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### **Physics and Magazines**

( *PHYSICS IN NEWSPAPERS, PHYSICS FROM NEWSPAPERS, PHYSICS OF NEWSPAPERS* )

#### **ABSTRACT**

- “To save electricity ... to use warm air in all the house ... to cook by induction cooking griddles... nanosomes ... anti U.V filters”..
- Advertising, images, themes and languages borrowed from the scientific world to non specialist-press
- Could we derive ideas from newspapers and magazines to realise a laboratory which will lead students from initial curiosity to further motivation during the weekly path of physics and mathematics?
- Could we take from non specialist press, daily experiences to put in evidence the links and achieve a closer examination in the field of physics and mathematics to rouse a reasonable study of the textbook?
- A seven steps path in the scientific laboratory will lead the students through preparatory tests, work sessions according to the methodology of cooperative learning. They could achieve critical competences to reading and analysing a text or an image even in the scientific field, up to level 7bis of reading and understanding a simple article or a scientific one ( lectio, meditatio, contemplatio).
- Written and oral tests, production of educational literature worked out by the students, translation of the work produced into English, will allow a monitoring *in itinere* and an assessment of the results in terms of contents, teaching methods, acquisition of a specific language

#### **Introduction**

I’m a teacher of Mathematics and Physics at the Liceo Classico “G. Galilei”, a grammar school. Subjects as literature, history, latin, have many hours of lessons, however the target is unity and plurality of knowledge. At the end of 5 years, students should know what science is about, and its place in the world.

- Our target is also to enable students to study physics, engineering or biology at the university, and provide interesting and stimulating scientific knowledge for the student who does not pursue these subjects further
- I have been selecting newspaper physics related articles and advertisements for the past two years
- Daily examples aim at showing students how close the relationship between simple daily activity and physics is.
  - ✓ Physics in magazines means: How many Physics related articles, news, can we find in daily or weekly non specialist press?
  - ✓ Physics of m. means: If we find in magazines or in newspapers Physics related articles or references, are they correct? Are they comprehensible? Are the students (people) good at understanding this information?
  - ✓ Physics from m. means: Is it possible to derive ideas from non specialist daily press to check our knowledge or to improve it?

## **Motivation**

- Everyday a lot of scoops, data, reach us
- The risk is to become passive
- We read, we hear, and we often forget
- Advertising reaches young people
- Pupils are well-read people but...
- They often read without paying attention

Let us take the opportunity to try a new didactic experience. Why not?

## **Aims I**

Laboratory:

-From articles and images to physics phenomena ... to scientific language ...to mathematic relations...

-From newspapers to the textbook, ..to a reasonable study of the textbook

## **Aims II**

-At the end of secondary school students are able to translate, to analyze, to understand literary and original texts

-They should be able to read, to analyze ... even in the scientific field, to discuss, to communicate also with appropriate language and technical terminology

-From newspapers:

-Curiosity ..... interest

-Knowledge check

-Group work

## **Aims III**

Students like new technologies, but new technologies can't take the place of the brain, of the mind, of life

It's important to work in group, but also to be able to study by oneself

## **Methodology**

I have adapted to my students the "cooperative learning" methodology, a successful teaching strategy in which small teams use a variety of learning activities

The main important things:

- Work schedule must be strict and carefully prepared
- To share resources
- To produce final poster
- To explain each other and to other groups
- Better to improve the method than to have a lot of contents
- There are some groups of 4. Each member is given number 1,2,3,4,..and second time 4.1.2.3...then 3.4.1.2....

Strategy: to surprise, to organize a course step by step, a workable course, strict, but not hurried, to gratify and reward students for the result

**The final plan is** a flexible proposal. It can be adapted to every level of school.

It's a proposal for a class during school lessons, or as extra curricular activity

It's very cheap.

Resources: Physics textbooks of various authors and different publisher, Cdrom,

White sheets of paper, markers, post it , magazines, newspapers

## THE SEVEN STEPS

0. THE WORK PLANE - A cdrom shows some images, some articles. Teacher asks students: "what does this phrase mean?...or ...Can you find a relationship between school subjects and daily situations? ..What shall we do?"

- Choose an article and motivate your choice
- Identify aims of articles
- Find number, quantities
- Find the phenomena you have to study and explain it

The same work plane is useful to analyze advertisements or photos selected from magazines (interior design, kitchen, fitness, beauty..)

1. INDIVIDUAL TEST –What is your intelligence like? *Test is a surprise, students discuss the results; they agree or not agree but they appreciate this beginning. Teacher must be intelligent. Each test is anonymous, it's not to be handed in. Soft discussion*
2. START OF THE ACTIVITY – Magazines are Handed out
3. TEST – How do you usually read? (*study, light, filter, analytical..*)
4. GROUP WORK. Link with mathematics and physics phenomena
5. POSTER – group work presentation (article or synthesis –Aims of article –units, numbers – phenomena and observations )
6. ADVERTISEMENTS. Invent a problem, a question
7. MONITORING – Final test. Oral and written tests and problems from the textbook, from the magazines. Final test (anonymous) to know students opinions  
7bis (for students 17 - 18 ) – Scientific articles from popular scientific magazines, Original memoires

*In conclusion, we appreciate the aim lectio, meditatio, contemplatio*

*You read a scientific article – you study – you think – you improve your scientific point of view-*

*Your knowledge grows – you can admire a wide scientific landscape*

### **TIMELINE OF A 1<sup>ST</sup> WORK SESSION**

15 -15.15 Formation of the groups ( various strategies. Month of birth, alphabetical index of first name..)

15.15 – 15.20 Take place

15.20 – 15.40 Results of test –Introduction between groups (it's possible they don't know each other)

15.50 – 16 Assignments – Resources

16 – 16.35 Individual focus on newspaper (15'). Then the group discuss and chooses 1 article (20')

16.35 – 17 The groups communicate and motivate their choice

### **2<sup>nd</sup> SESSION**

15' Test

30' Individual work

45' Work in group

30' Results – Discussion –

Every time: common resources (textbooks, markers...are in the centre of the room)

During the individual work students write their observations on some post-it

Only at the moment of synthesis they write unitary text

*Some questions(images, articles, advertisements)*

*Can it ever happen? It's a daily experience? Can we repeat or make it in the laboratory? What about the subject? Is it possible to calculate the dimensions? The weight? Do you need other information? What do you think you have learned? Can you explain?*

We had 5 + 5 work sessions

### **PLENARY DISCUSSION**

At newspapers kiosk we can find physics for all seasons

Spring and Summer: suntan, Swimming, light-cold drinks, Olympics games, sports

Autumn and Winter: skiing, insulation, heating, layers of clothes

### **WHY OUR WORK SESSION IS A "LABORATORY" ?**

Laboratory is

- To improve the autonomy
- To like understanding
- To prefer discovering by oneself rather than from others
- To learn without hurry
- Teacher is the coordinator –he suggest, encourage, checks
- Student and Teacher enquire together into physics law
- It's easy for students to ask teacher for something

In our Laboratory

- ✓ We have spare time to read
- ✓ We learn to read a science related article, to focus on the main content, to learn new words
- ✓ What must we look for?
- ✓ If we don't understand, we will study. If we have learnt, we must be able to explain. We are improving each other's scientific point of view

### **RESULTS I**

#### 2005/2006

- Electricity, gas, how much do they cost? (link : energy, work, fuel, power, statistical data)
- A piece of Mars at the bottom of the sea (link: pressure, density, currents, Stevin's law)
- Wabian 2 the technological nurse (link: force, lever, joint )
- Curling. Physics and Olympic games (link: inertia, friction, principles of dynamics )
- A little book "Invent a problem"

#### 2006/2007

- The battery
- Mercurio
- Marte
- Interview to Stephen Hauwking
- Cosmic gas
- Edison

## **Conclusion : Before and After**

### Before

- To read without paying attention
- To use some technical common words without knowing their correct meaning
- To study without connecting textbook to daily experience
- “I study only the formula, the definition. I don’t like physics, I don’t need physics. I want to be a Journalist!”

### After

- ✓ “I didn’t believe it was possible to look for a lot of new things in an hour’s lesson”
- ✓ “To find physics from different magazines we need our five senses”
- ✓ “I have realized that we must train focus which type of reading we need in different content”
- ✓ “I didn’t imagine how much physics is around us”
- ✓ “Now I study better”

### Students :

- We are a group of students who attend the “Galileo Galilei” grammar school in Pisa. Last year our school started a project called “Physics and Magazines”, led by our maths and Physics teacher, Rosa Fiore
- The project consisted in finding articles in newspapers and magazines concerning scientific topics. During this project, we had to take out anything possible phenomena from some common articles, taken from newspapers and reviews
- This year we have taken part in a similar project, but the difference was that we had to choose an article only from scientific magazines, such as “le Scienze”, “Newton”, “quark”, and “Focus”.
- During the course, that brought together students from different classes, with different knowledge and experience, we were divided into groups; we had to choose the article we preferred and prepare a poster about it, with some pictures, summaries and developments. At the end of the course, we had to present orally to the rest of the class our work and discuss it.
- This experience has helped us to improve our way to study, to analyze our reading, our knowledge in the scientific field, learning a specific language and to link scientific disciplines to our everyday lives, even thanks to the method of cooperative learning practiced while working in groups.

----- Thank you for your attention-----

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