during the whole 2012-2013 school year.

First step: the stars in the planetarium and the starry sky.



Thanks to the EU UNAWE project a group of girls and boys (obviously with their adult relatives) have left making a journey during the whole year allowing them to discover of the starry sky and of how the sky is seen in any part of the world. To start with, a journey below the stars of a planetarium with a show made richer by the stories and the shadows prepared by the puppeteer master Mariano Dolci for this project.

This is what the local newspaper has written about this first step:

[Orion shadow projected in the planetarium](#)

⁵ See appendix 4



"Mi domando se le stelle sono illuminate perché ognuno possa un giorno trovare la sua" Antoine de Saint-Exupéry (Il Piccolo Principe)

Gli alunni sotto i cieli ad... ascoltare le stelle

NEL MESE DI NOVEMBRE ha preso avvio il progetto "I cieli del mondo" che vede coinvolti studenti, genitori e insegnanti dell'Istituto Comprensivo di Ronco Briantino e Sulbiate. Si tratta di un particolare progetto sospeso tra astronomia, mitologia e intercultura, promosso grazie alla collaborazione con l'Osservatorio Astrofisico di Arcetri (Firenze) e, in particolare, con le due scienziate Lara Albanese e Alessandra Zanazzi.

L'idea progettuale è nata dal desiderio di riuscire a guidare gli alunni a guardare i cieli del mondo con occhi nuovi e differenti, a scoprire i meravigliosi segreti del nostro universo, a immergersi nel mondo misterioso e affascinante delle stelle, dei pianeti, delle galassie e a esplorare le 'altre vite' possibili della nostra galassia...

E per portarli infine a comprendere



Un vero e proprio planetario gonfiabile per ammirare pianeti e galassie. L'iniziativa grazie a un progetto Unesco

che Terra e Cielo sono spazi multipli che, a seconda del punto di osservazione e di vista, possono apparire straordinariamente simili o sorprendentemente differenti.

Il progetto, interamente gratuito per l'Istituto, è stato reso possibile in quanto inserito all'interno del Programma UNESCO Universe Awareness di didattica dell'astronomia, finanziato dall'Unione Europea. Tale Programma UNAWE è già attivo in 40 Paesi, con un network di quasi 500 astronomi, insegnanti ed educatori.

L'Osservatorio Astrofisico di Arcetri è l'unico partner italiano di UNAWE e si occupa, grazie a questo finanziamento, di disseminare in Italia l'esperienza de "I cieli del Mondo" attraverso corsi di aggiornamento per insegnanti delle scuole dell'infanzia, primarie e secondarie, conferenze-spettacolo, laboratori e l'avventura all'interno di un planetario itinerante e gonfiabile dove gli alunni possono scoprire come si vedono le stelle nei diversi cieli del mondo.

Il nostro Istituto ha avuto la fortuna di essere selezionato tra le scuole che avrebbero potuto usufruire di questa opportunità unica nel suo genere e così, nel mese di ottobre, le astrofisiche hanno tenuto la prima fase di un corso di formazione rivolto ai docenti dell'istituto e nel mese di novembre il progetto è proseguito con altre sessioni di formazione e il coinvolgimento degli alunni, che hanno potuto entrare in un planetario gonfiabile installato nelle scuole primarie di Ronco e Sulbiate.

Il cielo a portata di mano

Difficile raccontare a parole lo stupore e la meraviglia dipinti sui volti dei bambini mentre, con gli occhi rivolti verso l'alto, si facevano incantare dalla poesia luminosa delle stelle...

Giovedì 15 e venerdì 16 novembre gli alunni della scuola dell'infanzia e della scuola primaria di Ronco Brian-



tino e di Sulbiate e i ragazzi delle prime medie di Ronco hanno potuto, infatti, vivere un'esperienza davvero unica e singolare: quella di ammirare le costel-

lazioni nello *starlab*. Un planetario gonfiabile all'interno del quale - grazie a una sofisticata strumentazione - le due astrofisiche hanno potuto proiettare e spiegare le costellazioni visibili nel nostro emisfero, ma anche far compiere straordinari viaggi in giro per il mondo e ammirare cieli di luoghi lontani.

Alternando spiegazioni scientifiche a narrazioni mitologiche e a spettacoli d'ombre, le due scienziate hanno fatto esplorare agli alunni la galassia, alla scoperta suggestiva e intrigante dell'*Orsa Maggiore*, del *Grande Carro*, di Cassiopea, della *Stella Polare*, di *Sirio* e, in particolare, della costellazione di *Orione* intorno alla quale hanno narrato simbologie, miti e leggende provenienti dagli angoli più svariati del pianeta.

Ma l'esperienza nello *starlab* si è caratterizzata anche come opportunità di sguardo interculturale. Le scienziate sono partite da una semplice (ma non scontata) domanda: tutti gli abitanti del mondo vedono lo stesso cielo? E, dopo aver raccolto idee e ipotesi degli alunni, hanno potuto spiegare e mostrare ai bambini - grazie a un cilindro rotante - quali stelle e costellazioni si vedono nelle varie parti del mondo, li hanno guidati a cogliere le caratteristiche del cielo peruviano, di quello sudafricano, di quello cinese e a comprendere che le stelle brillano sopra le teste di tutta l'umanità, ma non tutte nello stesso periodo e nella stessa posizione.

E, aspetto ancor più unico e interessante, hanno fatto capire ai bambini che le stelle "premiavano i poveri" del Mondo perché brillano di più proprio là dove l'assenza di inquinamento luminoso le rende maggiormente visi-

bili e luminose, come per esempio in Africa...

Ma il viaggio nell'astronomia interculturale non è stato riservato solo ai piccoli. Anche gli adulti hanno avuto l'opportunità di provare l'incanto che solo le stelle sa suscitare. Nella serata di venerdì le due astrofisiche hanno incontrato i genitori per raccontar loro il senso di questo progetto interculturale, per ricordare quanto meraviglioso e importante sia alzare gli occhi al cielo insieme ai propri figli.

Attraverso collegamenti internet e l'utilizzo dello *stellarium* hanno mostrato e spiegato come riconoscere le costellazioni dell'emisfero boreale e di quello australe. Gli adulti si sono avventurati quindi all'interno dello *starlab* per osservare le costellazioni proiettate sulla cupola e, per finire, sono usciti anche fuori in giardino a cercarle nel cielo vero.

Il sabato mattina, infine, proprio per offrire l'opportunità a grandi e piccini di ri-vivere l'esperienza insieme, la visita allo *starlab* è stata aperta alla cittadinanza. Sorprendentemente c'è stato un afflusso continuo e ininterrotto.

Un vero successo: più di 300 persone di Ronco, Sulbiate e dei paesi limitrofi hanno assaporato e condiviso l'o-

riginale esperienza astronomica e tutti hanno espresso grande entusiasmo e apprezzamento per l'iniziativa.

L'esperienza continua

L'avventura nello *starlab* ha rappresentato solo il primo passo del progetto. In seguito al corso di formazione, le insegnanti delle diverse classi hanno programmato percorsi di lavoro sulle costellazioni, sui pianeti, sulla Luna e sul Sole, che svolgeranno nel corso dell'anno.

Nei primi mesi del 2013 sono previste visite all'**Osservatorio astronomico di Merate** e l'attivazione di percorsi sui cieli nell'arte figurativa e nel cinema, nella narrativa e nella poesia. A marzo le due scienziate torneranno a scuola per attivare laboratori di costruzione di strumenti astronomici e per tenere lezioni-spettacolo di astronomia con gli alunni delle scuole primarie e secondarie. Alla fine dell'anno scolastico i materiali prodotti nelle diverse classi verranno esposti in una grande mostra collettiva e durante un evento finale di socializzazione ciascuna interclasse mostrerà ai genitori frammenti del lavoro svolto.

Patrizia Canova
insegnante della scuola primaria



Second step: the schoolwork on the issues that have most interested the pupils. Test of the materials.

What shall we talk about?

The amazement and the interest of the boys and girls has been great. Many have been the questions, many the curiosities. Maybe thanks to a course made the previous year linked to the origins of themselves most of the curiosities of the children have been towards the origins of the world and of the Universe.

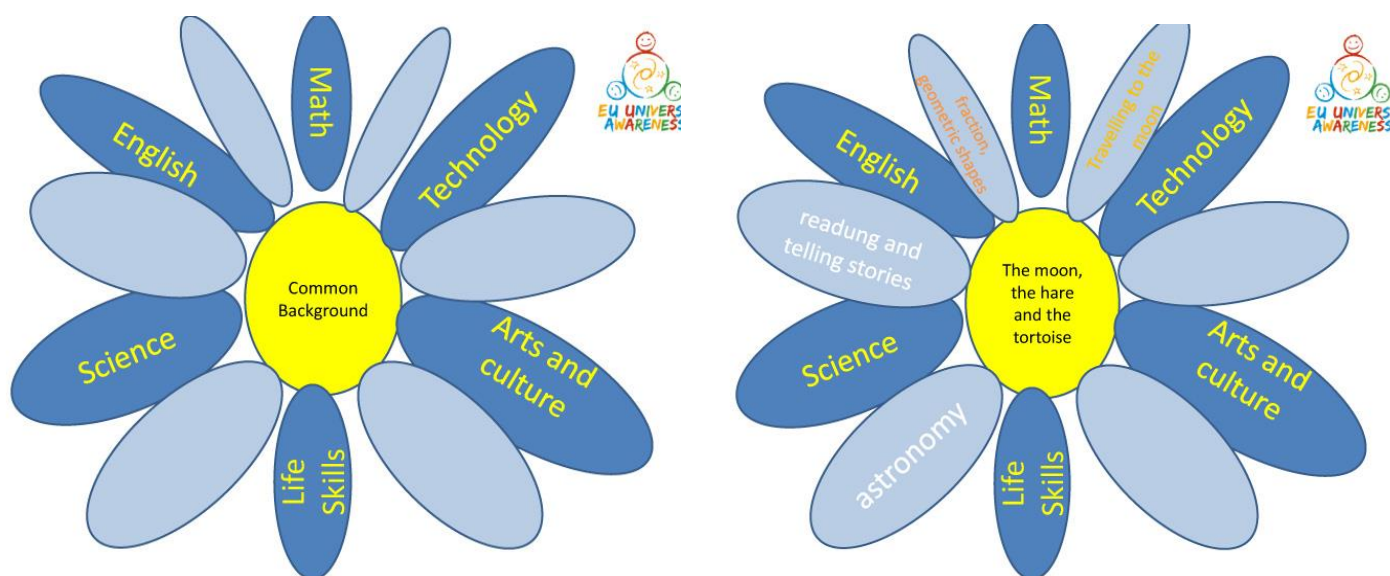
Thanks to the materials supplied by the project and to several deepening both during the training and autonomously, the teachers have perfected a programming that has touched almost all the school curricular subjects.

After the planetarium show the teachers have decided to work in an interdisciplinary manner on the issues being more of interest to their pupils.



The concept map

This is the method that we usually suggest during the teachers' training courses. Similar results have been obtained in a course during August 2013 at Cape Town with our South African project colleagues. In that case reasoning about the methodology for the integrating background the teachers have reached the following scheme. Please notice that the second image is based on the hypothesis of working on a story (as integrated background) linked to the starry sky ("The tortoise, the rabbit and the Moon").



Getting back to the Ronco Briantino project, these have been the issues on which boys and girls have more asked to dwell:

- Birth and expansion of the Universe
- The constellations and the stars
- The Solar System formation
- The forces of the Universe
- The creation of the Earth
-

Third step: meeting with the lady astronomers and connection by skype with a southafrican class joining the project

After a couple of months work the lady astronomers have come back to the school. This time offering a conference show on the intercultural skies.

It has also been decided to get connected with other children, joining the EU UNAWA project, living on the opposite side of the world, in South Africa.



"The best thing for me was that all the children there were as black as I am!"

Despite the great connecting difficulties the boys and girls have shown great curiosity and attention, have felt deeply involved and have asked more than once to repeat this experience: a friendship at great distance was born!

But the project still required great steps to be made as:

Fourth step: the night at school.

Since the starry sky can obviously be seen only by night, for the first time the lady teachers have decided to spend a night at school, discovering our sky and the one of the Native Australian.



Preparation of tents for sleeping



Dot Art, exactly as Native Australians!



A few steps under the night sky (in spite of light pollution!)



And finally ... Everybody to sleep, under the tents, in the school gym



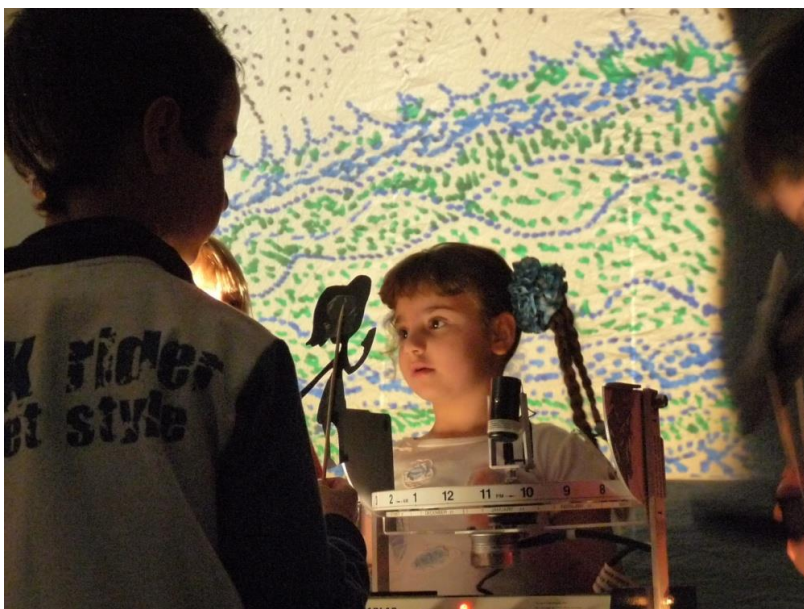
In the morning, after breakfast, back in the planetarium!!!! And also more playing with the tents

A bit sleepy (but it was worthwhile!!!) ... in approximately two weeks a great star party is going to take place at school. And then it'll be the children in the planetarium that will project and show the Native Australian sky and their stories!!

Fifth step: the final party of the parents with the planetarium played by the boys and the girls, astronomical exhibition and laboratories prepared by the parents



The final party of the whole school; representations – for parents and relatives – of the stories invented, narrated, illustrated by the children inside the planetarium. They used puppet shadow theatre, starlab drawn cylinders they made, overhead projector, ecc.





Again in the planetarium: the children try out the cylinders they designed



Exhibition of astronomical models, instruments and materials built by the children

Evaluation of activities with teachers

Analysis of the indicators (quantitative)

	No	Yes
Was this course your first training in Astronomy?	5	50

	Very much	Much	Not much	Not at all
Did the course subjects meet your expectations?	17	33	1	1

Questionnaire distributed to all the teachers of all the subjects at the end of the teachers training course	Very much	Enough	Not much	Not at all	% of “Much” answers
Do you agree with the pedagogical approach of this course?	34	20			63%
Was the course well presented?	40	12	1		93%
Have the materials given been useful?	19	34	1		35%
Had you got chances to be active?	6	42	6		11%
The learning contents were based on practice	13	33	5		25%
Did you learn something new?	26	29	1		46%
Was this course inspiring?	33	18	2		61%
Are you ready to start the activities with the children?	11	33	5	2	21%
Had there been enough time for questions?	15	30	2		31%

Altogether the course had a positive result, although numerous – even if a minority – of the teachers answered “Enough”.

Talking with the coordinating teachers, we realised that extending the course to all the teachers expert in the different curricular subjects could sometimes be an obstacle for reaching certain objectives.

This is why we decided to meet again only ten of the teachers, those of the school in Ronco Briantino (not only the 3rd classes) in order to deepen the different subject chosen by the children

Interviews to the teachers of the ten classes	Very much	Enough	Not much	Not at all	% of "Much" answers
Do you agree with the pedagogical approach?	9	1	0	0	90%
Was the course well presented?	8	2	0	0	80%
Have the materials given been useful?	9	1	0	0	90%
Had you got chances to be active?	8	2	0	0	80%
Were the learning contents based on practice?	10	0	0	0	100%
Did you learn something new?	10	0	0	0	100%
Was this course inspiring?	10	0	0	0	100%
Are you ready to start the activities with the children?	9	1	0	0	90%
Had there been enough time for questions?	9	1			90%

Qualitative analysis of the describers for teachers of the third classes of the school in Ronco Briantino

1. Were the teachers curious about the subjects dealt with? Did they research browsing books or the Internet? Did they write emails to the project's managers in order to ask for materials?

Teachers have always been active and with suggestions. They have prepared a booklet (available on the project website) and they have literally overwhelmed us with e-mails.

2. Did the teachers introduce in their curricular activities the themes and methodologies dealt with in the courses?

As already reported (see our conceptual map and appendix 4) the teachers have introduced the issues examined within their curricular practice. Also the socialization activities have remarkably been affected by the project. This is why the school party organised for Christmas and the one for the end of the school year both had got an astronomical background.

3. Did the educational practices related to Astronomy education change?

The school had never before been working with astronomy, limiting itself to merely offer a handful of astronomical geography concepts. We can therefore state with certainty that a marked change has occurred.

Evaluation of children's activity

Analysis of indicators (quantitative evaluation)

Questions to the children of the 3rd classes before starting the course (during conversations, they could answer or not and speak more than once)	Scientific and correct answer	Scientific but uncorrect answer	Not scientific answer	Answers Total	Percentage of scientific and correct answers
STARS: what are they? Birth, life and death	2	48	9	59	1,18%
UNIVERSE: what is it? Birth, life and death	5	12	8	25	1,25%
How is the sky seen in the different parts of the world? Is it the same anywhere? In case it changes how do you imagine it changes?	1	29	3	33	0,33%

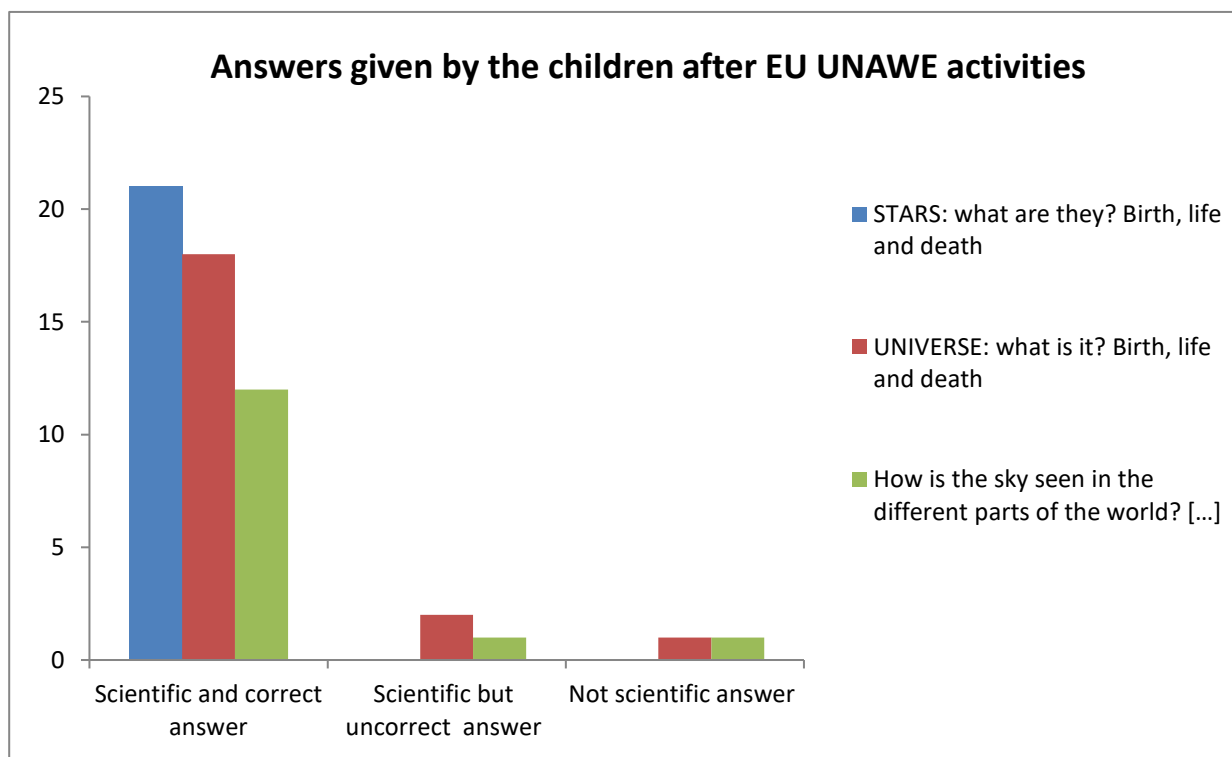
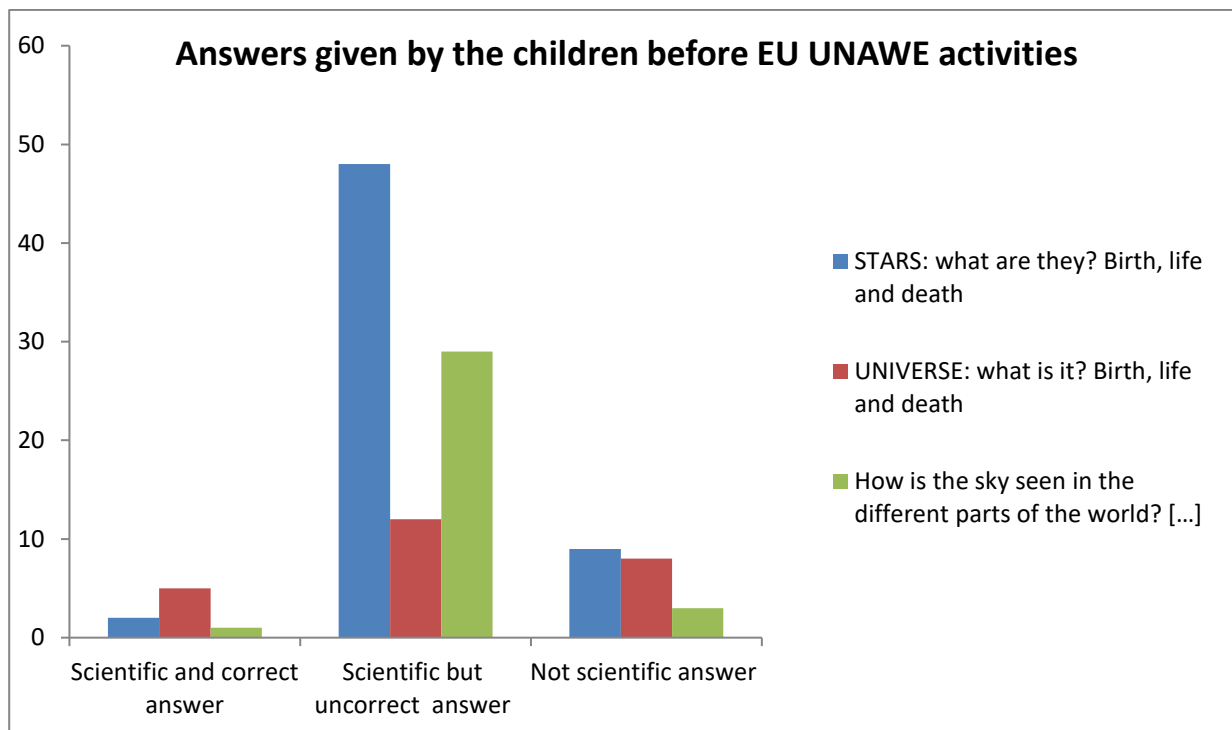
Questions to the children of the 3 rd classes at the END of the course (during conversations, they could answer or not and speak more than once)	Scientific and correct answer	Scientific but uncorrect answer	Not scientific answer	Answers Total	Percentage of scientific and correct answers
STARS: what are they? Birth, life and death	21	0	0	21	100%
UNIVERSE: what is it? Birth, life and death	18	2	1	21	85.7%
How is the sky seen in the different parts of the world? Is it the same anywhere? In case it changes how do you imagine it changes?	12	1	1	14	85.7%

SUMMARY TABLE OF THE INDICATORS

Scientific and correct answer before and after the EU UNAWA course	Percentage of the scientific and correct answer (before the activities)	Percentage of the scientific and correct answer (after the activities)	percentage of improvement
STARS: what are they? Birth, life and death	1,18%	100%	98,82%
UNIVERSE: what is it? Birth, life and death	1,25%	85.7%	86,45%
How is the sky seen in the different parts of the world? Is it the same anywhere? In case it changes how do you imagine it changes?	0,33%	85.7%	85,37%

In addition to the initial and final questionnaire during phase two the children have compiled two questionnaires (available in the appendix) made to test their knowledge in connection to planets and to the birth and development of stars.

The percentage of the correct answers has been 91.5% in the first case and 73% in the second one.



Moreover if we look at the words used by the children in the conversations about the origins of stars and universe, we can notice a great occurrence of terms such as “God” and “created, create, creation” when children were talking at the very beginning of the project; on the contrary when they were talking about the same themes, after the project – and also after the long term holidays had passed – at the beginning of the following school year we can notice a predominance of “scientific”

[illegible]

30

Analysis of the describers for the boys and girls of the third classes of the school in Ronco Briantino

1. Were children intrigued? Did they become curios? Did they ask questions? (UNAWE Domains of active learning: motivation)

The children have shown to be most curious. They have sent to us several e-mails regarding various astronomical issues⁶.



2. Did children produce materials related to the subjects treated? Do they invent stories? Draw stars? Do they make "Space games" or astronaut games? Did they ask adults to accompany them to observe the sky? (UNAWE domains of active learning: Scientific skills)

The children have autonomously created games about Space. During the Summer holidays one of the children has invented and written a "Space diary" based on a dialogue with an alien. They have kept inventing stories and explanations on different scientific issues. They have shown great enthusiasm towards the night at school, in particular because it would have allowed them the observation of the starry sky.

3. At the end of the project did the children's imaginative world and language changed? (UNAWE Domains of active learning: Scientific Skills)

The language and the imagination of the children have decidedly changed as verified by their conversations, reported in the appendix.

4. Did the children acquired a better awareness about the themes desalt with? (UNAWE Domains of active learning: Universe Knowledge)

Certainly, as it can be deduced by the just reported indicators

5. Are children curious about the intercultural themes of the project? (UNAWE Domains of active learning: Intercultural)

Boys and girls in the day before the night at school and in the period before the final party have studied and deepened the issues linked to the interculture showing curiosity and creativity, as easily deducible by the describers gathered.

⁶ Cfr. Appendix 3 "Children ask questions ... and the scientist answers"

Evaluation of the parents activities

The children's parents have participated in all the activities and in particular in those related to the preparation of the Christmas party and to the end of the year party, during which they have created a great number of games and experiments and suggested activities to boys and girls. For the final party the parents have prepared seven different sites with astronomical experiments and in order to do this they have made more than one meeting. Furthermore the parents have participated to all the evening events devoted to them.



The parents at one of the evening events organised by the school.

Evaluation of materials and resources

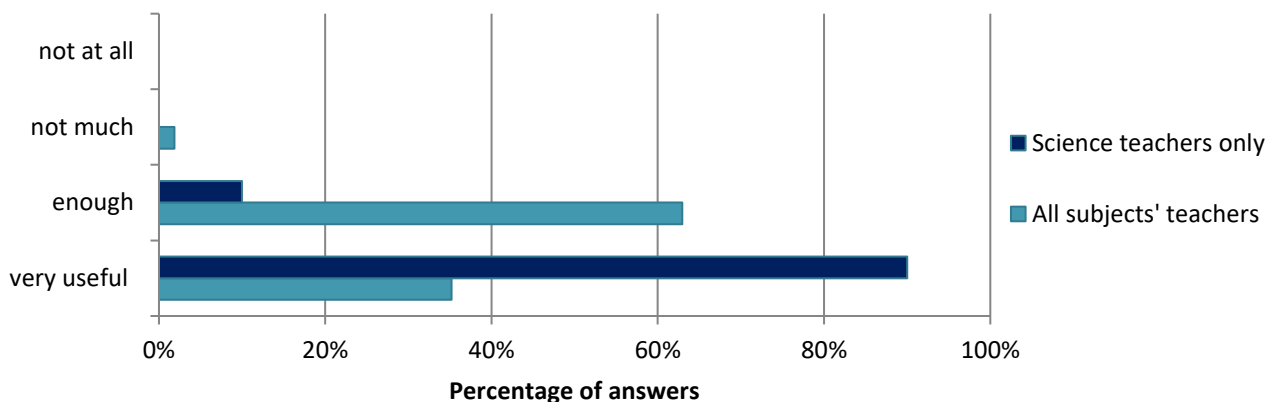
Question put during the training course followed by the teachers of all the subjects.

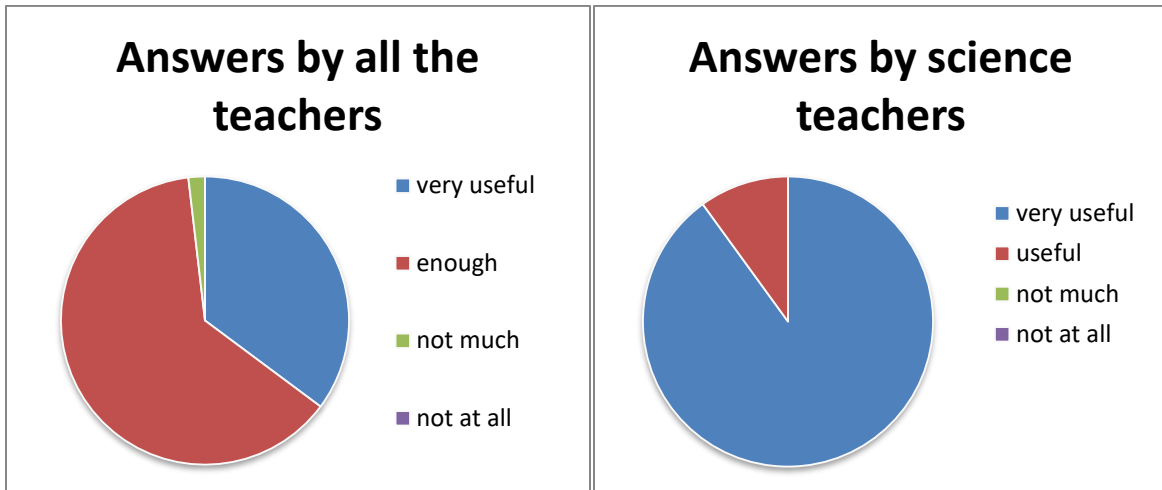
	Very much	Enough	Not much	Not at all	% very much
Have the materials given been useful?	19	34	1		35%

Domanda posta alle dieci insegnanti di area scientifica della scuola di ronco Briantino

Have the materials given been useful?	9	1	0	0	90%
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Have the given materials been useful??





From the analysis of this result it clearly appears that the material offered is more appropriate for the teachers of scientific subjects.

Unfortunately it has not been possible to us to test the “Universe in a Box”, the box for astronomy supplied to us by the project, since it arrived too late. Nevertheless some of the pieces of equipment and of the activities included in the box are analogous to the ones offered during the course (for instance the “Tube of the Constellations” to see or project the stars of the constellations)



Constellation tube activity

General evaluation of the Italian teachers training courses.

We hereafter report the results of the data analysis of the questionnaires given to the schools teachers that participated in our teachers training activities; we present data from the following training courses:

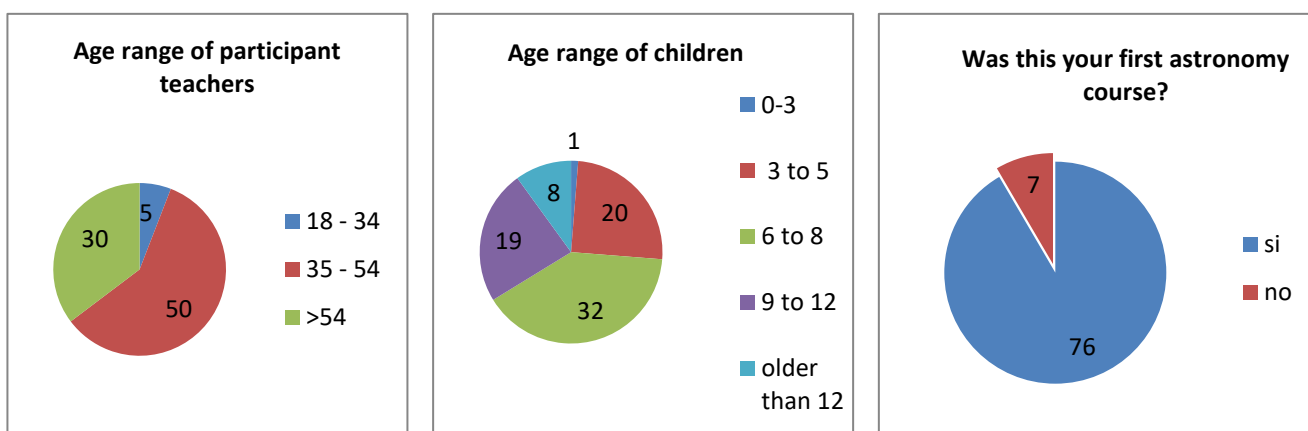
- Ronco Briantino
- Ferrara
- Zafferana Etnea
- Vittoria
- CEM

The questionnaires were structured so to allow data analysis and graphical representation. As explained above, in the project's first phase the questionnaires given were slightly different from those proposed and shared by the project's partners later on, and the majority of our courses went on before the final shared form was decided as UNAWE evaluation standards; some of the questions posed in the questionnaires were actually similar and related to the same content, but being them proposed in a different way, we thought it more rigorous to keep analysis separate.

Only the answers that could be quantitatively are here reported.

"Type 1 questionnaire" answers.

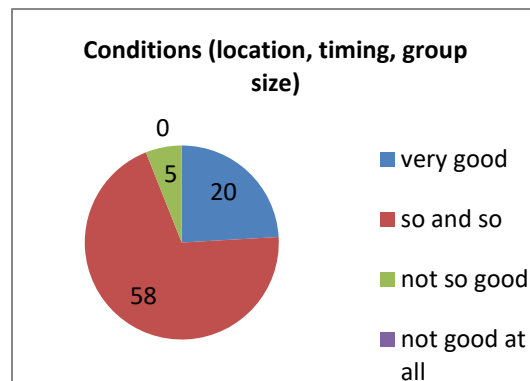
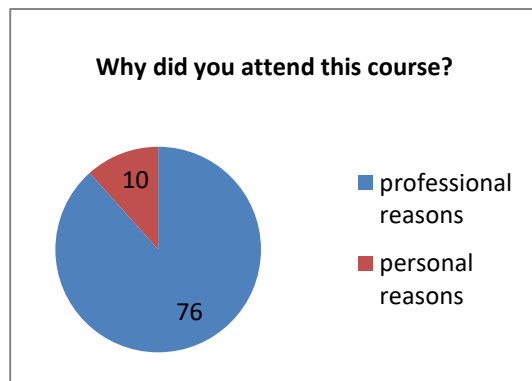
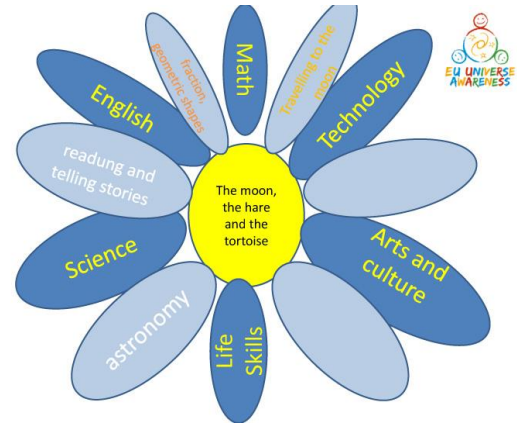
These are the questionnaires that were distributed in the first phase of the project, discussed and agreed with some of the partners, before the project's evaluation guidelines were definitely agreed on)



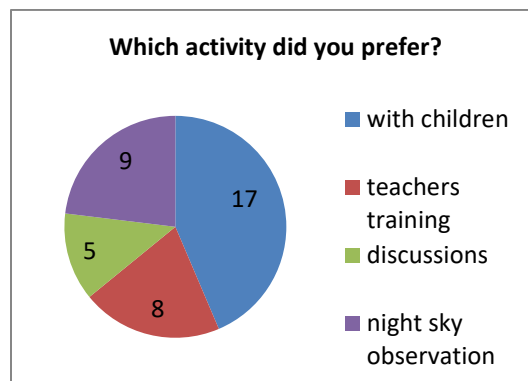
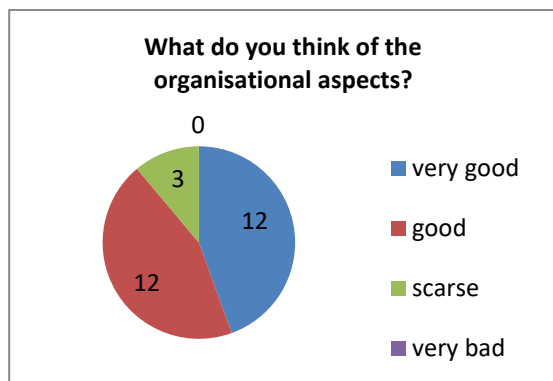
We can notice from the answer to the last question that in fact the EU UNAWE course was for many of the teachers their first occasion to deepen astronomical related themes. We must remember the in the Italian curricula astronomy actually represents a very marginal aspect. Nevertheless astronomy can enter in a transversal way the school programs.

Teachers enjoyed the courses right because we also discussed about interculture and links in between many disciplines. Here in the picture we report a work done during the EU UNAWE training course we

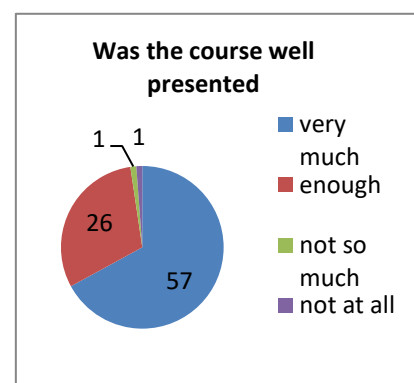
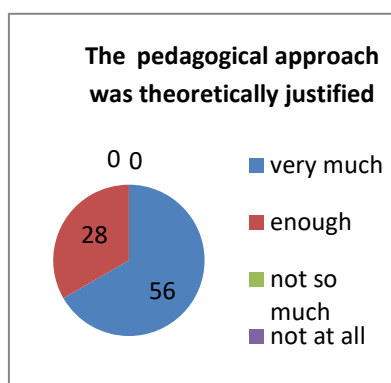
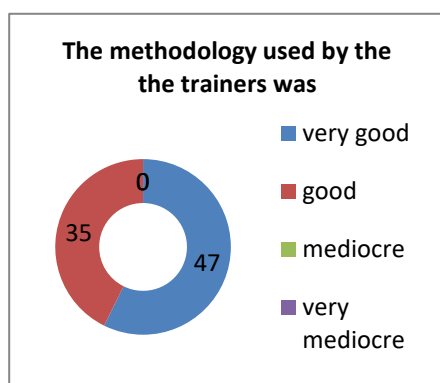
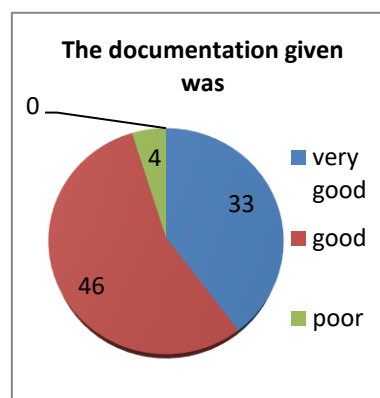
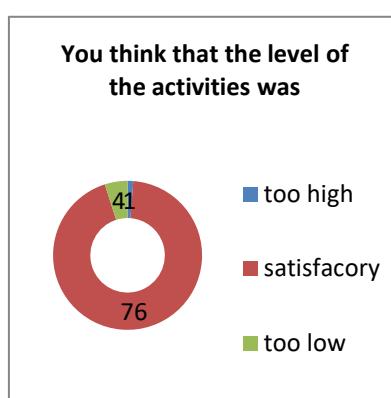
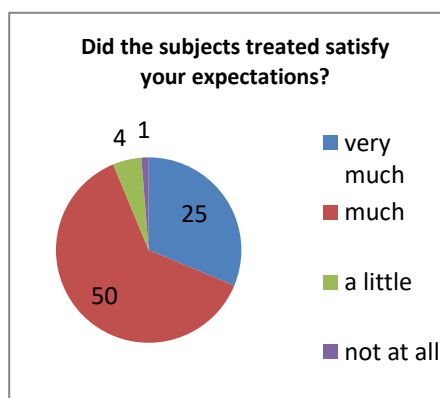
had at the SAAO Observatory together with the South African colleagues and teachers, which shows the high interdisciplinary character of Astronomy and also that the necessity of creating links between subjects is not only an Italian need. During the Skype Italy - South Africa connection we had during this course all the participants unanimously agreed on this point.

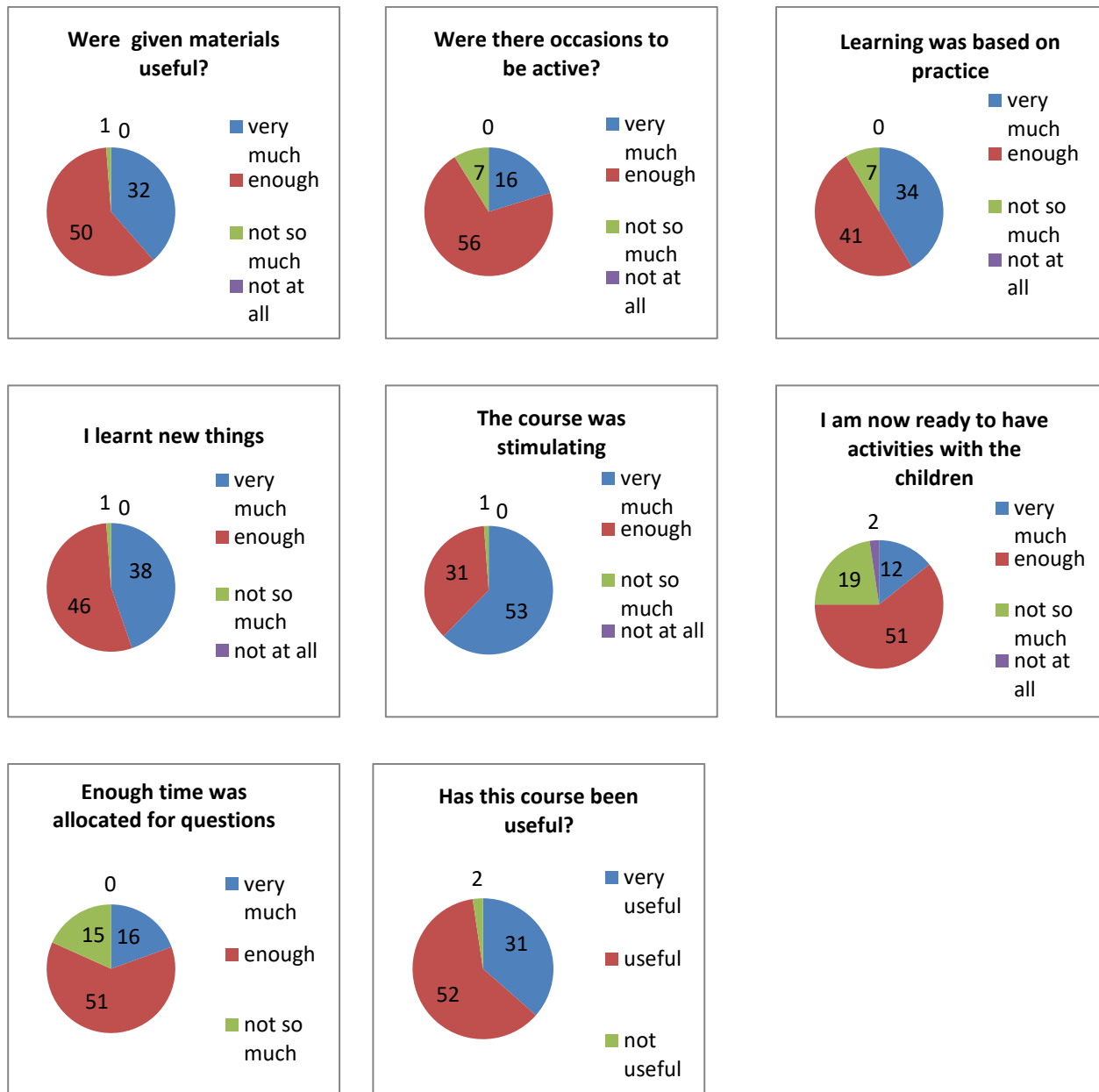


Comments and informal interviews with group of teachers highlighted a critical point related to the short time given to some courses: this obviously relates to the teachers that did not had the chance to have the activities in the classroom with the children by the UNAWE experts. In fact – since in the majority of cases this subjects were addressed by the teachers for the first time (see related graph above) – the teachers often expressed the need to have more follow-up meetings and hours dedicated to the diverse pedagogical and thematic deepening. In is not by chance that 20% of the absolutely positive answers ascribe to teachers that have seen the UNAWE experts participating in school activities with the children as a part of the training course. As a result of the evaluation of these questionnaires we foresee that in the future we will analyze before the course start-up if the teachers have or not experience in the field (of astronomy), and in case they don't, we plan to allocate time in order to carry out also direct activities with the students. This obviously requires even longer times that those dedicated to our courses, but the advantages are absolutely beneficial.



Activities with children in the classrooms were the occasion for the teachers to observe the application of what was discussed during the training . Once again there's a suggestion of the importance of not limiting ourselves to frontal - though highly - interactive courses, but to let the teachers experience directly in the classroom, involving them together with their children.

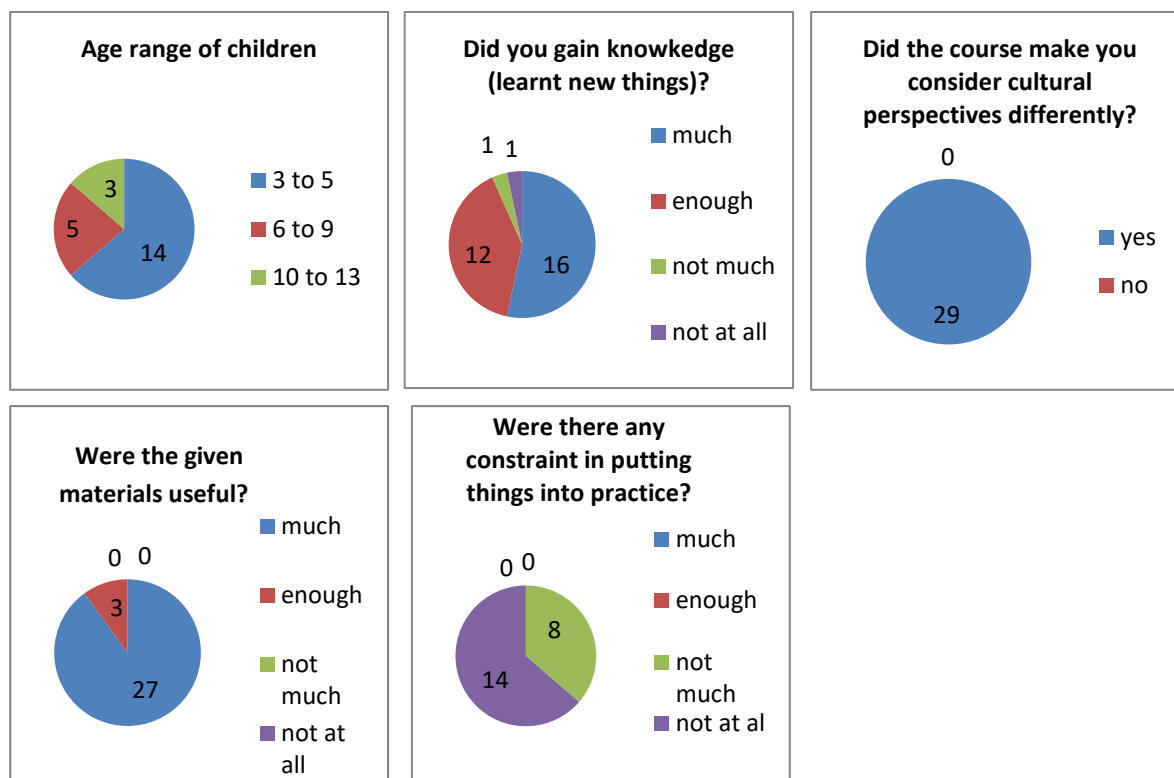




“Type 2 questionnaire” answers. (questionnaires given after February 2013)

We could not graph open questions, since they are not easily and unequivocally translatable into numbers. Anyhow, the indication that we inferred from these answers were the same as those from the type 1 questionnaires analysed before:

- Usefulness of the courses (medium-high)
- Need to associate activities with the teachers to activities in the classroom (high)
- First-time approach to Astronomy education (high)
- Importance of deepening themes related to interculture (high)



As a final comment, the analysis of the questionnaires given to the teachers has actually evidenced two main critical points:

- 1) The low attitude of many Italian teachers to use the web, associated to the low knowledge of English language, is responsible of the fact that almost none of the teachers filled in the on-line questionnaire form. Many of the teachers that attended our courses did not fill in the questionnaire at all, although being asked to do so. This is not actually an EU-UNAWE related problem, on the contrary it is a problem widely diffused in Italy. Moreover there's a privacy law that allow people not to sing and give personal data (such as age, name, qualification , ...) in questionnaires and the like.
- 2) A clear indication was given that the most effective courses were those that supported, along with the activities with the teachers, activities carried out directly with teachers and children at the schools.

The other indicators all show a high appreciation of the EU UNAWE courses that we carried out.

Appendix – Activity planned during the school year (Italian)

ASTRONOMIA:DAL BIG BANG ALLA FORMAZIONE DEL SISTEMA SOLARE

Argomenti affrontati

- 1) Nascita ed espansione dell'Universo**
- 2) Le costellazioni e le stelle**
- 3) La formazione del Sistema Solare**
- 4) Le forze dell'Universo**
- 5) La formazione delle Terra**

Successione degli argomenti, attività proposte e aree disciplinari coinvolte

1) Nascita ed espansione dell'Universo

Incipit:

- Conversazione collettiva su preconoscenze relative alle origini dell'universo (I perché del gambero)
- Seconda conversazione: tutto quello che vorremmo sapere sull'universo
- Individuazione fonti di informazione e decisione su come raccoglierle
- Intervista alle scienziate e lettura collettive loro risposte

Lingua italiana/educazione immagine

- Visione di video Genesis + comprensione contenuto con tecnica del testo bucato
- Realizzazione di quadri polimaterici individuali che ripercorrono le fasi dal big bang alla formazione del sistema solare
- Realizzazione di quadri polimaterici collettivi che ripercorrono le fasi dal big bang alla formazione del sistema solare
- Lettura dei miti cosmogonici + domande di comprensione testuale + rappresentazione grafica

Ricerca interdisciplinare (scientifica/geografica/storica)

- Esperimenti scientifici + schede di verbalizzazione degli esperimenti
 - Universo in espansione (teoria dell'espansione dell'universo)
 - Si formano i pianeti (per capire la formazione dei pianeti e la forza di aggregazione)

2) Le costellazioni e le stelle

Lingua italiana/educazione immagine

- Visione del film La stella di Laura: la dimensione fantastica del rapporto con le stelle
- Lettura di leggende sulla costellazione di Orione e sulla via lattea + domande di comprensione testuale + interpretazione e rappresentazione grafica delle stesse
- Lettura di poesie filastrocche sulle stesse e costellazioni
- Invenzione di metafore/similitudini/catene associative/acrostici/poesie sulle stelle e costellazioni

Musica

- Canzone Lo stelliere
- I suoni spaziali

Motoria

- Danza delle stelle
- Gioco motoria per comprendere come nascono le stelle
- Ricostruzione con il corpo delle costellazioni

Inglese

- Calendario dell'avvento stellare in inglese
- Stelle simmetriche con cartoncini e fili colorati (geometrix stars in inglese)

Ricerca interdisciplinare (scientifica/geografica/storica)

Dall'esperienza dello Starlab

- riproduzione grafica dello starlab con parole chiave di quanto visto/vissuto
 - scrittura testo individuale
 - brainstorming su quanto fatto nello starlab
 - discussione collettiva su tutto quanto scoperto nello starlab e conseguente relazione scientifica
-
- Esperimenti scientifici + schede di verbalizzazione degli esperimenti+ schede scientifiche di approfondimento (dall'esperienza alla scienza) + verifica: cielo si verifica
- Esperimento: Luce di stelle (come ci giunge la luce delle stelle)

- Approfondimenti scientifici con schede su:

-tipi di galassie

-stelle:nascita, vita, morte, magnitudo (apparente e assoluta) /anno luce/

-il sole

-le costellazioni

-la stella polare e l'orientamento

Produzione creative in collegamento al percorso scientifico

- Costellazioni con il coloredo
- Miniplanetario
- Biglietti augurali natalizi con soggetto stelle
- Addobbi natalizi incentrati sulle stelle e costellazioni: albero stellare e vetrate con le costellazioni
- Problemi matematici incentrati sulle costellazioni
- Percorso sui cieli nell'arte (da fare)
- Costruzione di oggetti per osservare il cielo: cannocchiali (Con Papetti)

3) La formazione del Sistema Solare

Lingua italiana/educazione immagine

- Visione di videoclip e animazioni anche in lingua inglese + raccolta informazioni sul sistema solare
- Lettura di poesie e filastrocche sui pianeti e rappresentazione grafica
- Narrazione storia fantastica inventata dalle insegnanti sull'incontro con Piccola stella e preparazione di un viaggio in pianeti di un'altra galassia
- Preparazione dei costumi da extraterrestri (collegamento carnevale)
- Viaggio nei 5 pianeti: narrazione collettiva del viaggio e descrizione dei pianeti raggiunti
- Lettura audiolibro Piccolo Principe + attività varie di comprensione del testo (da fare)
- Percorso teatrale sul viaggio immaginario su 5-6 pianeti diversi (da fare)

Ricerca interdisciplinare (scientifica/geografica/storica)

Esperimenti scientifici + schede di verbalizzazione degli esperimenti+ schede scientifiche di approfondimento (dall'esperienza alla scienza) + verifica: sistema solare

- Esperimenti:

-Si formano i pianeti (per capire la formazione dei pianeti e la forza di aggregazione)

-Mini sistema solare (modello in scala del sistema solare)

-Generatore di ellissi (per capire cos'è un'orbita dal punto di vista geometrico)

-I crateri della luna (da fare)

- Approfondimenti scientifici con schede su:

-gli elementi che compongono il sistema solare(sole/pianeti/satelliti naturali e artificiali/meteoriti/asteroidi/comete/ materia interstellare)

-differenza tra le stelle e i pianeti

-caratteristiche dei pianeti rocciosi e gassosi

-carta d'identità dei pianeti

-la luna: carta d'identità

Convegno di astronomia:

Consultazione a gruppi di diversi testi scientifici, scelta libera di argomenti da approfondire e preparazione a coppie per esposizione. Organizzazione di un vero e proprio Convegno di Astronomia: esposizione di quanto studiato. Riprese video

Produzione creative in collegamento al percorso scientifico

- flip book sulla luna
- Costruzione di un modellino di sistema solare (tipo mobile)
- Approfondimento in inglese del Sistema Solare con realizzazione di un pannello

Motoria

- Ricostruzione con il corpo del sistema solare

Musica

- I suoni spaziali
- Canzone ufo robot/extraterrestre/
- Canzone sui Pianeti (Galileo)

4) Le forze dell'Universo

Ricerca interdisciplinare (scientifica/geografica/storica)

Esperimenti scientifici + schede di verbalizzazione degli esperimenti+ schede scientifiche di approfondimento (dall'esperienza alla scienza) +

- Esperimenti:

-Con la centrifuga dell'insalata (forza centrifuga e centripeta)

-Balla sempre in coppia (centrifuga e centripeta)

-Asciugatrice rotante (centrifuga e centripeta)

-Gravity in action (forza di gravità)

-Acqua nel bicchiere (forza di gravità)

-Sfida tra monete (forza di gravità)

-La gravità ti butta giù (forza di gravità)

- Approfondimenti scientifici con schede su:

-Newton/Galileo: piccole biografie

-considerazioni sulla gravità

5) La formazione della Terra

Lingua italiana/educazione immagine

- Visione del film Fantasia + raccolta informazioni sul contenuto del filmato, suddivisione in sequenze e corrispondenza immagine/testo scritto
- Realizzazione di quadri polimaterici individuali che ripercorrono le fasi dalla nascita della Terra fino alla comparsa dei mammiferi
- Realizzazione di quadri polimaterici collettivi che ripercorrono le fasi le fasi dalla nascita della Terra fino alla comparsa dei mammiferi
- Lettura di miti cosmogonici sulla formazione della Terra + invenzione di miti cosmogonici