TALETE

Teaching mAths through innovative Learning approach and conTEnts

LIFELONG LEARNING PROGRAMME
COMENIUS

Coordinated by Università degli Studi "G.Marconi"

TALETE International Workshop

Science and maths: a new learning approach for pupils

This project has been funded with support from the European Commission. This communication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein

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Lifelong Learning Programme: COMENIUS
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Elaborated by (Name of the organization)	Università degli Studi Guglielmo Marconi
Conference Name	TALETE International Workshop: Science and maths: a new learning approach for pupils
Date	10th November 2011
Place	Rome
Type of Audience	School teachers, PhD students, Educational stakeholders
Size of Audience (n°)	+ 20

INDEX

Conference Objectives and Topics

The Università degli Studi "Guglielmo Marconi" organized an International workshop addressed to key actors interested in the application of innovative pedagogical methods in the maths teaching, especially in the geometry.
The event was organized in the framework of the COMENIUS project "TALETE – Teaching mAths through innovative LEarning approach and conTEnts" ref.code 518518-LLP-1-2011-1-IT-COMENIUS-CMP

Conference themes and structure

10th November 2011
14,00-17,30

Workshop

Science and maths: a new learning approach for pupils

14,00 Registration

14,15 Welcome and introduction to the Workshop
Mr Francesco Fedele, International Projects, R&D Office - Università degli Studi "Guglielmo Marconi" (IT)

14,30 Online Distance Education: the USGM experience
Ms Ilaria Mascitti, Head of International Projects, R&D Office - Università degli Studi "Guglielmo Marconi" (IT)

14,45 The mathematization and the assessment tools
Mrs Maria Zheleva, Burgas Free University

15,15 Educational environment in 3D virtual world
Mr Jonathan Himoff, Rezzable Productions Ltd

15,45 Coffee Break

16,15 Italian teenagers and Science education: problems and perspective
Mrs Maria Guida teacher and researcher - ANSAS (ex Indire) Florence.(IT)

16,45 School Networks and Community Building: Experiences from SPICE, Scientix and eTwinning Projects

Mr Premysl Velek, European Schoolnet

17,15 Conclusions

Mr Francesco Fedele, International Projects, R&D Office - Università degli Studi "Guglielmo Marconi" (IT)

17,30 End of the Workshop

The Experts

Mariya Monova-Zheleva Doctor of Informatics (1968), studied Informatics, in combination mainly with Mathematics at the Sofia University "Saint Kliment Ohridski", Faculty of Mathematics and Informatics and obtained her masters degree in Informatics (1991). Additionally she is certificated for secondary school teaching (Informatics, Mathematics).Since 1992 she is a lecturer at BFU. In 2001 she started her post-graduate work at the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences. The topic of her work is "Methods, models and algorithms for development of adaptive learning content for interactive learning environments". The dissertation was successfully defended in 2006. E-learning expert.

Jonathan Himoff is the CEO & Founder of Rezzable. He is an experienced IT engineering in 3D virtual world. He believes that web-based virtual world are the beginning of a very exciting direction toward the 3D Web, where a new type of interaction with information, content and people will be possible. The avatar will be the essential interface/guide/companion for this dynamic new environment.

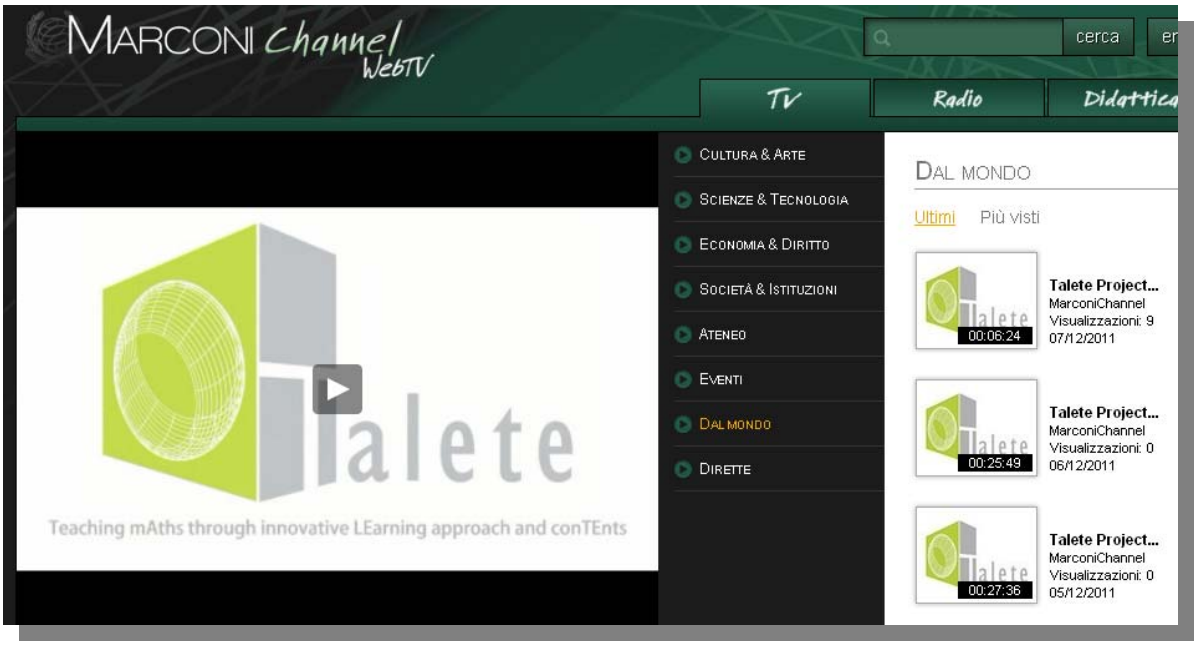
Prof. **Maria Guida** holds a degree in Mathematics, a Master in "tutor in online learning environments" from IUL (Italian University Consortium) and a post graduation course in "IWB for teaching and communication" (University of Florence, Italy). a post graduation course in "CLIL- Content and Language Integrated Learning" (Universiti Ca' Foscari,

Venice) After six years teaching Science in lower secondary schools in Naples and eighteen years teaching Mathematics and Physics in upper secondary school in Sorrento (Naples), she is now working at ANSAS (ex Indire) in Florence. Her main fields of interest are IBSE and other innovative practices in math and science teaching, especially with new technologies as well as teachers online collaboration in community of practice. Italian native speaker, she can communicate in English and Spanish. Maria has a ten year experience as teacher trainer in courses dealing with ICT. She was an eTwinning Ambassador and coordinator of three Comenius school partnerships on science topics. Now she is in the panel of Scientix and SPICE.

Premysl Velek works at *European Schoolnet (EUN)* as the Web Editor / Content Manager of the Scientix portal. His responsibilities include creating and editing the portal content, liaising with Scientix members and participating in Scientix dissemination activities. He is also involved in other EUN science education projects, namely SPICE. Before, Premysl worked as Communications Officer at the Academy of Sciences of the Czech Republic (2005-2008) and later at the European Science Foundation in Strasbourg, France (2008-2010). He was in charge of a range of communication and outreach tasks: from coordinating web development projects, managing online content and media relations to producing information materials and organizing public outreach events. He was also involved in several EU funded science communications projects (EC Framework Programmes, European Social Fund).

All the video presentations are available in the project web site in English and in all partner language (www.taleteproject.eu). The TALETE International workshop was broadcasted on the WEB TV Marconi Channel.

Moreover during the event the experts were interviewed and the video was published in the project web site and broadcasted on the WEB TV Marconi Channel.



TALETE presentation

We presented the TALETE project, the aims, the results and the products to be achieved.

Please, see the all the ppt presentations enclosed to this report.

Recorded presentation available at: www.taleteproject.eu and on the WEB TV Marconi Channel.

TALETE dissemination activities

During the conference the TALETE project brochures have been handed out and a stand was arranged with all information materials. A attendance certificate was delivered to all participants.

Annexes

1. **Workshop program/Invitation card**
2. **Project Abstract**
3. **PowerPoint presentations**

Teaching mAths through innovative LEarning approach and conTEnts

TALETE Workshop

Science and maths: a new learning approach for pupils

L'Università degli Studi "Guglielmo Marconi" organizza un workshop internazionale rivolto a tutti gli attori interessati all'applicazione di metodologie didattiche innovative nell'ambito dell'insegnamento delle materie scientifiche, in particolar modo della matematica.
L'evento è organizzato nell'ambito del progetto COMENIUS "TALETE – Teaching mAths through innovative LEarning approach and conTEnts".

L'evento si svolgerà interamente in lingua inglese data la partecipazione di ospiti stranieri.

Giovedì 10 Novembre 2011, ore 14,00 – 17,30

Università degli Studi "Guglielmo Marconi" - Aula Magna

Via Plinio, 44 ROMA

Conference Room

PROGRAMME

14.00 **Registration**

14.15 **Welcome and introduction to the Workshop**
Mr Francesco Fedele, International Projects, R&D Office - Università degli Studi "Guglielmo Marconi" (IT)

14.30 **Online Distance Education: the USGM experience**
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14.45 **The mathematization and the assessment tools**
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15.45 ***Coffee Break***

16.15 **Italian teenagers and Science education: problems and perspective**
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16.45 **School Networks and Community Building: Experiences from SPICE, Scientix and eTwinning Projects**
Mr Premysl Velek, European Schoolnet

17.15 **Conclusions**
Mr Francesco Fedele, International Projects, R&D Office - Università degli Studi "Guglielmo Marconi" (IT)

17.30 **End of the Workshop**

Contatti
La partecipazione è gratuita previa iscrizione al seguente indirizzo e-mail:
m.tramonti@unimarconi.it - d.dimarco@unimarconi.it
Tel. 06/ 377 255 11

Università degli Studi Guglielmo Marconi

Education and Culture DG
Lifelong Learning Programme

Il presente progetto è finanziato con il sostegno della Commissione Europea. L'autore è il solo responsabile di questa pubblicazione (comunicazione) e la Commissione declina ogni responsabilità sull'uso che potrà essere fatto delle informazioni in essa contenute.

UNIVERSITÀ DEGLI STUDI GUGLIELMO MARCONI

COMENIUS - Multilateral projects

Sintesi

<u>Titolo:</u> TALETE - Teaching mAths through innovative LEarning approach and conTEnts

Il mondo del lavoro globalizzato richiede il possesso di solide competenze di base. Insegnare e apprendere queste competenze richiede spesso l'adozione di strategie di sostegno nelle scuole e avere una visione olistica dell'apprendimento degli studenti, il loro sviluppo personale e sociale. I Ministri dell'Istruzione e gli attori chiave dell'educazione pongono molta attenzione alle competenze matematiche e alla loro valutazione specialmente negli esami nazionali al termine dell'obbligo scolastico.

Il progetto mira a:

- identificare e sviluppare un metodo di insegnamento e apprendimento nel campo della disciplina di Matematica con un focus sulla geometria attraverso il mondo virtuale in 3D al fine di supportare lo sviluppo di diverse competenze (alfabetizzazione matematica, imparare ad imparare, competenze sociali e civiche, comunicazione in un'altra lingua l'Inglese);
- sviluppare strumenti pedagogici attraverso contenuti interessanti e divertenti per gli studenti. Saranno rappresentati in un differente modo dalla maggior parte degli esercizi e problemi che si trovano di solito nei libri di testo. E' importante abituare gli studenti ad usare / utilizzare le conoscenze acquisite anche attraverso lezioni meno strutturate.

Il progetto è indirizzato a due diversi target group:

- gli insegnanti, che avranno l'opportunità, nel rispetto dei curricula nazionali delle materie scientifiche, di sperimentare metodi didattici utilizzando le nuove tecnologie in 3D
- gli studenti di 14/15 anni, che avranno l'opportunità di migliorare le conoscenze di base della matematica, ed in particolare della geometria, attraverso l'uso di materiale didattico innovativo.

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Codice Fiscale e Partita IVA: 07154361005

UNIVERSITÀ DEGLI STUDI GUGLIELMO MARCONI

Il Partenariato

IT – Università degli Studi “Guglielmo Marconi”
GR - University of Thessaly
TK - Kadikoy Ilçe Milli Egitim Müdürlügü (Provincial Directorate of Education of the biggest county of Istanbul – Kadıkoy)
IT – IAL Istituto per la Formazione Professionale di Roma e del Lazio
BG – Burgas Free University
UK - REZZABLE Ltd

Data inizio attività: 01 Novembre 2011

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Learning in Virtual Worlds:
AVATAR, ST.ART and EUROVERSITY
European projects

Daniela Di Marco
Project Manager

Cristina Stefanelli
Project Manager

OVERVIEW

- ✓ Virtual worlds
- ✓ Virtual learning
- ✓ AVATAR project
- ✓ ST.ART project
- ✓ What's next?

VIRTUAL WORLDS

Definitions:

- Virtual world
  A 3D virtual environment where users can interact, use and create objects.
- Avatar
  The graphic representation of a user in the virtual world.
- Communication media
  text, graphical icons, visual gesture and sound.

VIRTUAL LEARNING

- It overcomes the limitations of a traditional classroom setting
- It is a real-world simulation and allows role playing
- Ideal for collaborative learning, role playing, serious gaming and learning by doing
- It's engaging! Students find it more attractive: learning process more effective

The AVATAR project

PROJECT	**AVATAR - Added Value of teAching in a virTuAl woRld**
PROGRAMME	Lifelong Learning Programme Subprogramme Comenius
DURATION	24 months (1 December 2009 – 30 November 2011)
AIM	Teach secondary school teachers to use virtual worlds in education through an **on-line pilot course** and **virtual laboratories**.

Partners

For.Com. Formazione per la Comunicazione
Italy - www.forcom.it

Information Design FH JOANNEUM University of Applied Sciences
Austria - www.fh-joanneum.at

Universidad Nacional de Educación a Distancia
Spain - www.uned.es

University of Southern Denmark
Denmark- www.sdu.dk

Burgas Free University
Bulgaria - www.bfu.bg

University of Hertfordshire
UK - www.herts.ac.uk

SOPH.ia In Action Consulting
Italy - www.sophiaconsulting.eu

Cross-Cooperation

ST.ART	ST.ART STreet ARTists in a virtual space" Comenius project LLP Comenius	Exchange of best practices and lessons learnt
avalon	AVALON Access to Virtual and Action Learning live Online LLP KA3	Support with the estate in SL AVATAR invited keynote speakers for the in-world seminars
	NIFLAR Networked Interaction in Foreign Language Acquisition and Research LLP	Support with the estate in SL
muvenation	MUVENATION LLP Comenius	Transferibility to differtent target groups

Cross-Cooperation

AVC@SL	AVC@SL the Anti-Violence-Campus at Second Life	Exchange of lesson learnt for the organisation and promotion of virtual seminars
	ReDNet EU Health Programme	Guest speakers
next tell	NEXT-TELL FP7 for R&D ICT	Sustainability issue
	LLP Leonardo da Vinci	Participation to their project conference
VirtualLife	7th FWP - Action Line: ICT-2007.1.5	Participation to their project conference

Evidencies

Jens Kjaer Olsen
Teacher in English, Multimedia and ICT at a 10th grade school in Denmark.

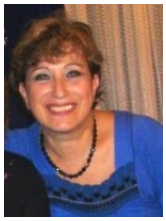
"Virtual worlds add an international dimension to language teaching"

Evidencies

Claudia Malta
Teacher in Italian Literature and History, Mercurio Technical School "Giuseppe Ginanni", Ravenna, Italy

"Competences acquired with the AVATAR experience may be transferred to many different contexts"

Evidencies



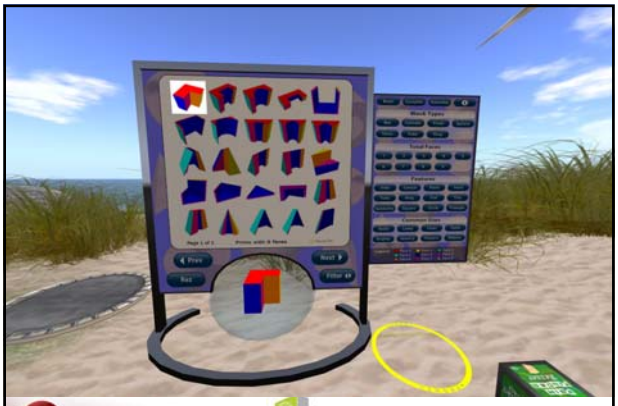
Yanka Shurelova
Teacher in Informatics and Physics, Secondary Vocational School of Mechanics and Electronics, Burgas (BG)

"Students can learn through exploration, building and collaboration. They can travel through time and space"

Evidencies

Susanne Kiesling
Teacher in Mathemetic, BG, BRG und Wiku BRG für Berufstätige, Graz (AT)

"There are many useful resources to use in-world and to create you learning scenarios"



ST.ART PROJECT

"STreet ARTists in a virtual space"

PROJECT	**ST.ART - STreet ARTists in a virtual space**
PROGRAMME	Lifelong Learning Programme Sub-programme Comenius – Multilateral Projects
PERIOD	24 months (1 December 2009 - 30 November 2011)

ST.ART PROJECT

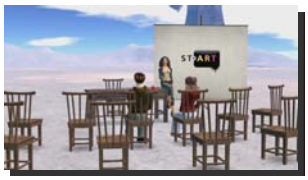
"STreet ARTists in a virtual space"

Programme: LLP COMENIUS Multilateral projects
December 2009 - November 2011
Project Prime Contractor: USGM (IT)

ST.ART PROJECT
Target group

• Secondary schools students: students aged 16 to 18 in secondary schools (mostly art schools).

• Secondary schools teachers: Art teachers, ICT teachers, English as foreign language teachers in secondary schools (mostly art schools).



ST.ART: OBJECTIVES

The main aim of ST.ART project is to have students in secondary school:
1.better know street art, its origins, roots and latest developments

ST.ART: OBJECTIVES

2. understand that the street art forms could be a tool for the qualification of urban environment;

ST.ART: OBJECTIVES

3. develop transversal competences and increase their awareness as European citizens.

ST.ART: THE COURSE

Course duration: 6 Months December 2010 – May 2011

TEACHERS

IN PRESENCE SEMINAR

WIEN 13/14 DECEMBER
•Training path;
•Use of new technologies in education;
•Teachers' role during the experimentation phase.

TEACHERS/STUDENTS (20 / 177)

E-LEARNING

Training area:
49 h e-learning course on:
•Aesthetics and creativity;
•Entrepreneurship;
•Digital competences in web 2.0 and Open sim

OPEN SIM

Social area:
•Upload photos;
•Discussion mentor-student

Virtual city:
• 45 h to develop a project art work

ST.ART - THE VIRTUAL CITY

Metropolis

ST.ART - THE VIRTUAL CITY

Metropolis

ST.ART - THE VIRTUAL CITY

Metropolis

WHAT'S NEXT ?

The Euroversity network

PROJECT	**EuroV**
PROGRAMME	Lifelong Learning Programme KA3 (ICT) Multilateral networks
DURATION	3 years – expected start date: 1 Dec 2011
COORDINATOR	University of Hull, UK
PARTNERS	19 partners (from Austria, France, Germany, Sweden, Norway, Cyprus, Portugal, Spain, UK, Netherlands, Italy, Israel)
AIM	Facilitate the transfer of core knowledge in teaching and learning in VWs to new contexts; provide a framework for the creation of a pan-European virtual-world university

Join the Euroversity network!

Online community:

http://euroversity.ning.com

Thanks!

Daniela Di Marco
d.dimarco@unimarconi.it

Cristina Stefanelli
c.stefanelli@forcom.it

AVATAR website: www.avatarproject.eu

AVATAR Island: http://maps.secondlife.com/secondlife/AVATAR Project Island2/43/233/30

ST.ART website: www.startproject.eu

MATHEMATIZATION AND THE ASSESSMENT TOOLS

Ms Mariya Zheleva, Burgas Free University, Bulgaria

TALETE Workshop, 10 November 2011, Rome

SOME MAIN CONSIDERATIONS

- Students can not learn in school everything they will need to know in adult life
- What the students must acquire is the prerequisites for successful learning in the future
- Students must be able to organise and regulate their own learning
- Students must be able to learn independently and in groups, and to overcome difficulties in the learning process

MAIN QUESTIONS

- Are students well prepared for future challenges?
- Can they analyse, reason and communicate effectively?
- Do they have the capacity to continue learning throughout life?

THE ANSWERS WILL HELP

- To improve teaching methods through innovative pedagogical tools integrating theory and practice and favoring approaching to school subjects (in particular maths, geometry)

HOW TO ASSESS THESE ASPECTS

- Two projects (instruments), providing information to assist policymakers, researchers and the public obtain a comprehensive picture of how students perform in key subject areas:
  - Trends in International Mathematics and Science Study /TIMSS/
  - Program for International Student Assessment /PISA/

WHY TIMSS AND PISA?

TIMSS and PISA are complementary instruments developed of international group of experts attempted to assess different features of student learning

- TIMSS sought to find 'what students know'
- PISA sought to find 'what students can do with their knowledge'

TIMSS – source of data

TIMSS gathered data from:

- samples of the student population at three levels (middle primary, lower secondary, final year secondary)
- the teachers of these students
- the schools and systems.

WHAT TIMSS DATA RELATED TO?

The data gathered in the TIMSS related to:

- the intended curriculum (the curriculum specified by the system or other body)
- the implemented curriculum (the curriculum as taught by teachers, the nature of actual classrooms)
- the attained curriculum (what students have learned).

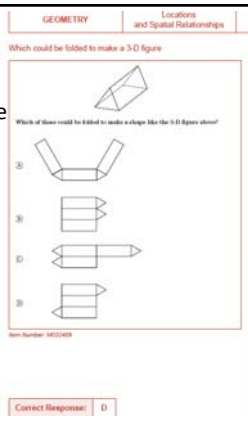
TIMSS FRAMEWORK DIMENSIONS

- *Content dimension* which indicated the proportions of test questions required for each of the areas of science:
  - Life science
  - Earth science
  - Chemistry
  - Physics
  - Environmental, etc.

TIMSS FRAMEWORK DIMENSIONS

- *Performance expectations dimension* for what was likely to be involved in answering the items
  - Understanding simple information
  - Understanding complex information
  - Theorizing, analysing, solving problems
  - Using tools, routine & science processes
  - Investigating the natural world

TIMSS Sample Question



PISA

- PISA is concerned with how well 15 year old students can make use of science knowledge acquired from school and from other sources, in situations in everyday life that involve science and technology.

Because of the emphasis on scientific literacy and "preparation for life", the beginning point for the science testing is quite different to TIMSS.

MATHEMATICAL LYTERACY- PISA DEFINITION

- After consideration by the science expert group, the following definition of mathematical literacy was adopted by PISA for its testing.

"Mathematical literacy is an individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgements and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen."

PISA DEFINITION ASPECTS

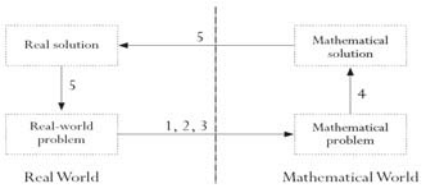
This definition comprises three aspects:

- *scientific processes* (recognising questions, identifying evidence, drawing conclusions, etc. - that is knowledge about how scientific investigations are done),
- *scientific concepts* (with a very strong emphasis on being able to use concepts, as described above), and
- *situations* or *contexts* in the world for which science is a key component.

PISA - MATHEMATICAL CONTENT

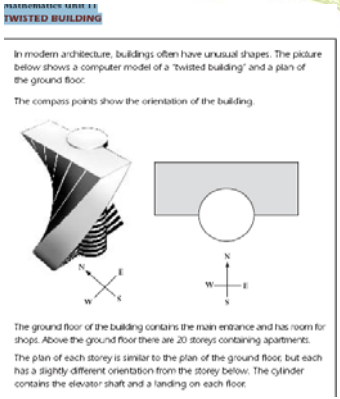
The mathematical content is defined mainly in terms of four "overreaching ideas" (quantity, space and shape, change and relationships, and uncertainty) and only secondarily in relation to "curriculum standards" such as numbers, algebra and geometry.

MATHEMATISATION CYCLE



1. Starting with a problem situated in reality
2. Organising in according to mathematical concepts
3. Taking into account the mathematical features of the situation and transforming real-life problem into mathematical problem
4. Solving the mathematical problem
5. Making sense of the mathematical solution in terms of the real situation, including the identifying the limitations of the situation

PISA
Example


TWISTED BUILDING

In modern architecture, buildings often have unusual shapes. The picture below shows a computer model of a 'twisted building' and a plan of the ground floor.

The compass points show the orientation of the building.

The ground floor of the building contains the main entrance and has room for shops. Above the ground floor there are 20 storeys containing apartments.

The plan of each storey is similar to the plan of the ground floor, but each has a slightly different orientation from the storey below. The cylinder contains the elevator shaft and a landing on each floor.

Mathematics Example 11.2

The following pictures are sideviews of the twisted building.

Sideview 1 Sideview 2

From which direction has Sideview 1 been drawn?

A. From the North.
B. From the West.
C. From the East.
D. From the South.

Scoring and comments on Mathematics Example 11.2

Full Credit
Code 1: Response C: From the East.

No Credit
Code 0: Other responses.

Item type: Multiple-choice
Competency cluster: Connections
Overarching idea: Space and shape
Situation: Public

The second example asks students to mentally compare different visual representations of a building, and to choose from options that could describe the relationship between those representations. The spatial reasoning involved places the item in the *connections* cluster.

This item was considerably easier than the first one, but showed poor measurement properties in a number of participating countries. It may be that the quality of the graphic used in the field trial version was inadequate for the high visual demands of the item.

TALETE Prototype

- Design and development of the prototype in 3D environment
  - Provision of innovative pedagogical tools and learning scenarious to be used by teachers
  - Delivery of the tools through 'serious game' methodology

TALETE Training Path

- Training path is structured in:
  - Educational pills delivered by e-course to teachers
  - Pedagogical tools delivered to students by 3D

Technological Educational Model

- E-learning platform - open source LMS hosting LO, individual study and collaboration tools, social areas (addressed to teachers);
- 3D virtual world – attractive pedagogical tools and social areas addressed to the students
- Methodology for combining these two virtual learning environments in an innovative didactic way.

Thank you for listening!

mariya@zhelev.com

Burgas Free University, Bulgaria

ITALIAN TEENAGERS AND SCIENCE EDUCATION. PROBLEMS AND PERSPECTIVES

Maria Guida – ANSAS ex Indire - Italy

Questions:

- How do many students feel the school is boring?
- Why should a fifteen year old student study science?
- Since students' world is made of football or fashion (depending on the gender) and also smartphone, facebook, social exchanges and games… what's the matter with science?
- How to get students through the tedium for something they feel not to be a part of their reality?

Task

- We should promote a virtuous cycle that leads students from boredom to curiosity then to discovery and therefore to joy of discovery.

How to do this?

Relying on inquiry which can be the most appealing part of science for students of every age.

And students' imagination permits them to carry out abstract processes.

A new methodology for teaching

- Inquiry
- Competences
- How science works
- New tecnologies

How science works

Understanding how science knowledge is acquired and even questioned and reformulated is the basis of critical thought and rational attitude

"making science" instead of "giving lessons"

This understanding is not easily obtained with a transmissive teaching method but it's easier by making pupils solving problems instead, according to the method of science investigation.

The starter problem/scenario

- might be real or authentic
- useful to stimulate students to new knowledge achievements.
- Starting from real life promotes the integration of knowledge from different science subjects.
- This facilitates student's understanding the world in a perspective of system complexity.

Starter problem for students

- Relevant = close to their reality
- Important = for their future and environment

Cross-curricular topics

- water, climate, waste …..

- Students find links
- Students to acquire a global perspective
- Complexity of the natural world

How to organize students work?

Activities may be made partly individually, partly in class and partly in small groups, the latter being the preferred mode for discussion and activities for those practices to be performed in the laboratory or in nature.

But the problem is not only student's engagement….

On the other hand, according to the diagnostic model OECD PISA, our students show a deficit in learning science that sets them apart in comparison with other countries.

This deficit results in little interest in school and specific choices in the transition to the university.

PISA (Programme for International Student Assessment) OECD (Organization for Economic Cooperation and Development)

- the project is conducting an investigation through international procedures such as standardized survey of schooled fifteen year olds.
- PISA assesses literacy in reading, mathematical literacy and scientific literacy of students, focusing on the mastery of processes, understanding of the concepts and ability to apply them in different situations.

Pisa assessment

- The survey was organized in three-year cycles and there is already a schedule that extends it until 2015. PISA 2009 was attended by 61 countries.
- PISA scientific literacy (2007) has 4 interconnected issues:
  - **the context,**
  - **the knowledge**,
  - **the skills**,
  - **the attitudes.**

The implicit questions

underlining the project are the following:

- What is important for a citizen to know,
- what is valuable to a citizen,
- what is one able to do in situations that require the use of science and technology or are in some way determined by them?

The answer to this questions

given by the experts, can be found in OECD

key competencies

that define science literacy in PISA 2006.

They focus on three areas:

- to identify science problems;
- to give a scientific explanation of phenomena;
- to use proof based on scientific evidence

As part of PISA 2006, scientific literacy of an individual means:

- **all of his scientific expertise and use of this knowledge** to identify scientific questions, to acquire new knowledge, to explain scientific phenomena and draw conclusions based on facts about scientific matters;
- **his understanding of the distinctive features of science** as a form of knowledge and investigation of human beings;
- **his awareness of how science and technology influence** our material environment, intellectual and cultural life;
- **his willingness to afford issues and problems** related to science, as well as the ideas of science, as a citizen that reflects

Gender issues

- More innovative curricula and ways of organising the teaching of science that address the issue of low student motivation are required.
- In particular, a physical science curriculum that specifically focuses on developing an understanding of science in contexts that are known to interest girls should be developed.

Gender issues

In fact in every country females, on average, reach higher levels of performance in reading literacy than males, while for maths and science is the opposite

image from telegraph.co.uk

Nature or culture?

- Whatever the variations, the data suggest that the current differences are not the inevitable outcomes of differences between young males and females in learning styles.
- These gaps can be closed.
- Some countries do appear to provide a learning environment that benefits both genders equally, either as a direct result of educational efforts or because of a more favorable societal context.

girls and boys have different interests and curiosities: (from the Nuffield Foundation report)

girls	boys
Why we dream when we are sleeping and what the dreams might mean	*Explosive chemicals*
Cancer – what we know and how we can treat it	*How it feels to be weightless in space*
How to perform first aid and use basic medical equipment;	*How the atom bomb functions;*
How to exercise the body to keep fit and strong;	*Biological and chemical weapons and what they do to the human body;*
Sexually transmitted diseases and how to be protected against them	*Black holes, supernovae and other spectacular objects in outer space.*

Among the reasons of the learning deficit, the following can be identified:

- teaching methods,
- use of a limited range of teaching tools,
- limited and poor availability of space and resources.

Teaching methods: IBSE(Inquiry-Based Science Education)

- 2007 "Rocard report", "Science Education NOW: a Renewed Pedagogy for the Future of Europe".
- In this document the adoption of a particular educational approach, called IBSE is recommend.
- the report states that the method "IBSE was effective both in primary and secondary school in increasing interest and learning levels of children and students, while stimulating the motivation of teachers."

Teaching methods: IBSE(Inquiry-Based Science Education)

- This approach gives more space to the observation, experimentation and autonomous construction of knowledge, although in a process guided by the teacher.
  In this approach, what is meant by the word **"inquiry"** is the conscious process of identification of problems, criticism of the experiments, distinction between alternatives, formulation of conjectures, modeling, peer discussion and construction of coherent arguments.

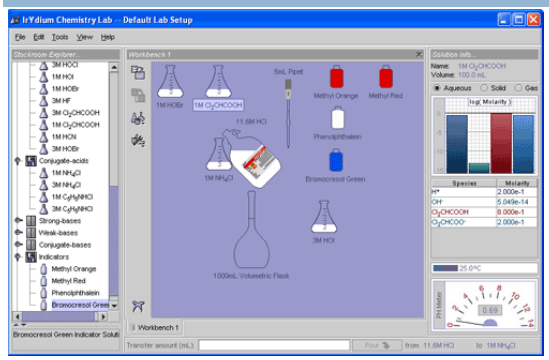
Teaching methods: IBSE(Inquiry-Based Science Education)

- The IBSE is effective with all types of students, with the weakest and most able to fully satisfy the need for enhancement of excellence. Moreover, IBSE promotes interest and participation of female students in science. Finally, IBSE and traditional approaches, the deductive, not mutually exclusive, rather both should be used in science classes to meet the different learning styles and characteristics of students in each school level.

The role of technology

The Internet is becoming a social place for training and for communities of practice (in our case of teachers), it is no longer just a digital library to search for and download information (Donovan 2007).

Virtual laboratories support, never replace, the real laboratory



Scaffolding students

- Recent studies have shown that through “learning by discovery” students alone are not able to "rediscover" the science, on the other hand, rigidly structured activities don’t stimulate critical thinking and learning.
- What makes the difference, then, is the “scaffolding" , the infrastructure to support the activity that the teacher organizes to help students to build a mental image of concepts.
- Two important aspects appear to be the opportunity to show the invisible (for example, the representation of the magnetic field by displaying the lines of force) and the use of analogy as a cognitive device that extends the zone of proximal development (Vygotsky's words).

IWB

- digital resources available in the classrooms
- Integration in everyday teaching.
- IWB is intuitive and “recognizable“ similar to slate blackboard
- encourages a first approach to technology.

IWB

The IWB is not a disruptive innovation to the organization of the learning environment but a technology that allows teachers to become familiar with multimedia in everyday teaching.

IBSE founds in the IWB an ally

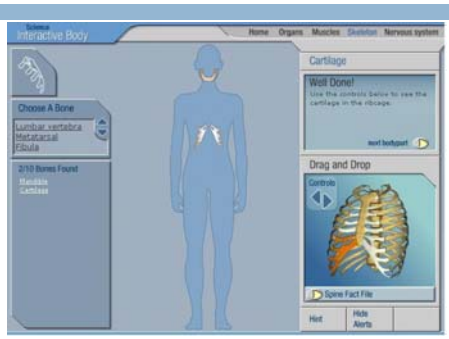
a place, like a table, where to share the conscious process of identifying problems, criticize experiments, make distinction among alternatives, formulation of conjectures

construction of models, peer discussion and construction of consistent arguments.

interaction between technology and science teaching

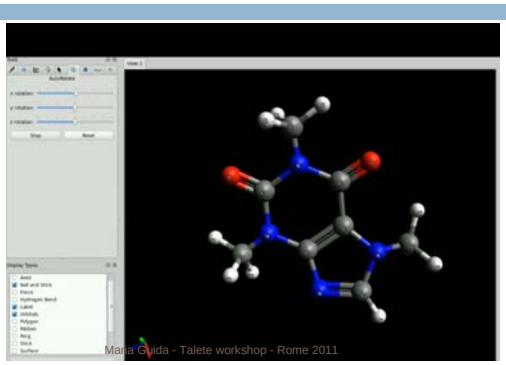
- a technical level - tools
- a cognitive / heuristic level - virtual lab
- a pedagogical level – digital convergence

Interactive body



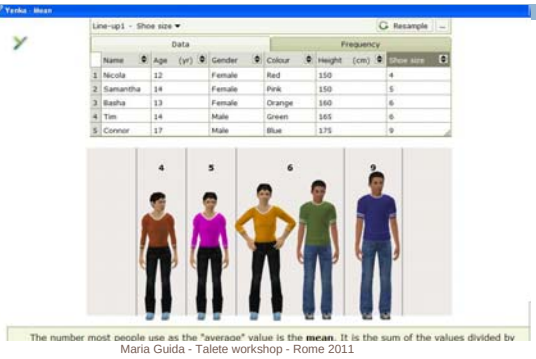
Aquaring

3D molecule builder

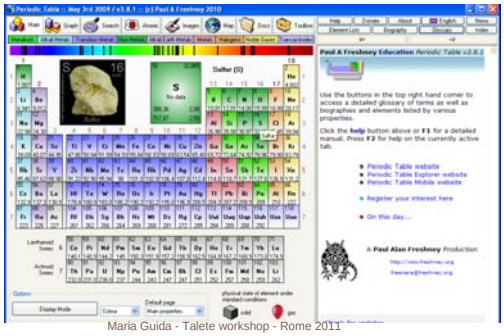


Cells alive!

Interactive statistics



Interactive periodic table



Interactive physics simulation

Earth science interactive lessons

Ubiquitous learnig/mobile learning

Ubiquitous learnig/mobile learning

- The new emphasis in education is on supporting the learner, in collaboration with peers and teachers, through a lifetime education, both within and outside the classroom.
- Personal mobile technology is a powerful tool in many contexts over long period of time.
- Students can observe natural phenomena in situation, performe real measures, search for information on the internet, use apps, take notes….

3D virtual worlds

Thanks!!

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Making Digital Education Games Fun

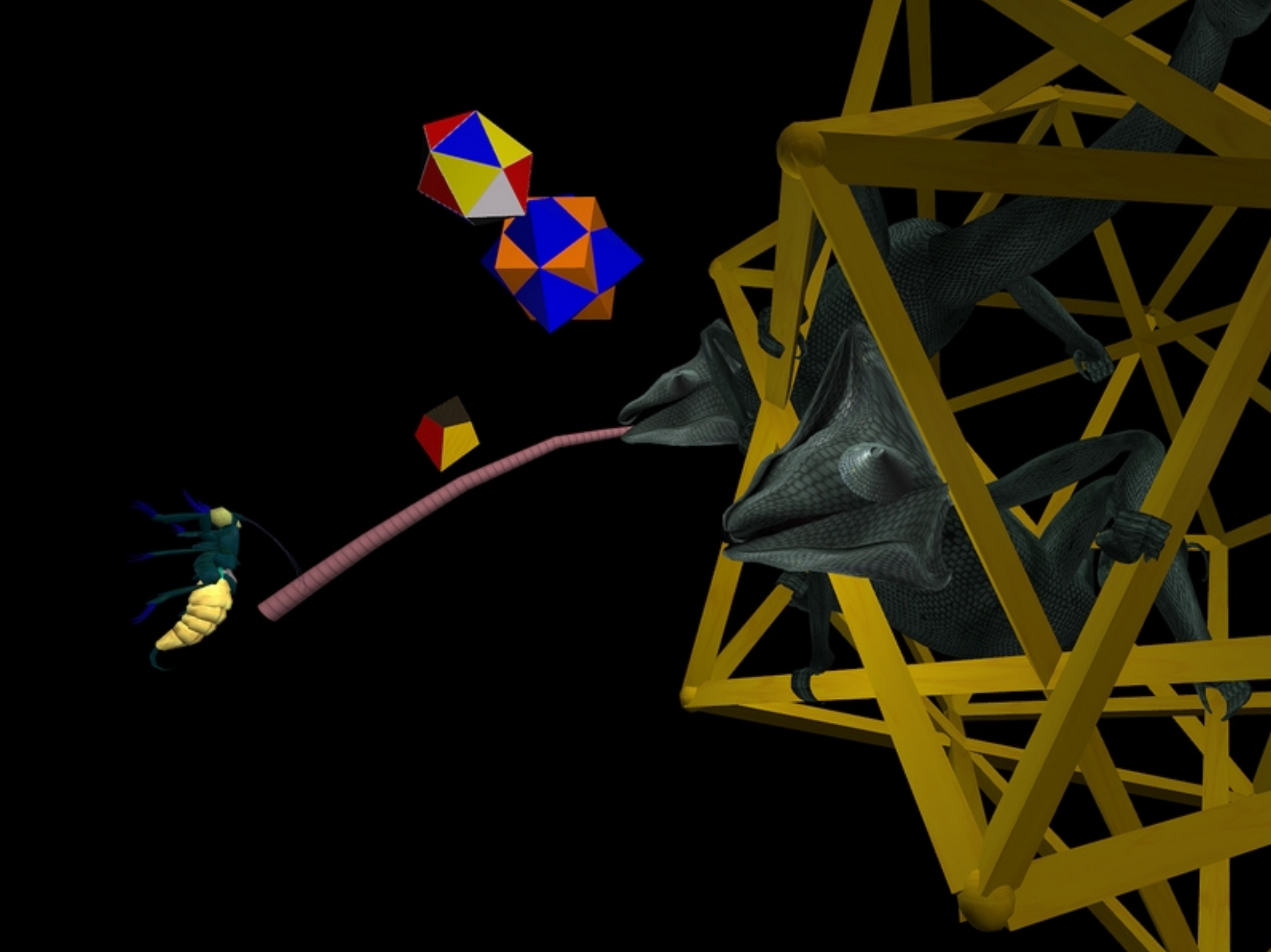
Why is Fun Important?

Fun is not the objective – it's a key part of design and process

- Get Attention
- Maintain Interest
- Students more open to new ideas/content

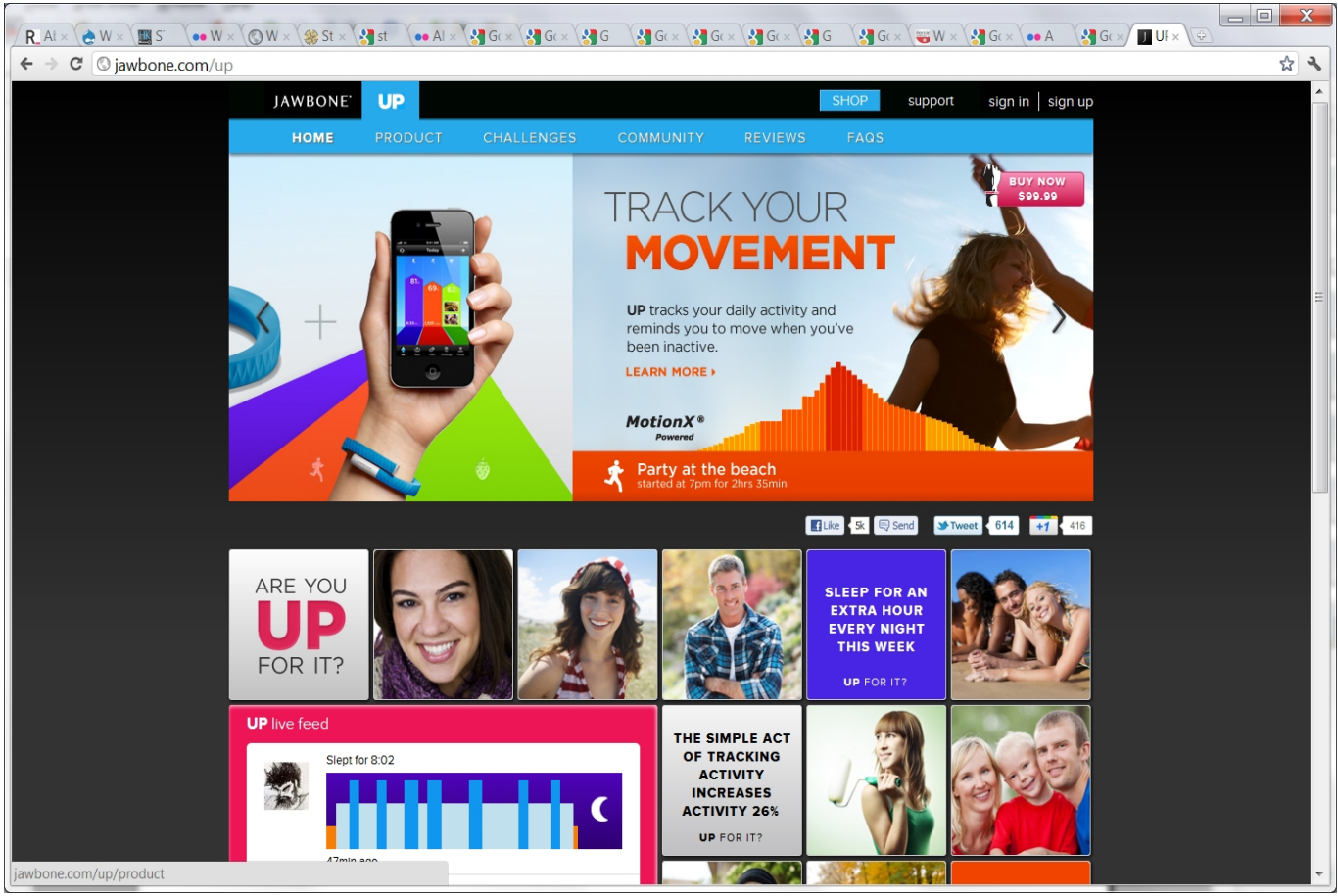
What is Fun?

- Pace
- 3D
- Easy of Use
- Humor
- Achievement



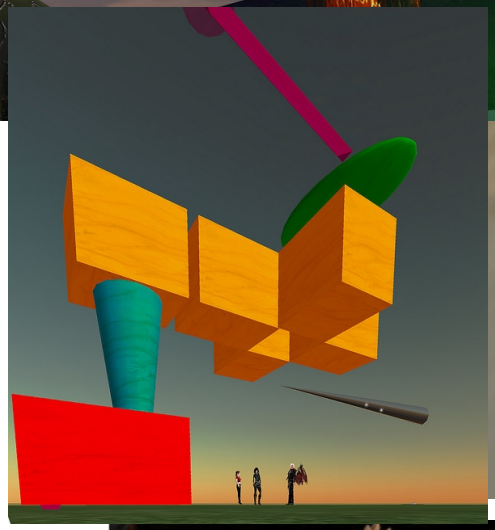
Fancy Devices

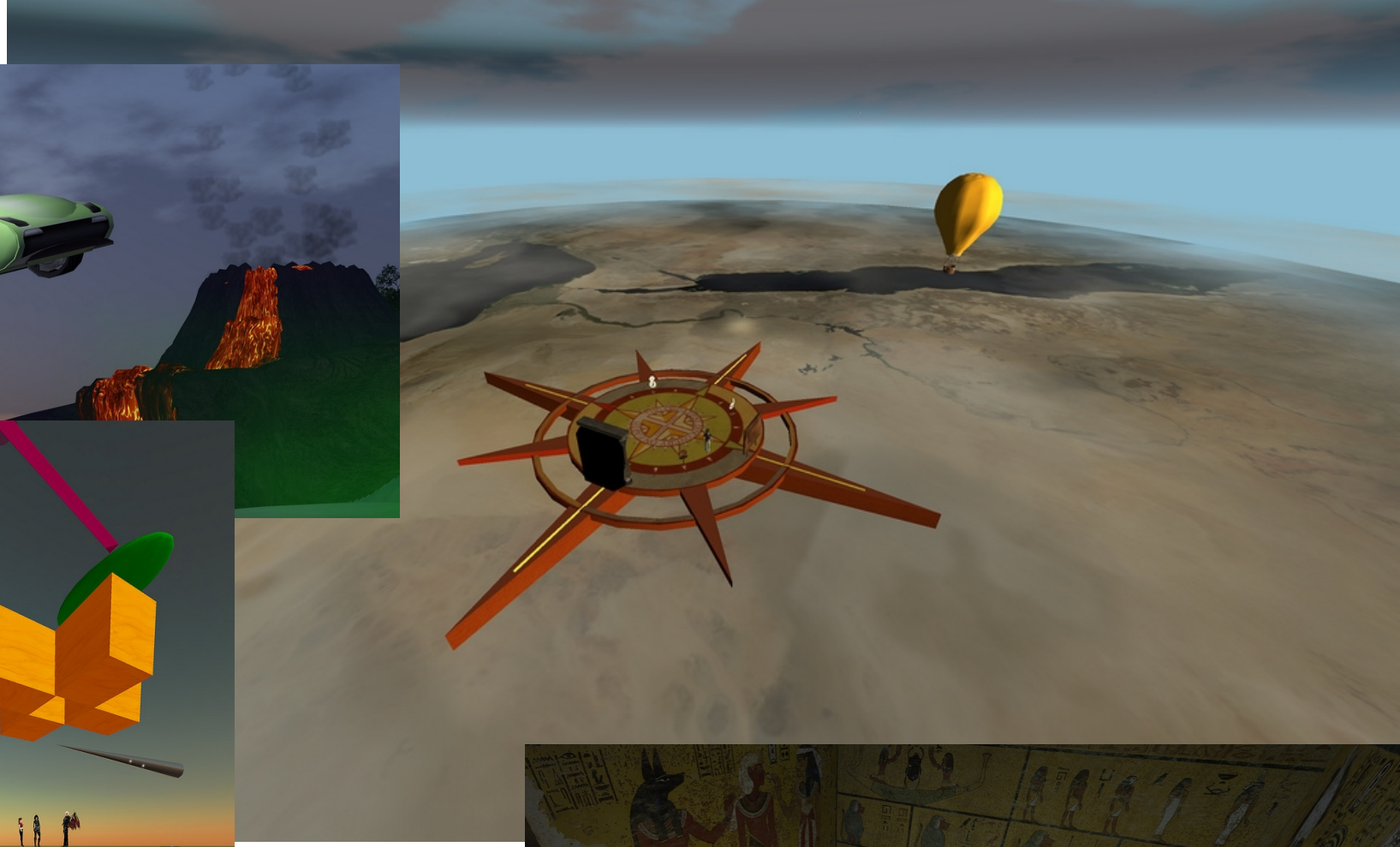
- Browsers
- Whiteboards
- Smartphones
- Tablets
- Personal Tech



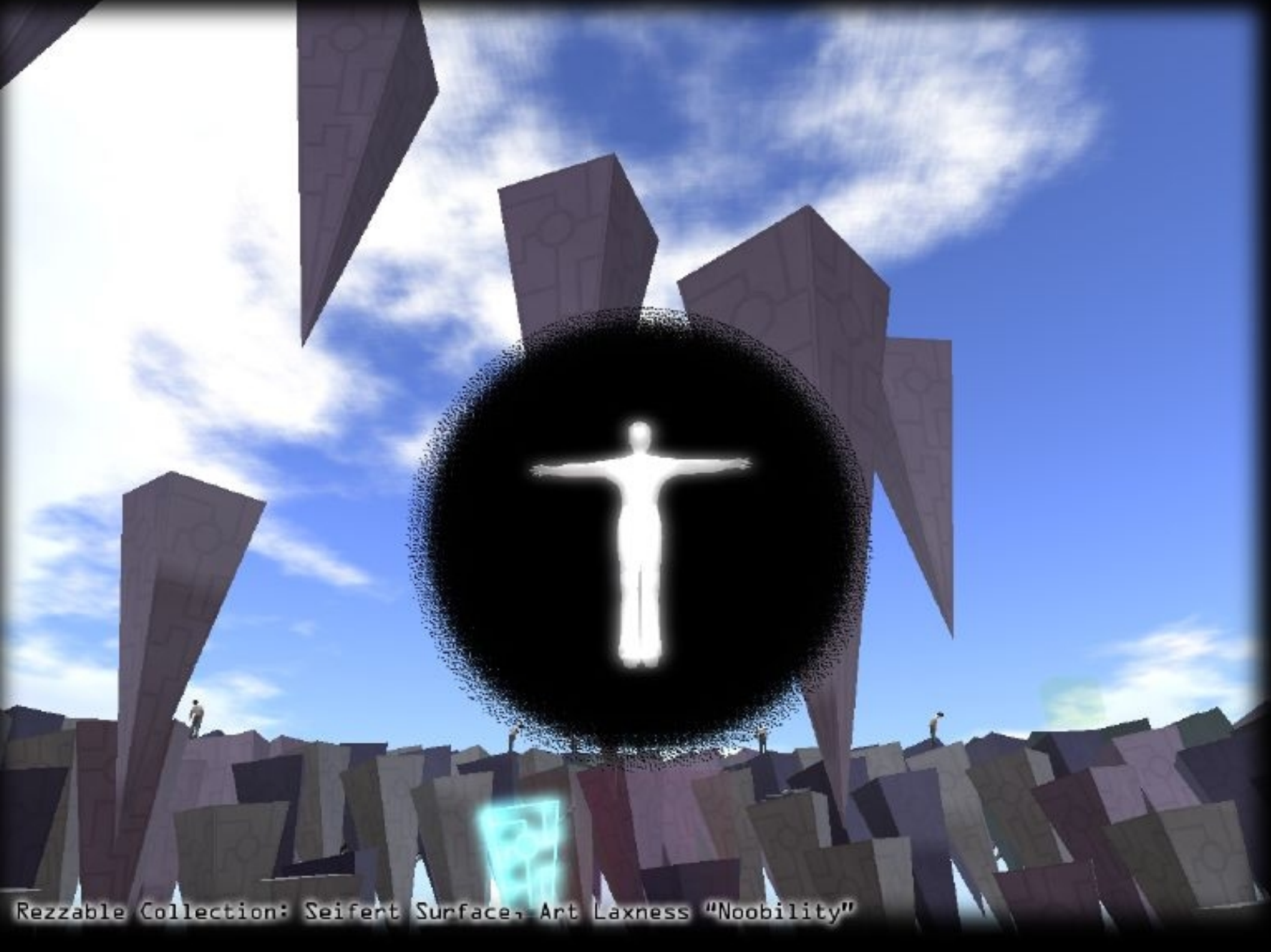
3D Interactive Basic Ingredients

- Context/Backstory
- Placeness/Areas
- Characters: Avatar & NPCs
- Activities: Linear Story, Mini-games, Exploration
- Achievements: Points, Badges, Money
- Customization
- User Generated Content
- Data Collection
- Web Social






LAKERS
32
CELTICS
33


Rezzable Collection: Seifert Surface, Art Laxness "Noobility"

ST.ART

ST.ART Project

Transformational learning in a highly immersive virtual environment.

http://heritage-key.com/project/start

Earn Levels

User login

Username or e-mail *

Password *

- Create new account
- Request new password

Log in

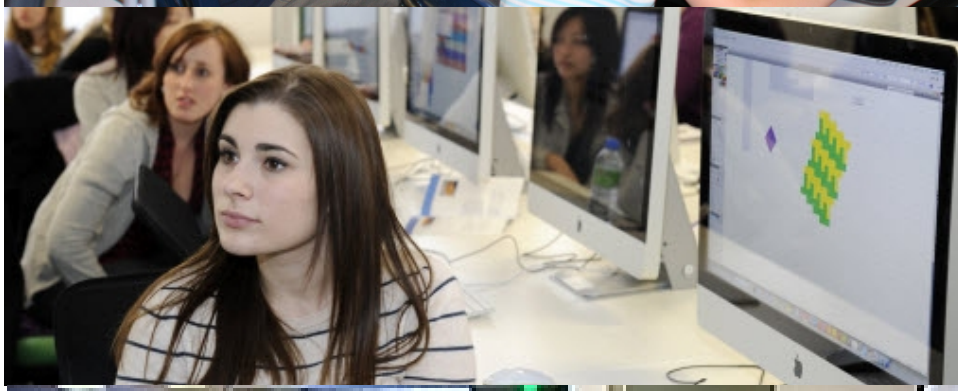
New content


11 Key Factors in Avatar and NPC Realism


Who Uses Drupal and 6 Reasons Why

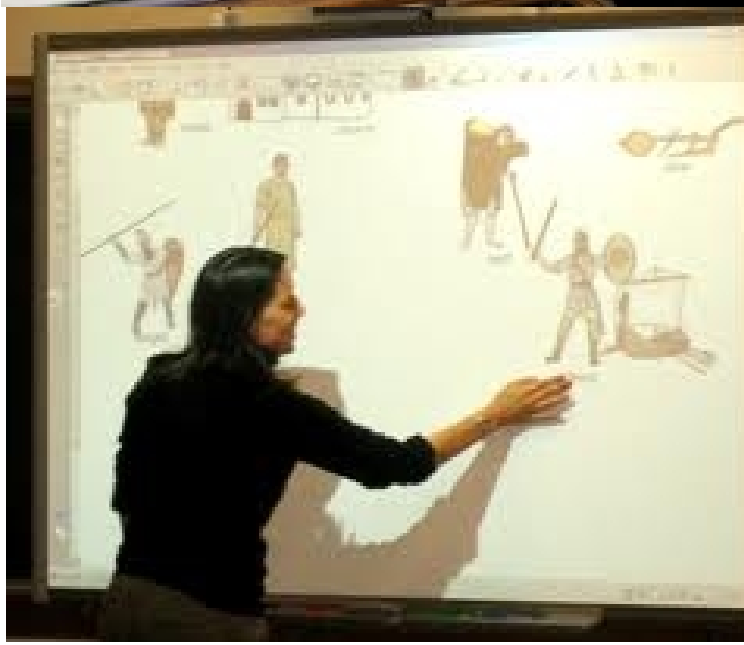
Approach

- Small Bites
- Repetition
- Heuristics
- Problem Solving
- Individual Pace
- Teamwork / Collaboration
- Competition

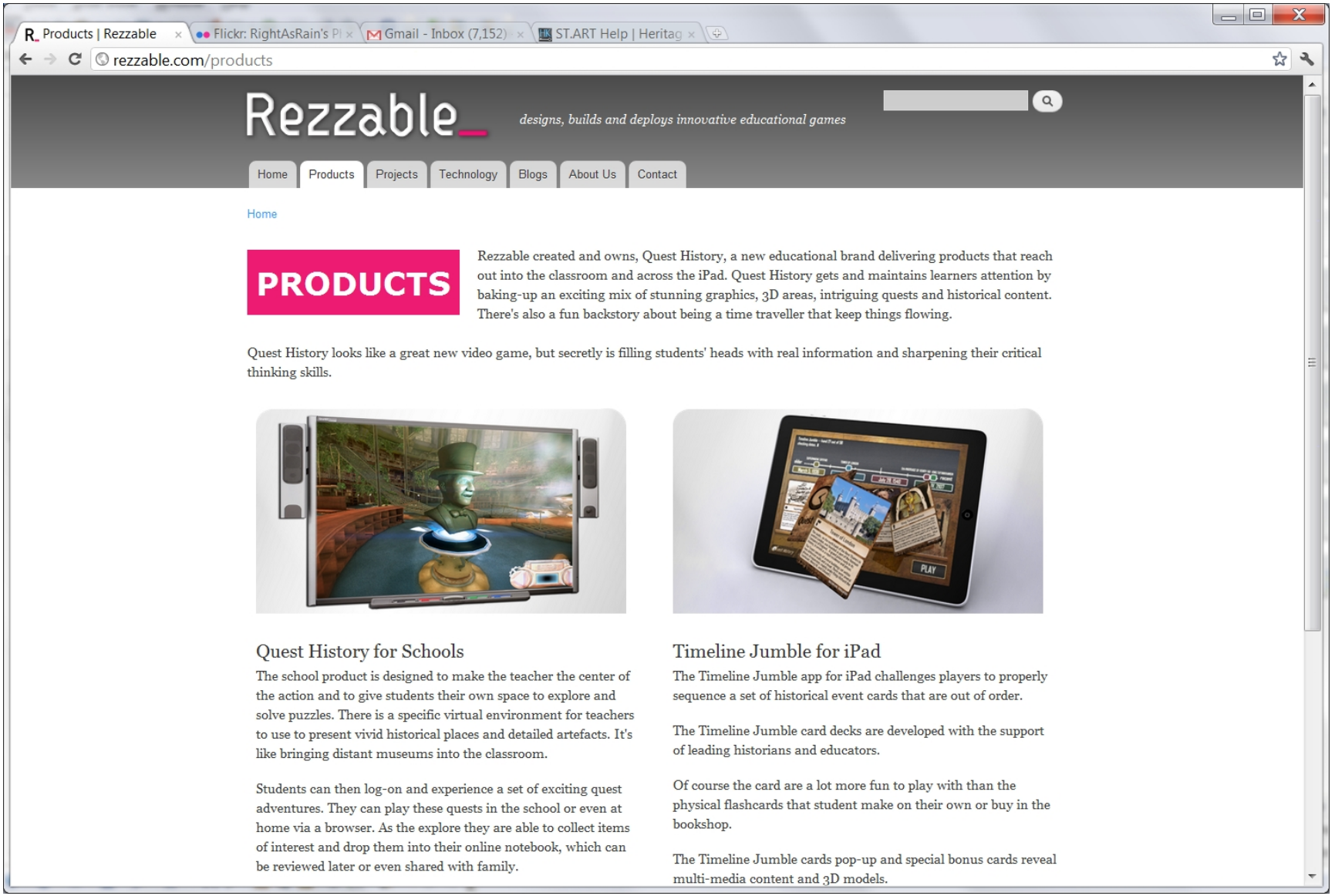


Serving It Up

- Design as part of Course and Lesson Plans
- Teacher Presentation
- Student Activities
- Expose Results
- Share Acheivements
- Access in class, lab and at home



jon.himoff@rezzable.com



School Networks and Community Building

Experiences from SPICE, Scientix and eTwinning

Premysl Velek

European Schoolnet (EUN)

Network of 31 Ministries of Education in Europe

www.eun.org

- Support schools in bringing about the best use of technology in learning
- Promote the European dimension in schools and education
- Improve and raise the quality of education in Europe

Three areas of work: (1) Policy, research and innovation; (2) Schools services; (3) Learning resource exchange and interoperability

Scientix: The Community for Science Education in Europe

SCIENTIX
The community for science education in Europe

- Managed by EUN on behalf of the European Commission
- Started in December 2009, portal launched in May 2010
- Targeted at teachers, researchers, policy makers

Scientix is financed under the European Union's Seventh Framework Programme for Research and Development.

Scientix: The Community for Science Education in Europe

Scientix : The Community for Science Education in Europe

SCIENTIX
The community for science education in Europe

- Mission: to facilitate dissemination and sharing of best practices in science and maths education in Europe
- Objective: to create a lively community for its stakeholders

Tools:

- Scientix online platform: www.scientix.eu
- Scientix European Conference, May 2011, Brussels
- Workshops for teachers and/or researchers

Scientix: the online platform

The portal collects teaching materials and research reports from European science education projects financed by the European Union and various national initiatives.

The portal sections:

- Project library
- Resources repository
- News
- Events calendar
- Community

Available in English, French, German, Italian, Spanish and Polish

www.scientix.eu

Scientix: the online platform

The project library:
- Basic information
- Information for researchers
- Information for teachers

Searchable by country, topic, target group, programme

www.scientix.eu/web/guest/projects

Scientix: the online platform

The resoures repository:
- Teaching materials, lessons plans, guides...
- Research reports
- Online courses

Translation on-demand service:

Translation free of charge of teaching materials into your preferred language

www.scientix.eu/web/guest/request-translation

www.scientix.eu/web/guest/resources

Scientix: the online platform

Scientix news:
- Latest updates from the projects presented
- Policy news from the EU
- Education research news

Scientix events:
calendar of conferences, workshops, science festival and other events related to science and maths education

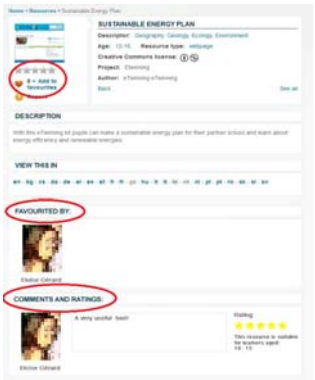
www.scientix.eu/web/guest/news

www.scientix.eu/web/guest/events

Scientix: the online platform

Networking tools:
- Public profile directory
  partner search tool to facilitate collaboration
- User generated content
  rating and commenting on Scientix resources

- Discussion fora
- Online chat



Scientix: European Conference, 6-8 May 2011, Brussels

- Key note speech – John Holman, UK
- Posters session
- 46 talks
- 2 Round tables
- 25 stands presenting EU funded projects
- 10 mini-workshops
- 379 participants from 37 countries

www.scientix.eu/web/guest/conference

Scientix: European Conference, 6-8 May 2011, Brussels

Conference sessions:
- Science education research
- Science education – thinking outside the box
- EU projects for researchers
- School collaboration
- Science & industry and schools
- Teachers associations
- Portals and resources
- Tools and experiments
- Science museums and amusement parks

www.scientix.eu/web/guest/conference

Scientix: European Conference, 6-8 May 2011, Brussels

Main conclusions:

Key elements of a good science education system: school curriculum, pedagogy and assessment [...however...] the quality of an education system depends ultimately on the quality of its teachers.

All presentations on innovative approaches to science education --> inquiry-based approach (facts and figures + process of producing scientific knowledge). Practical experience –> learning by doing + first-hand contact with real research.

To fully exploit the concept of inquiry based learning, teachers have to be properly trained. Teachers should combine excellent knowledge of their subject with excellent pedagogical and assessment skills.

www.scientix.eu/web/guest/conference

Scientix: Workshops

- GIREP 2010, France
- Eminent 2010, Denmark
- eTwinning Conference 2011, Hungary
- Pathway summer school 2011, Greece
- SPICE summer academy, Czech republic

Objective:

Present, share, highlight and inspire good practices, linked to the specific content offered by Scientix and take into account the latest development in the field of science and maths education and the results produced by EU funded projects.

Spice: spicing up maths and science classes

Spicing up Maths and Science classes by sharing initiatives between European teachers

Coordinated by European Schoolnet

Project partners from Czech Republic and Portugal

Funded by the Lifelong Learning Programme of the European Commission

Project period 2009 - 2011

SPICE has been funded with support from the European Commission.

Spice: spicing up maths and science classes

Who
Maths and science teachers from 14 European countries

Activities
collect, analyse, validate and share innovative teaching practices

To promote Inquiry-Based Science Education and the use of ICT in the classroom

spice.eun.org/web/spice

Spice: Good Practices (GPs) trials

The GPs have been tested in the classroom in several European countries and assessed by education experts

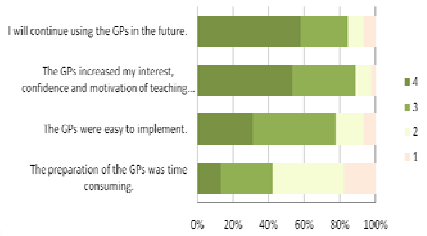
Two sets of questionnaires were created for both students and teachers:
General PRE / POST
Specific PRE / POST

Test results comparison between groups of students who were taught using the GP and those who were not

Once validated, the GPs will be made available online

Spice: first results

Analysis of the teacher questionnaires



Spice: communities of practice & moodle

The SPICE good practices will be available on the Scientix moodle platform

The SPICE Communities of practice are hosted in the Scientix fora

moodle.scientix.eu

eTwinning

Community for schools in Europe

Social network and communication platform allowing for teacher and student exchange

Managed by EUN on behalf of the European Commission

33 participating countries (National Support Service in each of them)

eTwinning is part of Comenius, the EU programme for schools

eTwinning

Three main elements:
- Informal social network
- Online collaborative work
- Continuing professional development

11 subject areas
(Languages, Arts, Sports, History, Science...)

Spice & Scientix: subject specific

www.etwinning.net

eTwinning portal tools:
- Desktop
- Twinspace

eTwinning: Desktop

Personal profile:
- Personal content
- Contacts & projects
- Journal

Features:
- Partner search
- Discussion fora
- Results sharing

eTwinning: Twinspace

Created as a collaborative tool specifically for eTwinning, Twinspace is a virtual classroom where eTwinning partnerships run their projects.

Twinspace supports both teacher and student collaboration

Synergy eTwinning – Scientix / Spice

Scientix / Spice:
- Math and Science subjects resources
- Contact with research and latest development in science education

eTwinning:
- Online platform for collaborative project work
- Contact with other teachers
- Professional development opportunities

Challenges in eTwinning collaborative work: different curricula in European countries

Spice good practices have been tested in different European countries > ready-to-use for eTwinning science projects

Thank you for your attention

More information:

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