International Council of Associations for Science Education

Supporting and promoting science education internationally
The ICASE Newsletter

DECEMBER 2012

Welcome to the ICASE December 2012 Newsletter !

The ICASE Newsletter is a regularly distributed publication containing current information about topics of interest in the field of science education. The table of contents for this issue is located in the right hand column.

The International Council of Associations for Science Education (ICASE) was established in 1973 to extend and improve science education for children and young people throughout the world. Today, ICASE is a huge network of science education associations, institutions, foundations and companies, facilitating communication and cooperation at the regional and international level.

International Council of Associations for Science Education

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Science Education International

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ICASE Management and Exective Committee Meetings

On December 10, ICASE will hold its annual Management Meeting in Bangkok, Thailand. Among the many issues to consider is the new strategic plan adopted for ICASE. This envisages ICASE promoting excellence in science education and taking on a position of leadership in the new directions associated with the 21st century vision of science education, while still maintaing its links with Science Teacher Associations. This direction sees science education moving away from its dominance in knowledge acquistion and giving more attention to the eductional domain and especially attitudes and values. A more detailed account will appear in the next newsletter.

The ICASE Executive Committee, made up of all committee members (Management plus regional representative plus chairs of standing committees) will have a meeting on the 13th December in Bangkok, hosted by Suan Sunandha Rajabhat University. Major considerations will be given to implementation of the ICASE strategic plan in the coming years and also the organisation of the ICASE General Assembly, to be held during the World Conference in Kuching, Sarawak.

In addition to the meetings, the ICASE Executive members are involved in a running a one day workshop for a Thai audience on activity approaches to motivational science education using robotics, data-logging, micro-scale equipment and scientific literacy activities. These 4 workshops will run in parallel and will be preceded by an inaugural session related to the setting up of an ICASE-Thai science and technology education centre. The ICASE part is heavily directed to the support of science teachers through professional development programmes. It is planned to publish the workshop activities in a new ICASE science education journal. The workshops are followed by a one day seminar on Education for Sustainable Development and its promotion in a science education context. For the seminar, members of the ICASE Executive are joined by science educators from the Philippines, India, Russia and Thailand.

ICASE World Conference

The Upcoming ICASE World Conference is to be held in Kuching, Sarawak from the 29th September to the 3rd October 2013. The Call for Papers is now open and an electronic registration has now been up-loaded on to the website - WorldSTE2013.org

The theme of the conference, ***'Live Science, Love Learning, Create Change'***, addresses contemporary issues of importance to Science Teacher Associations, Science Centres, science teacher educators as well as both students and teachers as we move into the second decade after the millennium. It is intended to appeal to STEM, Geography and Sustainability areas.

There will also be two adjoining conferences - Solar and Hybrid Technologies beforehand and Safety in Science afterwards. A huge exhibition linked to a month of Science Festival is planned in Kuching.

In the ICASE Executive meeting , the role of ICASE in the conference will be discussed. There can be no doubt that the new strategic plan for ICASE calls for seeing 21st century science education as strongly relating to everyday life. In addiition, it is heavily geared to being delivered in strongly student motivational ways and through seeing change in the direction of teacher perceptions of science education, the need for major curriculum changes.

Readers are very much invited to suggest their vision and how ICASE can play a supportive role for its member organisations while providing a leadership that takes science education in a positive direction in the eyes of teachers, whether this is in a developed or developing country. A forthcoming book in the area of chemistry eduation recognises that education can be seen from 4 major directions. These, simply expressed, are promoting democracy, economic development, skill training and cultural enhancement. While the areas are not meant to be mutually exclusive, they do provide a new vision for education and science education in particular.

What makes a good examination question?

Jack Holbrook, ICASE Immediate Past President

This can be an intriguing question as the response may well depend on your point of view. If you are a student sitting for the examination, the response may well be – one that is easy to answer. From the curriculum developer's point of view a good question is likely to be one that matches the intentions of the curriculum. For the future employer a good examination question might well be one that is able to separate the more able student from the others. But how would you react to the idea that a good question is one that allows as many students as possible to pass the examination?

In my days as a science teacher, examination marks across the range of subjects which the students studied were added together and used to rank student performance within the class. This made it easy for me to ensure my subject was of much importance as al I had to do was make sure that the range of marks given in the examination for my subject was the largest among mark ranges in other subjects. If you like I tried to make the standard deviation much larger than those by other teachers. While the thinking of the other teachers was the students need to gain high marks, otherwise the subject would not be seen as popular by students. However, the rank order of the students in the class was heavily dependent on which subjects gave the biggest mark range. My mark range was usually by far the largest and hence strongly influenced the class rank order, If a student answered poorly in science, they tended to end up with a low class position. As the class position was all important and parents became aware of this through the school reports, students recognised the importance of working hard in science class.

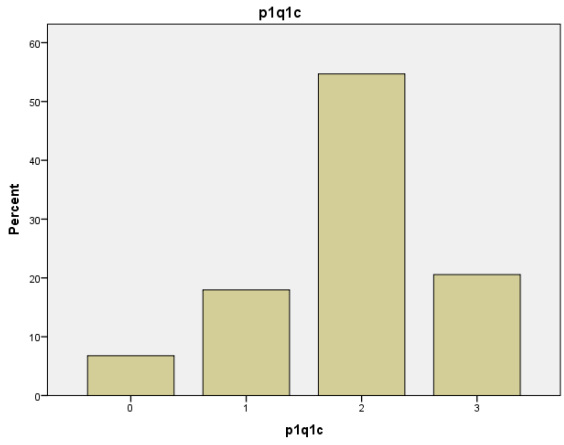
So what would be viewed as a good question by an examination board running an external examination? Would the examination board see the need to discriminate between stronger and weaker students and hence strive towards viewing good questions as ones with a high discrimination index? Or would the Board wish to see large numbers of students passing as it sets its questions within the curriculum confines? And of course it is possible to do both if the pass mark is taken as one end of the spectrum of marks awarded and 100% as the other. But in saying the above I have not, of course, said anything about the questions themselves. I have given a philosophical response without examining the purpose of the questions from an educational perspective. And it is here that the real value of good questions can be examined. Should a good question examine knowledge and conceptual understanding of the subject matter as put forward in the textbook or by the teacher? Or is it necessary to ensure that good questions are able to test student capability to go beyond the textbook and see the ideas being applied to new situations in an analytical or judgemental sense? Bangladesh is one country where it suggests both of the above are appropriate. It has introduced, perhaps uniquely, creative questions made up of a textbook part and a creative part. The questions are introduced by an original passage, story or situation. This does not come from the textbook or any other source seen by students. In this sense the questions are completely original, whether the questions are set within a science subject examination paper, or in other subject areas such as history, economics, introduction to business, etc. Initial parts of the equestion examine the underlying textbook knowledge asssociated with the subject topic related ot the initial passage.

However later, more demanding parts, focus on creative applications, analyical thinking or undertaking judgemental reasoning geared to the unique situation posed by the initial passage in the questions. Are these good questions? Certainly they are designed to separate the more able and lower ability students. And by making the textbook part more dominant in the question, the potential is there for all students to gain marks beyond the past mark. In Bangladesh they have introduced what can be called 70-30 questions – 70% marks geared to ideas introduced in the textbook and 30% creative components. And alhough it is through different test items the examinations also gear mulitple choice question papers with the same 70-30 division.

What about the outcomes? The examination in 2012 was the first time such questions were set in 21 subject areas at the end of grade 10 in secondary school. Approximately 1,000,000 candidates sat for these examinations, making this a huge exercise in logistics. As details per question are not collected, a small impact study was conducted to examine how well the questions function, both in the question parts for 70-30 questions and for the items in the multiple choice papers.

The two charts below show a typical picture for the two creative parts of a question, the first awarding 3 marks for a full answer and the second 4 marks. Partial marks re awarded based on relevant textbook knowledge (and limited creativity for 3 marks in the part d)

Part c



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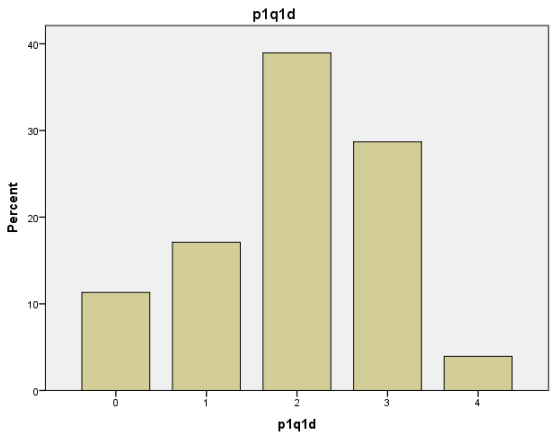

The pattern points to the Bangladeshi idea of good questions, whereby the more able students answer at the creative level, but the majority of students do not get beyond the comprehension level signalled by 2 marks (other parts of the question – part a and part b are textbook oriented and are typical well answered).

It seems the questions function well, are liked by students because they are more interesting and they can easily gain some marks. The drawback is with the question markers who need to very strictly follow the marking scheme – something they are not used to.

LD-skills project:

Development of learning design skills

for enhancing students' key competencies

Education and Culture DG
Lifelong Learning Programme

Argiris Tzikopoulos*, Research & Development Department of Ellinogermaniki Agogi, Athens-GREECE
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The LD Skills project is EU funded project.The aim of the LD-skills project is to have a positive impact on the development of students' problem-solving competencies by promoting the use of inquiry and problem-based approaches to teaching. To achieve this, a training framework was developed for training teachers how to create science lesson plans not just by providing exemplar solutions to problems that arise from everyday practice, but also enabling them to perceive effective lesson planning in relation to educational principles that may enhance students' problem-solving skills. Following the recommendations of the Rocard report on science education in Europe, the use of problem-based and inquiry-based approaches is important because they provide the means to increase students' interest and motivation.

More precisely, participants gets the theoretical knowledge and also the practical aspect by having the opportunity to put into practice what has been learnt in the course. Throughout the duration of the course teachers experience inquiry strategies in three different modes:

a) as learners participating in inquiry-based learning;
b) as teachers implementing inquiry-based strategies in their classes; and
c) as researchers collecting, examining and interpreting data about their practice and their students' learning.

The project captures a variety of pedagogical models (inquiry-based and problem-based learning) for facilitating the process of strengthening students' key competencies. This is achieved through the development, implementation and test of a training framework that provides a means for creating learning activities into a workflow, capture a wide variety of pedagogical models and, provide a vehicle for the sharing and re-use of learning design patterns in schools.

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LD-Skills Project Workshops in Turkey

Nineteen pre-service teachers from the department of science education attended the first workshop. 4 Researchers from the Project Team (one is from a German Partner) introduced the LD skills project and gave lectures on the learning design skills using educational portals developed by other projects. The workshops are conducted in three sessions: in the first session, teachers were introduced to the scientific literacy as the main goal of science education. The aim of the first session was to legitimise the necessity of learning and teaching through problem-based strategies and to educate the elementary students as scientifically literate. The second session of the workshop was related to the strategies to implement problem-based science education. In this session, science teachers experienced a chemistry topic through problem-based learning and discussed about the advantages and disadvantages of this teaching method. In the third session, pre-service teachers were made aware of the learning design. They were introduced to the concept of "Learning Design" and presented examples of portals for designing learning online for different purposes with inquiry-based strategies. Additionally, in the workshop conducted with experienced science teachers, Janchai Yingprayoon (ICASE Science and Technology Education Centres Chair) was invited to present examples of hands-on science teaching with easy-to-find materials. The effectiveness of the workshops was assessed via pre- and post- testing of the participants by scientific inquiry and nature of science questionnaires developed by the partners of the project. The results show that in terms of the understanding the scientific method, scientific interrogation, scientific hypothesis, and realization of investigation, the teachers tend to have slightly more accepted views after the workshop.

For more information please visit: http://www.ea.gr/ep/ld-skills/. **Project partners:** Ellinogermaniki Agogi School Greece; Humboldt-University of Berlin Germany; University of Vienna Austria; MENON Network EEIG Brussels; Dokuz Eylul University Turkey; Konstantin Preslavski University of Shumen Bulgaria.

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SAFE SCI: Be Protected!

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Dress for Safety!

The science laboratory by nature is a dangerous place. Time after time accidents are reported involving either students or teachers who were splashed and burned resulting from lack of personal protective equipment - no hand, body or eye protection. Although the laboratory can't be made totally safe using engineering controls, standard operating procedures and/or personal protective equipment, it can be made safer! A good place to start is in establishing a dress code and also, enforcing it. Teachers legally have what lawyers call "Duty or Standard of Care" when students are under their supervision in a science classroom, laboratory or out in the field. Duty of Care includes but is not limited to the following:

1. Duty to warn
2. Duty to Inspect for Safety
3. Duty to Enforce Safety
4. Duty of Maintenance

Always make sure students are warned about proper dress for the lab in advance so they come prepared. Then inspect to make sure the dress code is being followed. If it is not – enforce the code. This may mean removal from the lab or field activity.

Tips on Safer Dress!

A lab safety dress code should first be planned and then written into the lab's safety plan or chemical hygiene plan. In consideration of a safer dress code, the following items are a good place to start:

1. Footwear: The general rule is not to wear open-toed or high heeled shoes. If chemicals, glassware, heavy masses, etc. are dropped from the work bench, feet will get injured. Stay away from flip flops, sandals and other open-toed shoes. Also prohibit the wearing of slippers, shoes with open sides and heels. Only allow shoes which completely cover and protect feet. Do wear comfortable shoes along with socks to protect ankles and add padding to the feet.

2. Clothing: Many of the biological, chemicals or physicals present in the lab can seriously injure bare or unprotected skin. The operative term here is "barrier." Clothing and lab coats or aprons establish the necessary barrier to protect skin. Loose clothing can be a problem in that I can cause glassware and other equipment/supplies in the lab to be knocked over or dragged into flames or chemicals. Clothing should cover the chest, belly, back, sides, shoulders and upper arms. Cutoffs, muscle shirts, tank tops, etc. are out! The torso skin should be covered! Long pants, long skirt or long dress and shirts with sleeves should be worn in the lab. Given lab can be warm, clothing should be made from cotton or other natural fiber that allows air exchange. Clothes need to breath.
3. Hair Length: Long and handing hair has the potential to get burned, come in contact with hazardous biological or chemical samples, caught in moving parts, etc. Always tie back hair when working in the lab.
4. Eyes: The wearing of contact lenses in the lab can be a danger because they have the potential to absorb certain chemical vapors. This can prolong your exposure to the chemical and damage your vision. Always wear appropriate indirectly vented chemical splash goggles meeting the ANSI Z87.1 standard when working with hazardous liquids. Safety goggles or safety glasses can be used when working with physical hazards; e.g., meter sticks, projectiles, glassware, etc.
5. Hands: Always wear gloves when working with hazardous materials. Vinyl gloves protect hands when in contact with biological hazards. Nitrile gloves should be used in working with most chemical hazards. Latex gloves should be avoided, given they are an allergen for some people. Also do not allow artificial nails to be exposed in the lab. Acrylic nails are extremely flammable when working near burner flames or other heat sources.
6. Jewelry: Jewelry should be avoided when working in the lab. Some hazardous chemical vapors can damage valuable jewelry. Long handing chains or necklaces can get trapped in machines and should be avoided.

In The End!

Bottom-line is establish acceptable dress and body protection for both students and employees. Make sure the code is in writing and shared with laboratory occupants. The final piece is to make sure the code is enforced, including removal from the lab. Should someone get injured, you don't want to be liable or subject to litigation resulting from failure to enforce of Duty of Care!

Internet Resource:

1. National Science Teachers Association *Safety In The Science Classroom:* http://www.nsta.org/pdfs/SafetyInTheScienceClassroom.pdf
2. Connecticut State Department of Education, *Connecticut High School Science Safety: Prudent Practices and Regulations:* http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/science/safety/science_safety.pdf

The Association for Science Education
Promoting Excellence in Science Teaching and Learning

Science Education Research

ASE Annual Conference 2013 @ University of Reading

Wednesday 2nd - Saturday 5th January 2013

Research Seminar Series Promoted by the ASE Research Committee

We welcome papers on science education research topics.

The contributions can include:

- teacher education
- early years education,
- primary education
- secondary education
- curriculum development and evaluation
- pedagogy
- learning and assessment in science

We hope to have contributions from teacher educators, teachers, higher education degree students and from colleagues involved with curriculum development and evaluation.

Submissions
Please submit an abstract of no more than 500 words (in PDF format) to the ASE at f.j.woodhouse@hud.ac.uk setting out your research questions and rationale, background to the study, methods, findings and references (references are not included in the word limit).
All submissions will be peer reviewed and accompanying papers published in an on-line **Conference proceedings** and we welcome work in progress and contributions from across the world.

Format for submissions :

The presentations should be 20 minutes with an additional 10 minutes for questions.

Initial submissions **31st July**. A final conference paper (circa 2,500 for research in progress or circa 5,000 for completed research and available for publication) to be submitted by **31st October 2012**.

For registration details please see the ASE website www.ase.co.uk

ICASE World Conference 2013

Following similar conferences in 2003, 2007 and 2010, the International Council of Associations of Science Education holds the next World Conference on Science and Technology Education

Sunday 29 September - Thursday 3 October, 2013.
in the Borneo Convention Centre, Kuching, Sarawak. See: http://www.icase2013.org/

The theme of the conference, ***'Live Science, Love Learning, Create Change'***, addresses contemporary issues of importance to Science Teacher Associations, Science Centres, science teacher educators as well as both students and teachers as we move into the second decade after the millennium.

"Live Science" – encourages ICASE member Science Teacher Associations and Science and Technology Education Centres to recognize that science is more than just a subject at school, to impact knowledge and skills adopted from yesterday's approaches. The promotion of science education as interdisciplinary learning is a vital step toward promoting students' acquisition of 21st Century skills not only for sustainable and responsibly citizenship but for a career in an increasing science and technology driven world society.

"Love Learning" – focusses on the role of the teacher, and hence considerations for Science Teacher Associations and Science and Technology Education Centres, not only to guide students to want to participate and acquire the knowledge and skills for tomorrow's society, but that students' own self-motivation is a necessary and key factor in embracing science education as a crucial component of learning.

"Create Change" - deals with the role of Science Teacher Associations, Science and Technology Education Centres as well as teachers themselves in using science education at every level as a way of shifting the mindset on meaningful sustainability, from merely 'talking about' best pedagogical practices to 'undertaking' them, creating a generational change in student attitudes and values towards science and school and the role of leanring through science lessons in shaping their future lives.

ICASE World Conference 2013

Call for papers

WorldSTE2013 Call for Papers

Want to be part of what is shaping up to be the premiere science and technology education event of 2013?

Well now is your opportunity… The World Conference on Science and Technology Education (WorldSTE2013) is proud to announce the Call for Papers. With diverse topics and a unique destination that will inspire, WorldSTE2013 promises to bring the world of science and technology education to teachers, educators, policy officers and scientists worldwide.

The paper submission process can be viewed by clicking on this link

http://worldste2013.org/conference/call-for-papers.html

The deadline for paper submissions is 31 December 2012.

We look forward to seeing you in Kuching, Malaysia, 29 September - 3 October, 2013, for the most anticipated WorldSTE Conference ever on the theme:

"Live Science, Love Learning, Create Change"

ICASE Executive Committee 2011-2013

The ICASE Executive Committee is persons who make decisions on behalf of the ICASE Governing Body. The ICASE Governing Body is the **ICASE member organisations**.

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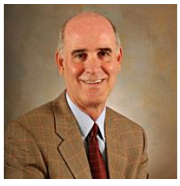

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