COMMUNICATING SPACE ASTRONOMY WITH THE TEACHERS: the ESERO project in Belgium

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The ESERO project

• Educational project supported by the European Space Agency (ESA)

• ESA asked the Planetarium of the Royal Observatory of Belgium to implement the project in Belgium

⇒ Presentation of the ESERO project seen from the Belgian point of view
The ESERO project

• ESERO stands for European Space Education Resource Office

• Project initiated after realizing that the traditional outreach methods were not efficient enough

 ➔ Make it possible for the ESA Education Department to further support the Member States specific educational needs
Education at ESA

• EU Lisbon strategy report -> attract more students towards a career in science & technology

• ESA Education Office addresses Europe’s need to build an increasingly knowledge-based society

➤ By drawing upon the genuine fascination for spaceflight young people possess
Education at ESA

• As many space agencies, ESA produces high-quality educational material

• The teaching material is developed using input from selected teachers and disseminated among Member States
Difficulties encountered

• Languages: 19 Member States, 14 languages

Some teaching documents are produced in 11 languages!

• Dissemination: ESA website => pdf or video downloads, printed material on request

➤ Adequacy between the material produced and the teachers needs?
Lack of efficiency?

- Translation works well, but differences between national curricula are not taken into account.

- Web-based dissemination is OK, but strong bias towards well-informed and interested teachers.

⇒ (i) The teaching material reaches mainly the most enthusiastic teachers, (ii) It doesn’t necessarily fit the needs of the bulk of (reluctant) teachers.
ESERO: genesis of the project

• Reaching the primary target audience directly is an impossible task for ESA

• The languages and educational systems are very different from one Member State to another

• ESA’s approach:
  - Member State by Member State
  - user-driven with the focus on teachers
ESERO: aims and objectives

• Establish ESERO contact points in all ESA Member States

• Support the specific educational needs of the Member States and their education communities

• Get easy access to already existing national education networks in science & technology
ESERO in practice: the Belgian Office

• ESA and the Royal Observatory of Belgium agreed in 2006 to launch a Belgian ESERO Office at the Planetarium of Brussels

• Two full-time collaborators (Dutch- and French-speaking) were hired as ESERO Office Managers
ESERO Belgium: first phases

• The Office Managers started their duties with:
  
  - Performing a thorough study of the education environment and evaluating the needs
  
  - Elaborating an operational strategy and its associated action plan
Outcomes of the preparatory study

• Need for ready-to-use science-related educational material referring explicitly to topics of the curricula
• Limited science training (at the primary level) → lack of confidence to tackle the “space” theme in the classroom
• No access to laboratories for experimentation
• Limited time devoted to a given project
• (Very) limited budgets
Establishment of an educative partnership

- ESERO Belgium tried to respond to most of these issues with the help of several partners:
  - **Teacher training institutions**: in order to provide the science trainings required by primary level teachers
Establishment of an educative partnership

- **Science education experts:**
  
  (i) train the trainers to adopt IBSE (inquiry-based science education) methods
  
  (ii) guarantee the content & quality of the trainings
  
  (iii) elaborate educational material & evaluation tools
Establishment of an educative partnership

- **Public education authorities**: they formally facilitate, endorse and authorize access to the national school systems and to official teacher training institutions

→ **An agreement has been signed between ESA and the public education authorities to support a pilot project called “Space & Education”, coordinated by ESERO**
The “Space & Education” project

- Pilot project ➔ limited number of schools:
  - 2 inspectors: “educative supervisor” whose job is to visit the classrooms and check if the teachers correctly follow the curriculum
  - in charge of 22 primary schools

➔ 22 school directors, 170 teachers, ~3400 children were part of the pilot phase of the project
What ESERO offers

• **Teacher trainings**: hands-on experiments, scientific methodology ➔ improve self-confidence

• **Training for school directors**: how to highlight the “science” theme in the school project document ➔ evolution towards “science schools”

• **Training for inspectors**: in order to disseminate the project and keep homogeneity of messages (teachers rely more on inspectors than on external trainers)
What ESERO offers

- **Funding**: a few k€ were distributed to each school in order to start classroom projects ➔ material for experiments, books, visit to science centers...

  - This aspect was of course very attractive and very well received by teachers...

  - ... but after 1-2 years, teachers themselves agreed that it was not the most important success ingredient
What ESERO offers

• **Adapted educational material: “Mission Espace”**
  - Elaborated by inspectors and teachers ➔ clear references to the Belgian curricula: teachers know when and how to use the material
  - Series of 8 booklets distributed over a period of 2 years to all schools (not solely to the pilot schools)
  - Based on the space flight of Belgian ESA astronaut Frank De Winne
  - Variety of addressed topics: life, water, energy, electricity, biology..., adapted to 5-8, 8-10 and 10-12
Specific educational material

PLAN: “MISSION ESPACE” 2008-2009
Specific educational material
A noteworthy success

• The ESERO package:
  + trainings
  + classroom project
  + educational material specifically elaborated
  + endorsement of the Minister of Education
  + support of inspectors
really helped the previously reluctant teachers to consider the teaching of science from a renewed point of view
The “Space & Education” science fair

• After 3 years of pilot phase, a one-day science fair was organized: all the schools involved in the project participated to the fair
The “Space & Education” science fair

- Children (and their teachers) were really proud to present their own project to their families (or colleagues)

- Three years before, those teachers were absolutely not enthusiastic about science, space or astronomy!

Montigny et Gouy: des écoles plus scientifiques

Comme l'école des Hautes Montées à Gouy, l'école du Grand Chemin à Montigny-le-Tilleul vient d'organiser une exposition scientifique. Pour les enfants, c'est l'oubli de longues heures d'apprentissage.

1 NASA LES ASTRONAUTES DE DEMAIN

"L'espace est un domaine qui excite trop peu de vacanciers. Pour pallier cette manque d'ingénieurs et d'astronautes, l'ESERO qui dépend de la NASA a eu l'idée de motiver les enfants dès le plus jeune âge en proposant à certains écoles d'adhérer à un projet scientifique envoûté sur trois ans. Au terme de ces trois ans, l'école se verra attribuer le label "École scientifique" explique Véronique Lovieux, l'une des enseignantes de Montigny qui participe au projet. "Mais le fait d'adhérer à ce projet ne suffit pas pour autant à transcrire plus d'heures de sciences au programme scolaire."

2 TROIS ANS LE TEMPS DES PREUVES

L'école communale de Montigny-le-Tilleul, comme celle de Gouy, a donc accepté de relever le défi et s'est engagée pour trois ans à poursuivre ce projet, de la 3e maternelle à la 6e primaire.

"Concrètement, poursuit Mme Lovieux, cela signifie que les enseignants un changement dans leur façon de travailler, une remise en question, avec une optique plus scientifique dès qu'il s'agit d'aborder certaines matières. La lecture sera dès lors basée davantage sur des histoires scientifiques, de manière à éveiller l'enfant aux sciences."

"C'est très motivant explique à son tour Laurence Laux, institutrice de 3e primaire à l'école de la Haute Montée à Gouy. "Les enfants attendent avec impatience le jeudi après-midi pour faire des expériences. Tois n'auront peut-être pas la fibre scientifique, mais tous s'amuseront. On fait des tests, on se trouve, on fait des recherches. C'est très enrichissant. La pannede d'Archimède... C'est fascinant, mais à leur manière."

3 SOUTIEN DES JEUNESSES SCIENTIFIQUES

Cette année, les deux écoles ont reçu plusieurs fois la visite des Jeunesses scientifiques, dans la plupart des classes, histoire de vulgariser des matières souvent complexes à expliquer, mais aussi de mettre en pratique les théories. Pour apprendre la notion de densité, le sous-marin, parce que la première année est consacrée à l'eau.

4 EXPÉRIENCE BRICOLAGE EN CLASSE

Chacun à leur niveau, les écoliers ont donc bâti, construit des instruments pour mieux comprendre. Ils ont fabriqué des antémembres, des thermomètres, des ascenseurs hydrauliques, des écluses, des châteaux d'eau pour faire des expériences.

5 RÉCOMPENSES "A CHAQUE ÉCOLE UN PRIX"

Organisé par les Jeunesses Scientifiques de Belgique, ce projet a permis de récompenser deux classes des deux écoles. Pour Montigny-le-Tilleul, c'est la classe de M. Vanin qui a été classée 3e de sa catégorie, primée pour son travail sur les ascenseurs hydrauliques.

6 EN DIRECT AVEC FRANK DE WINNE DANS L'ESPACE

Si tout va bien et si les choses se passent comme prévu, quelques élèves de l'école de Montigny-le-Tilleul auront la chance de rentrer en contact direct avec l'astronaute belge Frank De Winne, via ordinateur et caméra.

"Nous les enfants avons envie de transmettre à autrui le plaisir que nous ressentons dans notre école scientifique, en éveillant l'intérêt des autres enfants. "

Enfin, la troisième école participant à ce projet, la Haute Montée à Gouy, est sur le point de valider un projet scientifique envoûté sur trois ans.
Dissemination: beyond the pilot phase

• **DVD & magazine**: presentation of the school projects ➔ distributed to all primary schools

• Increase of the number of schools involved in the project: from **22 to +100 schools** in 2011-2012

• **Trainings opened** to all interested (i) teachers, (ii) directors, (iii) inspectors ➔ they are all fundamental relays, at different levels
Follow-up & evaluation

• Some groups of children have been involved in the project for 4 years now
• Primary school ➔ Secondary school transition: momentum should not be lost
• Project extended to 4 secondary school: meetings between primary and secondary teachers (very unusual!)
  ➔ Dissemination towards the secondary level
  ➔ Evaluation: what specialization will those children choose in a few years?
ESERO Belgium: other activities

• Dissemination of educational material and didactic manuals (fairs & events, on demand...)
ESERO Belgium: other activities

• Organizing formal teacher trainings (secondary level)
ESERO Belgium: other activities

- Astronomy workshop for teacher trainees
ESERO Belgium: other activities

• Astronomy workshop for teacher trainees
ESERO-B scientific educational events

“A day in the life of an astronaut” – October 2009
ESERO-B scientific educational events

“Aim high!” project: launching of a weather balloon with in-board instrument elaborated in the classroom (2010-2011)
ESERO-B scientific educational events

Greenlight for Girls science day
Brussels November 2010
Conclusions

- ESERO is a highly successful project thanks to:
  
  - The possibility to have 1 (even 2) **full-time** people managing and coordinating the activities
  - The importance given to the **study** phase and to the establishment of a partners **network**
  - The **financial support** of ESA: trainings, material, events, funding of classroom projects
Conclusions

- Being a **non-profit** agency, ESA is a suitable partner for the public education authorities (no commercial issues)

⇒ This partnership is a major success ingredient to enroll teachers without an a-priori interest in science or who feel insecure about their knowledge in science