Science news / Novedades de las ciencias

South African produces TV documentaries to encourage science & maths in schools

Like many other countries in the developing world, the country of South Africa faces numerous challenges in its efforts to survive and position itself in the global economy.

Although recent indicators show that the country's economy is growing, the continued skills shortage in technical and engineering fields is widely considered to be hampering further economic growth.

Recent press reports have emphasized the urgent need to encourage mentorship of young technical graduates, and to create more awareness at the high school level of engineering, science and technical career opportunities.

Critical in these endeavors are the efforts of educators and the mass media, which in South Africa contributes to teaching and learning resources through educational newspaper supplements and television programs aimed at imparting curriculum content.

Independent documentary producer Kyle Lauf of Johannesburg based KURULA Media is one of a new breed of educator filmmakers who is attempting to encourage and inspire both learners and their teachers to excel in school subjects like math and science.

Small documentary productions find niches in existing TV programming that is aimed at learners and teachers. Producers like Lauf research stories surrounding the school curriculum, and issues like good school management and leadership.

> "We enjoy producing television content that encourages young South Africans to excel at school, in particular subjects like maths and science because they open up career opportunities in exciting and sustainable technology fields", Lauf said.

A recent documentary production which will be aired on an upcoming SABC Education programme in April, saw a high school teacher and three

top learners visit the National Metrology Laboratory in Pretoria. The trip was to find out more about the practical methods and instruments of scientific measurement and it refers directly to the grade 11 Science curriculum.

"At first the kids – and their teacher – were nervous in front of the camera, but they gradually relaxed and then their natural personalities came out. That is when other school age learners start identifying with them", Lauf said. "And that's how you start motivating your viewers", he added.

The international standards for scientific measurement are composed of 7 basic units. These are known as the 7 SI units and grade 11 learners are introduced to them at the start of the year's curriculum; e.g. metre measures length, kilogram measures mass, seconds measure time, and ampere measures electric current.

Correct and precise scientific measurement can also be very practical. Examples of practical applications are LIGHT METERS that are used by umpires in cricket matches, and BREATHALYZERS that are used to combat drunk driving.

Lauf, who scripted and directed the production with a small crew consisting of a camera operator and sound technician, explained that the stories were not primarily to impart textbook content like other TV programmes.

"My aim is primarily to encourage and inspire those involved in education – the students, their teachers, and even administrators and parents. Our documentaries want to tell stories that refer to the curriculum, they might touch on it here and there, but we don't want to take the place of the teacher in these stories. Instead, we find interesting stories that can be used to illuminate the teacher's content. We find that if we can motivate our viewers, they will want to excel and that I think is half the battle", Lauf explained.

South African television programs like 'Beyond the Classroom' (SABC 1 Sundays 12h30) are aimed at challenging and resourcing educators. Others, like Hip2B2 (SABC 2 weekdays), show to their young viewers that technology and science can be really cool.

"I like to develop stories that show interesting people, and their interesting research and technologies, or exciting new applications", Lauf pointed out. "That is when you can convey the message that although it can be difficult, it is essentially fun and exciting", Lauf said.

8th European Conference on Research in Chemical Education, Budapest (Hungary), Aug 31 – Sept 1, 2006

The Hungarian Chemical Society cordially invites you to attend the 8th ECRICE to be held in Budapest (Hungary) from the 31st of August to the 1st of September 2006. As a long tradition, the conference is organised under the auspices of EuCheMS (European Association for Chemical and Molecular Sciences), in relation to the activity of the Division of Chemical Education. The 8th ECRICE will be held following the 1st European Chemistry Congress (Budapest, Aug 27-31, 2006) where specific aspects of chemical education will also be discussed. The scientific programme of the 8th ECRICE will consist of plenary, and keynote lectures, oral contributions in 6 sessions, as well as poster session. Abstracts of oral contributions and posters will be peer reviewed. Details on preparation of abstracts and posters, as well as important dates are provided on the website: www.ecrice8.mke.org.hu

International and National Conferences in Science Education

VII Congreso Internacional sobre Investigación en la Didáctica de las Ciencias

Granada, España, 07 al 10 de septiembre de 2005

As the UNESCO is promoting the decade of "Education for Sustainable Development" (2005-2014), the major theme of the conference was defined as "Scientific Education for Citizenship". All the 527 papers presented were organized according to four sub-themes, offering the opportunity of analysing the main subject from different perspectives: science teaching and society (90 papers); "in context" curricular projects (172 papers); relationships between research, innovation and practice (124 papers); and communicative process in teaching and dissemination of science (83 papers).

Moreover, there were 58 papers presented in 14 symposia whose themes were "Gender and science"; "Are the history and the philosophy of science a basic tool in the education of chemistry teachers?"; "Contributions of history of science to science teaching"; "Analogies in science teaching"; "Models and modelling in science teaching"; "The paradigm of complexity, science teaching and education for a sustainable development"; "Research on alternative conceptions and proposals of science teaching strategies: Some examples form physics at the university level"; "To produce and to solve problematic situations: from class to environment"; "The university lecturer, the beginning and the future teacher: three case studies about science teachers' education"; "The producing of the socially contextualized scientific discourse"; "The texts, the reading, and scientific learning I", "The texts, the reading, and scientific learning II", "Introducing students to scientific universe"; and "Didactic and curricular innovative proposals for science education from 0 to 18 years".

Completing the scientific programme of the conference, there were eight keynotes: Research for the future of science education (by Jay Lemke, from the University of Michigan, USA); Uses (and abuses) of images in the teaching of science (by F. Javier Perales, from the University of Granada, Spain); Modelling as a new educational strategy in teaching (by Rosária Justi, from the Federal University of Minas Gerais, Brazil); Developing a new context-based biology courses for 16-19 years-old (by Michael Reiss, from the University of London, UK); Problematic issues of current scientific education of citizens (by Jean-Louis Martinand, from École Normale Superieure de Cachan, France); Higher order thinking in science classrooms: goals, means and research findings (by Anat Zohar, from the University of Jerusalem, Israel); Planning science instructions: Matching the talk which surrounds instruction (by Philip Scott, form the University of Leeds, UK); and Albert Einstein: historical point of reference and didactic resource (by Antonio Moreno, from Madrid Complutense University, Spain). All of them were followed by enthusiastic discussions with the participants.

By the way, the level of some of these discussions, as well as of those that occurred during the paper sessions or symposia was something that impressed me and contributed to make me conclude that this was one of the best conferences I have ever attended.

The conference was very well organised by the team that runs the journal "Enseñanza de las Ciencias", and it was coordinated by Mercè Izquierdo (from Universitat Autònoma de Barcelona) and Javier Perales (from the University of Granada). In order to contribute to foster the debate around the theme of the conference, papers from each keynote will be published at "Enseñanza de las Ciencias" during 2006. I would advice those who are interested in science education to read them (as well as the other papers published by this well recognised journal). It will certainly be a good opportunity for those who were not able to go to Granada to enhance their knowledge and/or to become engaged in the debate.

Rosária Justi
The Federal University of Minas Gerais, Brazil

Fifth International ESERA Conference on Contributions of Research to Enhancing Students' Interest in Learning Science

Barcelona, Spain, 28 August – 01 September 2005

The ESERA (European Science Education Research Association) was formed in April 1995. Some of its aims are to: enhance the range and quality of research and research training in science education in Europe; provide a forum for collaboration in science education research between European countries; foster links between science education researchers in Europe and similar communities elsewhere in the world.

The Fifth International ESERA Conference, held in the beautiful city of Barcelona, Spain, contributed in a special way to reach these aims. This was because it was attended by around 520 researchers from all the continents who, during five days, presented and discussed their research in a very supportive atmosphere. I do not have the official data, but it seemed to me that this was the ESERA conference where more countries were represented.

The conference was very well organized by a committee of people from different Catalonian universities – the Universitat Autònoma de Barcelona (where the chair of the conference – Roser Pintó – works), the Universitat de Barcelona, the Universitat Politècnica de Catalunya, and the Universitat Pompeu Fabra (the venue of the conference). It seems that this join work was essential for success of the organization of such a big conference.

The main topic of the conference was "Contributions of Research to Enhancing Students' Interest in Learning Science" and it was mainly addressed by six keynotes: Non-formal science teaching and learning (by Ivo Cap, from the University of Zilina, Slovakia), A resonant-dynamics model to account for success and insuccess in understanding, motivation to understanding, mediation of understanding (By Paolo Guidoni, from the University Federico II, Italy), Children's apprenticeship in learning science by design (by Yasmin Kafai, from the University of California, USA), Contest territory: The actual and potential impact of research on teaching and learning science on students' learning (by John Leach, from the University of Leeds, United Kingdom), Studying science teaching practices in relation to learning (by Andrée Tiberghien, from the University of Lyon, France), and Research-based innovative units for enhancing student cognitive outcomes and interest in science (by David Treagust, from Curtin University of Technology, Australia).

Moreover, twenty specific topics were conceived as ways of enhancing student interest in learning science. They were: reconceptualising the curriculum; model-based teaching and learning; fostering understanding natural phenomena and everyday life: Learning science concepts and processes, developing of attitudes and interests; teaching models and strategies for facilitating effective science learning; developing research-based innovative units for university students; developing research-based innovative units for secondary school students; developing research-based innovative units for primary school students; developing research-based proposals for teacher education and professional development; formative and summative assessment of science learning; understanding the nature of science: epistemological and historical patterns; laboratory-based practices for science teaching and learning; science and media. Images of science; the communication and public understanding of science; enhancing scientific thinking; promoting informal and non-formal contexts for science teaching and learning; bridging the gender gap; integrating communication and informatics technologies in the science curriculum; supporting environmental education and field studies; researching components of learning situations which arouse the interest of students; studying teacher's practices with respect to enhancing the interest of students.

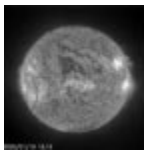
Each of the more than 400 presentations was related to one of these topics. They were presented in 32 symposia (138 papers), 58 paper sessions (236 papers) and one poster session (27 posters). As usual at the ESERA conferences, all the papers were refereed by two researchers and the ones that were accepted certainly represent good studies in all the twenty themes.

Moreover, the programme of the conference also included a session with the editors of some of the main science education journals. This was a very interesting session, especially for young researchers, since the editors could not only present their journals but also discuss the criteria for acceptance of papers in each journal and present some of the members of their editorial board who were present.

At the last day, before the closing ceremony, there was also a general debate on the theme "Where the research in science education is going on?". This debate started from the presentation of some key issues by three researchers. In the second part, the audience both discussed such issues and proposed different ones. Of course, this discussion was not over at the end of the section. It will certainly continue at the next ESERA conference, to be held in August 2007 in Malmö, Sweden.

Rosária Justi
The Federal University of Minas Gerais, Brazil

Scientists develop method to view Sun's far side



Researchers say they have developed a technique that makes the Sun's hidden face, its far side, fully visible for the first The new technology allows anyone with a computer to download images of the whole solar surface, the scientists say.

This would be useful because potentially damaging solar storms that form on the far side could be detected days or weeks before they wreak havoc on Earth.

"Sunspots, solar flares and other active regions on the surface of the sun emit radiation that can interfere with orbiting satellites, telecommunications and power transmission", said Philip Scherrer, a physicist at Stanford University in Stanford, Calif.

"This new method allows more reliable warning of magnetic storms brewing on the far side that could rotate with the sun and threaten the Earth".

It takes about 27 days for the sun to rotate on its axis. Stormy activity that forms on the far side can remain hidden for almost two weeks, surprising Earth-bound observers when it finally rotates into view and starts to affect us.

That's what happened in October 2003, Scherrer said, when active regions from the back side suddenly appeared on the eastern edge, spewing X-rays, ultraviolet radiation and high-energy particles into space.

Scherrer and colleagues study the sun using data from the Solar and Heliospheric Observatory, a satellite launched in 1995 by NASA and the European Space Agency. On board is an instrument that creates images of the sun's interior by measuring the speed of sound waves produced by hot, bubbling gases that well up to the surface. The technique is called acoustic helioseismology.

It's "the same principle as medical ultrasound, which can create an image of a fetus inside a pregnant woman", Scherrer explained.

Positioned about 1 million miles above Earth, the satellite always faces the sun's visible front side. In 2000 and 2001, scientists developed two techniques based on this principle that resulted in the first pictures of the sun's back side, Scherrer explained. But both had limitations. One only produced images near the center of the far side; the other was restricted to views at the edges.

To get a complete image, researchers would have to combine both methods, but that proved to be a major problem.

Scherrer's team said it overcame that last summer with a new computer program developed with Kenneth Oslund, an undergraduate at the California Institute of Technology. Their work resulted in the MDI Farside Graphics Viewer, which displays the first full images of the far side of the sun. The viewer is available online at http://soi.stanford.edu/press/farside_Feb2006/web.

"This new method is a vast improvement", Scherrer said. "It should be especially important during the next solar maximum, which should begin in 2011, when solar activity will be at its peak".

He noted that during the last "solar max", a peak period in a regular cycle of solar storms, which lasted from 2000 to 2003, these storms knocked out power in parts of northern Sweden and Canada. The storms also destroyed a satellite used to verify credit card payments at U.S. gas stations.

Air transportation also can be disrupted when solar radiation interferes with satellites.

"Our goal is to give pilots and air traffic controllers a day or two notice of a possible solar event", Scherrer said, adding that missions to other planets also can be affected by solar storms.

Last week, researchers at the National Center for Atmospheric Research in Colorado released new computer models predicting that the next solar cycle will be 30 to 50 percent stronger than last time.

http://www.world-science.net/othernews/060315_sunfrm.htm
March 15, 2006
Courtesy Stanford University and World Science staff

Reseñas de libros / Book reviews

J. Lahera, A. Corteza. Ciencias físicas en primaria y secundaria. Modelo y ejemplificaciones. Editorial CCS, Madrid, 2003, 231 pp.

En muchas de las pedagogías tradicionales para la enseñanza de las ciencias en la escuela secundaria (y aun en la universidad), la función del profesor se reduce a la exposición magistral de un conjunto de contenidos preestablecidos, aceptados por los alumnos como un dogma de fe, sin discusión o análisis. Es frecuente por tanto, que en la enseñanza superior, el profesor de ciencias se enfrente a formidables obstáculos en su trabajo diario, como consecuencia del fuerte arraigo en los estudiantes de conceptos erróneos acerca de la naturaleza de las cosas.

Los autores del libro "Ciencias físicas en primaria y secundaria" desarrollan explícitamente el planteamiento de un modelo de enseñanza/aprendizaje basado en el enfoque constructivista, cuyo objetivo es aportar al diseño y evaluación del proyecto curricular que delimite la función del profesor y las metodologías didácticas utilizadas, con el fin de lograr una renovación efectiva de la enseñanza de las ciencias tanto en el nivel de primaria como de secundaria.

En la primera parte del libro los autores se dedican a presentar los fundamentos sobre los cuales descansa el modelo por ellos planteado (Ausubel, 1968). Discuten los principales enfoques constructivistas del proceso de aprendizaje que apoyan la tesis de la necesidad de modificar el currículo con miras a que la función del profesor y las metodologías didácticas utilizadas permitan al alumno el aprendizaje en un esquema de investigación dirigida.

La idea del aprendizaje en un esquema de investigación dirigida, surge como una alternativa entre un modelo de aprendizaje por descubrimiento y un modelo de aprendizaje por transmisión/recepción de conocimientos. En este sentido es importe la estructura cognoscitiva del alumno que se constituye con base en el paradigma constructivista, donde el alumno construye su propio conocimiento a través de la interacción directa con los fenómenos y con los demás alumnos del grupo.

Se ponen de manifiesto según este acercamiento tres aspectos fundamentales: el primero es disponer de una metodología eficaz para determinar el nivel cognoscitivo de cada estudiante, el segundo definir claramente cuál es la función del profesor en el proceso de aprendizaje, y el tercero es cómo a partir de los dos puntos anteriores diseñar una estructura de contenidos que permitan no sólo la planificación de la enseñanza por parte del profesor, sino también desde un punto de vista más ambicioso lograr un cambio conceptual en la forma en que se enseña la ciencia.

El primer paso es la identificación de las preconcepciones de los alumnos acerca de un tema específico. Para esto se plantean tres actividades: un "pretest" de preguntas abiertas y no de selección múltiple para cada unidad y nivel; una entrevista personal con el fin que los alumnos expresen sus ideas acerca del tema en sus propias palabras, y la realización de un "póster de grupo" que permita la discusión del tema en pequeños grupos de trabajo con la intervención del profesor, la realización de un "póster de aula" en el cual se socialicen las ideas de los diferentes grupos de trabajo. A partir de esto se espera poder lograr una "categorización conceptual del alumno" lo bastante confiable para implementar las estrategias de enseñanza/aprendizaje mas apropiadas.

Una vez identificado plenamente el nivel cognoscitivo de cada estudiante con respecto a la materia en estudio, se procede a implementar un conjunto de estrategias de enseñanza/aprendizaje para orientar al alumno, sin perder de vista la investigación histórica y epistemológica de la disciplina ya que éstas permiten al alumno percibir más claramente el contexto de la disciplina en estudio, en este sentido están en completa contraposición con las pedagogías tradicionales y las epistemologías conductistas. Es en este punto donde entran en juego el diseño del plan curricular y la función del profesor. En general no es sencillo pasar de un análisis histórico y epistemológico de una materia, a concepciones científicas específicas, esto exige que conforme se realice una "categorización conceptual del alumno", se lleve a cabo también una "categorización de las ideas científicas" como resultado de la interacción entre el análisis de la materia enseñada y la evolución de las preconcepciones del alumno (Astolfi y Develay, 1989). Se espera pues según los autores, que los alumnos comprendan cómo las ideas científicas evolucionan con el tiempo y que tales ideas no son las únicas representaciones de la realidad que nos rodea. El papel del profesor es por tanto crucial, ya que no sólo debe tener un buen conocimiento de su área, sino también debe tener un conocimiento de las técnicas didácticas disponibles para la enseñanza, tales como el diagrama UVE de Gowin y la construcción de mapas conceptuales (Gowin y Novak, 1984) entre otros.

La parte final del libro se dedica a implementar el modelo en los niveles de primaria y secundaria. Se presentan tanto para el nivel I (primaria) como para el nivel II (secundaria) tres temas específicos que son: la materia, el movimiento y la luz, desarrollándose para cada uno de ellos el modelo planteado.

Para cada tema y nivel se realiza una evaluación del proceso llevado a cabo, mediante las siguientes actividades: ejercicios de meta-aprendizaje, análisis de resultados del postest que consiste en la resolución (por parte de los alumnos del grupo experimental) de las mismas preguntas que resolvieron al inicio del curso, esto se contrasta con los resultados del pretest; se realizan también análisis de las categorías de las respuestas de los alumnos con el fin de indagar sobre el efecto del modelo.

La bibliografía se presenta en forma extensa, sin embargo, excluye varios trabajos publicados sobre el tema en los países de Europa oriental y Rusia, teniendo en cuenta la gran importancia de esta experiencia en la metodología de la enseñanza de las ciencias naturales.

En conclusión podemos afirmar que la propuesta contenida en el libro es de interés para los docentes y está apoyada por investigaciones en el campo de la enseñanza y el aprendizaje de las ciencias.

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Asdrúbal Moreno

ONDAS

Replegadas en místico arsenal
al empuje de vibrante excitación
surgen las ondas en forma natural;
fuerza pulsante de choque y reacción.

No se inquietan sus borlas onduladas
uncidas a algún medio de expansión,
si son electromagnéticas o hertzianas
galopan en el vacío con esplendor.

De energía, las ondas con desfases,
a partir de la fuente de radiación
en tren de: sólidos, líquidos o gases
se desbordan cual mágica ilusión.

Siguen la dirección del movimiento
sin perder su ruta de propagación
y por clasificación del pensamiento
transversales o longitudinales son.

Recorrido de la onda es un período,
longitud de onda es apellidado;
y el número de ondas de este lapso
es frecuencia, por la técnica, expresado.

En la propagación hay velocidad
que es la resultante de la división:
longitud de onda sobre duración
teniendo en cuenta: medio y densidad.

Cada vez que una onda incide
en algún obstáculo, a su paso,
se refleja, si nada se lo impide
frente a este intrincado pincelazo.

Al cambiar de medio en el recorrido
sufre la onda una desviación
y a este fenómeno obsesivo,
la ciencia denomina: refracción.

Cuando una onda ordinaria
incide y se refleja totalmente
y yace la reflejada en la incidente
las dos forman la onda estacionaria.

Explorando el campo ondulatorio
urgen cuerdas de piano y de violón;
notas de marimba bom de campanario,
tubos argentados de órgano y clarín.

Hay invasión de campos ondulares;
ondas magnéticas, gravitacionales,
halo celeste, voces de arcángeles,
sonidos y luces de extraterrenales.

Salud campos del misterio humano;
mayestático arcano ondulatorio,
son enigmático de rumor lejano,
coros sonoros del conservatorio.

Pedro Chaves Moreno