International Council of Associations for Science Education

Supporting and promoting science education internationally
The ICASE Newsletter

MARCH 2011

Welcome to the ICASE March 2011 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 chldren 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

http://www.icaseonline.net

Contents of Newsletter

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ICASE News

Jack Holbrook, ICASE Past President

1. Mailing System for ICASE Newsletters

In future, the ICASE Newsletters will be sent to interested science educators using a list serve. ***In order to receive future newsletters from the list serve, please subscribe to the new mailing list following the steps below:***

1. Please visit the web page below:
http://host246.hostmonster.com/mailman/listinfo/icase_newsletter_icaseonline.net
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3. You will receive a confirmation e-mail with a link. Just visit the link in the e-mail to complete your mailing list inclusion.

2. ICASE Mission

At a recent strategic planning meeting held in Penang, Malaysia, ICASE has set about updating its mission statement and strategic plans for the future. This includes re-examining the ICASE constitution and standing orders. More related to this will appear in subsequent newsletters.

For those of you new to ICASE, this international, non-Governmental organisation was set up to be an umbrella for national and regional science educator groups. Originally the intention was that ICASE would be guided in its actions by the member organisations and hence all ICASE Executive committee members would be from and would even represent, full member organisations. However over the years, this intention is proving to be untenable and many Science Teacher Associations are looking for support and guidance from outside. At the same time, ICASE officers through their many connections to developments in different parts of the world have recognised they are well placed to identify and promote new ideas as well as disseminate activities and actions by member organisations.

ICASE News (Cont.)

One step in the revised role of ICASE is the distribution of this newsletter to individual science educators, rather than the situation in the past where the newsletter went to the member organisation and it was left to that organisation to decide if and what should be further disseminated. Unfortunately there is one major drawback – language. As of now ICASE is only able to disseminate the newsletter in English, but especially in Europe and Latin America, the sharing of ideas is limited until such times as versions in other languages become available. If any reader does have interest in playing a role in widening the appeal of the newsletter, in whole or in part, ICASE would be extremely interested. Unfortunately, as with all ICASE work and that includes all undertaken by ICASE Executive committee members, any translation and distribution is voluntary. There is no payment.

3. RECSAM- ICASE joint Seminar

Participants at a joint RECSAM-ICASE Seminar in Penang, Malaysia 16-17 Feb 2011 Innovations in Science Education

Members of the ICASE Executive Committee making a presentation to the Director of SEAMEO- RECSAM

Eight members of the ICASE Executive committee were able to seek non-ICASE financial support to be able to come to Penang, Malaysia for an ICASE Executive Committee meeting. Associated with the meeting at SEAMEO-RECSAM (South East Asia Ministers of Education – Regional Education Centre for Science and Mathematics Education) ICASE joined with RECSAM in offering a seminar on Innovations in Science Education.

ICASE News (Cont.)

The Innovations stemmed from developments within the country from which the Executive Committee members originate, although a continual theme was interwoven through the presentations. This theme was STL (scientific and technological literacy) which ICASE heavily pioneered in the 1990, together with UNESCO, in Project 2000+. Project 2000+ called for STL for all and promoted :

- Understanding of the hazards ad risks in everyday life
- Appreciating the nature of science and technology
- Appreciating the role that science and technology play in present and future developments
- Understanding the science and technology in everyday life
- Enabling future citizens to make informed decisions
- Understanding sustainable development
- Respecting and appreciating the biodiversity of the world
- Understanding the process of collecting reliable and valid information

(2000+ Science and Technology for All, UNESCO, 1999 ISBN 0 86357 395 3)

The seminar recognizes that 12 years on, STL ideas as still heavily subservient to content based curricula and examinations and more is necessary for the goals of Science Education to more meaningfully address STL for all.

4. Extracts of the ICASE President's Report on ICASE in 2010

Two major events dominated ICASE activities in 2010 – the World Conference and the ICASE General Assembly. These have been reported in an earlier newsletter.

1. ICASE centres

The first centre is established in Guilin, China under prof Luo. It is now forging links to the 1st all China STA – CNASE (an ICASE member – Prof Luo is a vice-President).

2. Involvement of ICASE Executive members in national STA events

As President, I can report that I managed to attend the annual meeting of an ICASE member STA. This was the annual meeting of STAN where I was invited to give a presentation, as the ICASE president, to the well over 1000 delegates.

3. ICASE Projects

ICASE made the presentation at the European PROFILES project 'kick-off' meeting in Berlin, on 'Introducing PROFILES' to all 22 partners. Activities associated with this project will begin in 2011 and continue for 4 years. European STAs have the opportunity to be associated with this project which seeks to raise the professionalism of science teachers at the secondary level (grades 6-12) to promote IBSE (inquiry based science education) initiated from a student motivational beginning, while placing strong emphasis on a socio-scientific approach to conceptual science.

ICASE News (Cont.)

4. Activities of ICASE Regional Representatives

In 2010, regional representatives strongly engaged in the ICASE World Conference in Tartu, Estonia as well participating in the ICASE General Assembly and Executive Committee meetings held at this time.

Regional representatives were engaged also in other activities. Azian was involved in the planning of an ICASE/RECSAM seminar on Innovations in STE as well as disseminating publicity on World Conf. Ben was involved in trying to set in place preparations for an ICASE African regional conference in 2012: Declan – promoted the World Conference in ASE, UK as well as seeking advice from ISTA on setting up an online membership database; Bev publicised ICASE in NISMED, Philippines. Chris used the time since being nominated to translate the ICASE declaration into Portuguese and to distribute this to a number of Brazilian associations, including the Brazilian Society for Research in Science Education which published the declaration in full.

6. ICASE Newsletter and Journal

During 2010, eleven ICASE newsletters were produced and sent out by e-mail to any science educator who wished to receive it. The worldwide distribution was uneven – the greatest number of receivers was in Australia/New Zealand, while the lowest were in North and Latin America. A wider distribution is planned for 2011. Four issues of the ICASE journal (ISSN: 2077-2327) appeared online in 2010 under a new cover designed produced by Bulent. The June issue was of particular significance as it contains articles written only by ICASE Exec. Members – a first (but maybe not a last) for the journal. The design and formatting of the journal was undertaken by Bulent Cavas, whereas a number of ICASE Executive members played an important role in reviewing individual articles. To raise to the status of the journal, Bulent Cavas also added Science Education International (SEI) to be indexed and abstracted in -- ERIC (Education Resources Information Center)-- Education Research Complete Database - Index Copernicus Journals Master List -DOAJ Directory of Open Access Journals - and The Education Research Global Observatory.

7. ICASE Standing Committees

The World Conferences standing committee established that, using the standard ICASE mechanism, the next World Conference would be in Sarawak, Malaysia in Sept/Oct 2013. A conference website has been set up and preparations are underway. The ICASE website underwent a number of transformations during 2010 and now carries all past ICASE journal and newsletters. The Safety committee contribution during 2010 was confined to monthly articles in the newsletter and expanded webpages. These tended to concentrate on safety in schools from a developed country perspective and strived to raise awareness. Interest in Primary/Elementary or Pre-secondary education was shown to be high in the World Conference, especially thanks to the efforts of the chair of the Primary standing committee.

Follow up to the ICASE Tartu Declaration

Jack Holbrook

In the declaration, the participants at the ICASE World Conference in Tartu 2010 resolved that:

- STE (science and technology education) involves students developing and applying scientific conceptual understanding to make sense of contexts in their evolving world;
- inter-disciplinary learning in relevant contexts is essential, to reflect the nature of professional science and everyday science and to allow teachers to build on students' interests and questions;
- an integrated approach to STE needs to be implemented, because science and technology are inseparable as we move into the future;

Clearly these resolutions point to the need to inter-relate science education in school to the society around them. And clearly an inter-disciplinary and integrated approach is needed. But what do these statements mean and how are they to be implemented?

The first statement suggests the need to apply conceptual understanding. It suggests that acquiring conceptual understanding, as is typically tested in school examinations, is not enough. The teaching must go further, if the science is to have any useful purpose. Students need to be able to apply their learning in new situations. Would this suggest that a problem solving ability is intended? And does this suggest that students are expected to answer 'why does' or how does' questions by using their conceptual understanding?

If this truly is the case and, at the same time, we recognise that it is not possible to learn ALL conceptual science in the limited amount of time spend in science lessons in school, how can the conceptual science for the intended scientific problem solving be gained beforehand ? Is it not necessary to be aware of the problem to solve BEFORE learning the conceptual science? And if that is the case, does not the various 'problem solving in a society context' need to drive the conceptual science that is to be acquired? If it does not, how is the conceptual science to be applied to contexts in the students' evolving world?

Project PROFILES (a European Commission science in society project involving partners in 20 countries) is examining the appropriateness of a 3-stage model in which, first the context is identified; it is socio-scientific. Second the conceptual science is acquired and then, third the science is applied to the socio-scientific situation in trying to make sense of the initial context. If applying the science is an essential component of science learning, is this not a more meaningful approach? But project PROFILES has one more key factor that further reinforces this approach – by initiating the science learning in the students' frame of reference, it strives to capture students' inherent, intrinsic motivation in the learning of science. It recognises such motivation as an essential ingredient in science learning at the secondary level. In this way, project PROFILES also takes on board the second resolution indicated in the above.

Follow up to the ICASE Tartu Declaration (Cont.)

Interdisciplinary means linking disciplines. In this way we can link (or interlink) between chemistry and biology (biochemistry) or even between physics and history and thus obviously between science and social science. But, although it relates disciplines, or subjects if you wish, it does not necessarily suggest the components are integrated to form a unified whole. Yet this 'going across borders' is intended when operating a social, natural or non-human, context. Disciplines such as biology, chemistry and physics are divisions of convenience, not having clearly defined boundaries, just as science education - that is (for our purposes) the teaching and learning of science in a school setting - must be very much considered a social science, both in terms of its delivery in its social setting and in its areas of research applied to persons.

From the above, is it correct to say that science education is the inter-disciplinary combining of the natural sciences and education and hence the more this is an integral whole, the better? If this is the case, then what is the 'content' of this integrated science education? Surely it cannot be simply conceptual science! But it can be the applying of conceptual science to a social context ! And if this is correct, then integrated, interdisciplinary science teaching incorporates the socio-scientific problem solving, a consideration where this section began.

It answers the question, does it not – is a science teacher a scientist, or an educationalist?

The third resolution brings in the inter-relationship between science and technology. Would you say science and technology are integrated? Would you say they need to be taught in an interdisciplinary fashion? You would surprise me if you wished to separate the two. In fact, in a social context, we are hard pressed to find science apart from technology, especially if we reflect on the use of technological fertilizers on plants, or the processed foods we eat. I suggest we passed the era of teaching pure science a long time ago and a context–based approach puts technology as a major component, if not the rationale, for the teaching of conceptual science. In fact, science education today is not only interdisciplinary between science and education, but it is also interdisciplinary between an integrated science and technology. If prior success in scientific process skills is not an absolute for scientific literacy and the technical aspects are not a prior requirements for technological literacy, is there, in fact, any real difference between scientific literacy and technological literacy?

May I trust these 3 resolutions given above are the directions which science teachers need to seriously embrace in their teaching?

Annual Meeting of The Penang Association for Science and Mathematics Education

As part of the Annual Meeting of ASMEP on 20th February 2011, the ASMEP President invited Dr Jack Holbrook to give a presentation on Enhancing STL as a major thrust for science teaching in school. The theme of STL (scientific and technological literacy for all) is not new to ICASE – it was a major focus of Project 2000+ during the 1990s – but it appears that other factors associated with teaching do not favour its enhancement. Certainly curricula are content focussed, assessment strategies are content focussed and the teachers present in the meeting were asked to consider whether the teaching approach must therefore also be content focussed.

The presentation went on to consider whether a teaching approach which was initiated in the familiarity of the science in the society was worthy of consideration, especially if the purpose of learning in school, and thus science education, is promote a well-reasoning democratic society. This would suggest that STL is much more about skills in reasoning and critical thinking and about collaborating and cooperating between individuals than it is about gaining of so-called 'scientific truths' which become important for passing the examination but are quickly forgotten thereafter.

The ICASE Immediate Past President, ICASE Asian regional representative and President of the Association for Science and Mathematics Education in Penang (ASMEP), ICASE Latin American regional representative together with the President and Committee Members of ASMEP

Invitation to the 2nd Chung Ling International Student Camp (10 - 16 July 2011)

Chuah Yau Chou, School Principal

Greetings from Chung Ling High School,

Chung Ling High School is organizing The Second International Student Camp as a platform for students of different nationalities to acquire global interaction and explore the multiple cultural thinking through this bilateral exchange programme. This international camp is co-organized by the Parent-Teacher Association of Chung Ling High School.

Besides fostering cultural exchange, strengthening ties with students from well-established schools, and promoting Penang internationally, we hope to gather 200 foreign students and teachers from all over the world to participate in The 2nd Chung Ling International Student Camp from 10 - 16 July 2011 in Penang, Malaysia.

We hope that students from your school can participate in this camp. Participants must be students aged 14 to 17 years old. The Camp fee is USD300.00 per person. It covers meals, accommodation, inbound transportations, program, training and 'George Town World Heritage Site' educational tour. We would sponsor the cost (excluding traveling expenses) of one accompanying teacher who leads at least 10 students from your school.

Knowing that your school is actively involved in international programmes for students and teachers, we extend this invitation to your school. Please fill in the attached Reply Slip and email/fax it to us not later than 15th. April 2011. Should you need further clarification, please do not hesitate to contact Mr. Chuah Yau Chou, the Principal of Chung Ling High School (Tel: +604-8282435 / Fax: +604-8294462 / Email: clhsisc@clhs.edu.my) or Mr. Loh Eng Chuan, the Organizing Chairman (Tel: +6012-4929793 / Email: eclow09@hotmail.com).

We look forward to your favourable reply and support in making our 2nd Chung Ling International Student Camp a great success.

For further details, you are cordially invited to log on to:

i) www.chungling-internationalcamp.com
ii) www.clglobal.net.my

Thank you.

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SAFE SCI: Be Protected!

By Dr. Ken Roy
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EYEING SAFETY!
Vinegar, hydrochloric acid, lye and other hazardous chemicals being used in a laboratory type situation are well known substances for which appropriate eye protection is needed. As indirectly vented chemical can splash goggles, access to eyewash stations and more are also the 'order of the day.' However, what about students doing experiments involving measurements with metre sticks, using glassware, launching rockets or other projectiles, undertaking nature walks in the woods, etc.? No hazardous chemicals are being used. Do students and teachers need eye protection for undertaking these activities?

DUTY OF CARE!
The bottom-line is YES! Best professional practice, and in many instances legal standards, require appropriate personal protective equipment (PPE) in the form of eye protection in these types of situations. An example of how a legal standard can address this issue is as follows: Any person who is working, teaching, observing, supervising, assisting in or engaging in any work, activity or study in a public or private elementary or secondary school laboratory or workshop where the process used tends to damage the eyes or where protective devices can reduce the risk of injury to the eyes concomitant with such activity shall wear an eye protective device of industrial quality in the manner in which such device was intended to be worn (1).

Eye protection devices should meet minimum standards in terms of design, construction and quality. Any eye protective device used in school laboratories should be designed and constructed to resist impact, provide protection against the particular hazard for which it is intended, fit snugly without interfering with the movements of the user and be durable, cleanable and capable of frequent disinfection as prescribed for such devices by the school medical adviser. Eye protective devices should be composed of materials which are mechanically strong and lightweight, non-irritating to perspiring skin and capable of withstanding washing in detergents and warm water, rinsing to remove all traces of detergent and disinfection by methods prescribed by the school medical adviser without visible deterioration or discoloration. Metals used in such devices should be inherently corrosion resistant. Plastics used should be non-flammable. One final precaution should be noted. Be careful in selecting straps or bans for eye protective devices. These are often made of latex elastic material and some students may be allergic to them.

In the case of the metre stick – an uncontrollable, or accidental operation of a lever system can cause injury! A quick turn by one student holding the stick could result in the end of the stick in the eye of another student. And in situations involving glassware, should this shatter, flying projectile pieces could land in eyes of students. Projectile use, such as rockets, again may be on a trajectory which could injure the unprotected eye of observers. Walking in the woods during a school field lab. activity has its own safety issues, and one for certain is the potential for being poked in the eye by branches. In such cases, eye protective devices (e.g. safety glasses or safety goggles) should be worn by students, teachers and any other observers.

SAFE SCI: Be Protected! (Cont.)

Too often science teachers ignore appropriate personal protective equipment and, should there be a safety incident, can find themselves in legal entanglements, including negligence. Teachers have what is known as a "duty of care" for their students. If a teacher does not state the hazards associated with the activity, remind students about the need for eye protection and also does not enforce the use, the teacher is severely at risk for ignoring their legal responsibilities for student care. This also would be true for other employees or volunteers in the laboratory during the activity.

BOTTOM-LINE!
The bottom-line is – science teachers need to know the legal standards and best professional practices required by their employers, appropriate government departments and professional associations. When there is any chance of injury to the eye, it is better to be safe than sorry! Wear the appropriate eye protection. Also remember, additional personal protective equipment may be required at times such as gloves, aprons, close-toed shoes, etc. In such cases, make sure the PPE are quality built to meet appropriate safety standards.

Reference:
(1) CONNECTICUT HIGH SCHOOL SCIENCE SAFETY Prudent Practices and Regulations
Regulations Concerning Eye Protective Devices As Authorized by Section 214a of the Connecticut General Statutes.
http://www.sde.ct.gov/sde/lib/sde/pdf/curriculum/science/safety/science_safety.pdf

Resources:
ICASE Science Education Safety Committee website resources:
http://icaseonline.net/safety.html

Teaching Scientific Thinking 4 [1]

Colin Smith

We continue to explore a model of scientific thinking (see earlier ICASE newsletters for parts 1-3). One fear of teachers is that inquiry-based methods may foster misconceptions. Of course, misconceptions may develop anyway but, despite this, we often feel more secure when we tell pupils what they should know. The following example of pupil conception formation is interesting because pupils developed, using scientific thinking, a misconception during one type of inquiry. However, it was the inquiry nature of the lesson that brought it to light when it might otherwise have remained hidden. The pupils then tested their theory through experimental inquiry, again using aspects of scientific thinking and came, closer at least, to the accepted form.

My Understanding of the Eye Project

This was a project devised with a colleague[2] for a class of thirteen year olds. It was intended to allow more investigation than the teaching materials provided, while ensuring that assessment outcomes were covered. We were also developing what we called a 'pedagogical model of understanding in science.' Quite simply, it conceived of understanding as moving from disconnected understanding (things a person might know or, as it turns out, think he/she might know, about the topic but have not thought about in a connected way) to descriptive understanding (being able to describe the phenomenon or, in this case, the object, its parts and what they do) to explanatory understanding (being able to give reasons for the phenomenon or, again in this case, explain how the parts of the object work together to produce the result we observe – seeing)[3].

The materials used were simple. First, a blank sheet of A3 paper with the words, "I know" scattered a few times at random across it. The pupils were asked to turn the 'I knows' into statements about the eyes and to add as many more as they liked. If they saw that some were related, they could write them close together. This represented their disconnected understanding or, in some cases, various degrees of connected understandings that comprise everyday or folk understandings of the eye.

To use another common phrase, "We starting from what they understood." Perhaps naively, we had not really expected the strength of some pupils' prior understandings. One group, who became increasingly voluble and persuasive to their peers as the project progressed, subscribed to the explanatory understanding of light coming out of the eye to make vision possible (a 'superman theory'). However, we thought that they would be silenced as we moved on.

1. The work reported here is part of the S-TEAM (Science Teacher Education Advanced methods) Project. https://www.ntnu.no/wiki/display/steam/SCIENCE-TEACHER+EDUCATION+ADVANCED+METHODS
2. This was a former physics teacher working in supporting pupils with learning difficulties of which there were a number in this class.
3. This pedagogical model of understanding in science was loosely based on Mayr's (e.g.1997) analysis of types of questions in science – "What?", "How?" and "Why?". Although these forms of question are found in all sciences, in Mayr's view, there are differences between them. In this activity, the target forms of understanding fit Mayr's descriptions of Biological "What?" and "How?" questions. Biological "Why?" questions concern the reasons why the object (the eye) is the way it is and the answers lie in the historical narrative that tells the story of the eye's evolution. These were not a focus here. Mayr argues that this type of "Why explanation" contributes to Biology's difference from physical sciences. However, we were distinguishing in our pedagogical model between "How explanations" and "Why explanations" and focussing here on the former. However, in practice, 'how descriptions' and 'how explanations' probably merge. For example, descriptions of how the parts of the eye work are a major part in an explanation of how it forms an image.

The second stage aimed at the beginnings of descriptive understanding and utilised another sheet of A3 with a space headed, "Diagram of the Eye'" and a large table with the headings, 'Part of Eye' and "Description of What it Does". The pupils used the various resources available to work in groups to complete these sheets. The resources included the usual school textbooks, videos of the eye (including one of an eye dissection[4]), models of the eye and access to the Internet. All the groups successfully completed these sheets through interacting with all of these resources –they had the usual set of acceptable descriptions of function (i.e. in line with the normal scientific descriptions). However, to our surprise, the 'superman vision' theory persisted and was actually spreading amongst the class, despite the accuracy of the notes they had compiled and the evidence from the demonstrations of how the eye works in the videos. The theory seemed to be something like this.

- We see because light *comes out of our eyes* and hits objects.
- As evidence of this *we can see in the dark* – for examples, I can make out objects in my bedroom *after the light is out*.
- The reason that it takes a bit of time to see these objects after the light goes out is that the *iris has to widen to let out more light* in the dark.
- Bright light makes it easier for me to see because *it charges up my eyes* (some pupils), or *my eyes only have a certain amount of light so in bright light I don't need to use so much to see well* (other pupils).

Note that they are arguing from what they regard as evidence in support of their theory – they are thinking scientifically to that extent. However, they are also ignoring the counter evidence that they have collected and observed in the videos and other resources. Also, it seems likely that this misconception was so strong, at least in the pupils active in its dissemination, that it would also have existed if we had followed the usual worksheet-approach. It was the more open nature of these lessons that brought the misconception to light and gave them the freedom to propagate it. We tried presenting the counter evidence to them, but with little success.

We had to resolve this issue before moving to the third part of the activity. In the end, we had to challenge them to do an experiment that would convince us to drop our theory and to adopt theirs. The solution they came to was to use a reasonably large, windowless storeroom and to black it out completely, including the spaces round the door and the keyhole. We then gathered together in the room and, of course, could not see a thing, no matter how long we left the light off. They extended the experiment by pointing a small, unidirectional beam from a ray box at various objects and noted they could only clearly see what the beam pointed to. They tried charging up their eyes with the beam, but again noted they could not see anything as soon as they switched it off. They therefore, concluded that our theory was 'better,' in the sense that it was more consistent with this evidence than theirs.

[4] At this time, dissections of eyes by the pupils or by demonstration were not permitted. The dissection video aims to compensate.

Table 1: 'My understanding of the eye' project

Aspects of scientific thinking	Analysis
Observation	Supported in all activities, but strongly in the pupils' experiment – but see note in Pattern recognition.
Categorisation	Supported in the earlier activities as they identified parts of the eye
Pattern recognition	Supported - even their observations in support of the 'superman theory of vision' utilised observing and recognising patterns. However, their pattern recognition, and subsequent cause and effect thinking and co-ordination of theory and evidence, was based upon thinking that their bedrooms were completely dark.
Hypothesis formation and testing.	Supported. The pupils devised the 'darkroom test' themselves with no help from us.
Cause and effect thinking	Supported. However, the first stages in the activity seem, for reasons we do not really understand, not to have ensured that all pupils developed the expected form of cause and effect thinking. However, it did lead to a good bit of science on the part of the pupils in devising their experiment and, subsequently, amending their thinking.
Ability to separate and co-ordinate theory and evidence. Not ignoring/recognising the importance of disconfirmatory evidence. Realising one's thinking may be wrong and in need of revision.	Supported but, like for cause and effect thinking, not immediately as expected. In developing their theory of vision, the pupils were certainly co-ordinating theory and evidence. However, they were not considering certain evidence at all and also started from a mistaken observation that their bedrooms were completely dark. However, they did go on through their experiment to realising that their thinking might be wrong and in need of revision.
Visualisation	Supported through models, diagrams etc.
Making the implicit explicit in one's thinking. Developing control of thinking and representations - metacognition.	Supported. As noted in the text, this seems unlikely to have occurred in a less open learning environment.
Ability to use metaphor and analogy	Supported in theory debate
Use 'confirm early-disconfirm late' heuristic	Not supported
Collaborative (distributed reasoning)	Supported through group work and theory debate

This allowed us to move to the third activity aimed at them developing and presenting explanations of how the eye formed an image. In observing and discussing their presentations with them, it was obvious that variations in how well they could integrate their knowledge of the individual parts of the eye into an explanation of how it works still remained. There were also variations in their awareness of unexplained observations, such as the image being inverted on the retina but not experienced as such. However, given our aims to engage the pupils more effectively and to better support their development of understanding, we counted the project as successful since more pupils were better able to give overall descriptions of how the eye works than had been able to in the past. Also, marks in the assessment were good.

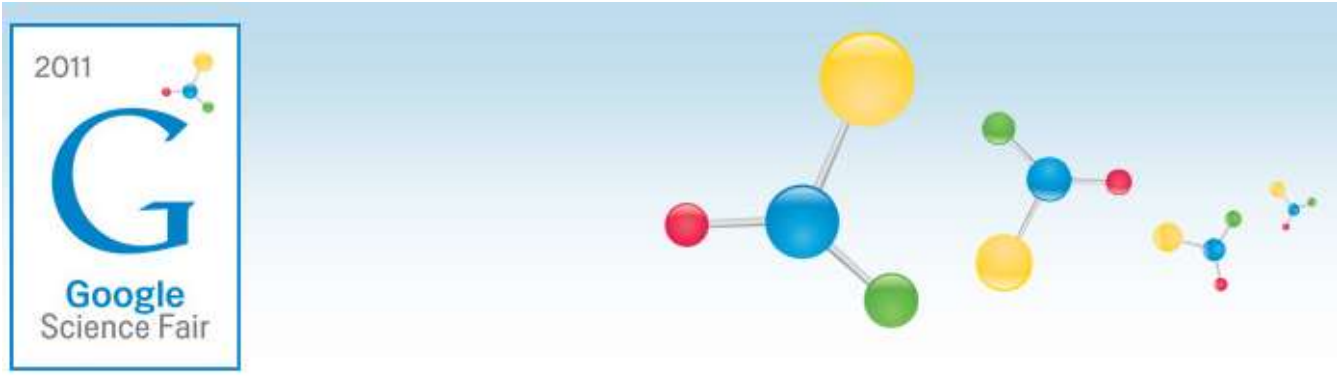
The point here is, though, how does it fare against our model of scientific thinking (Table 1)? Thanks to the unexpected extension, quite well it would seem. In fact, it is hard to imagine how some of this would have been achieved without initial pupil misconceptions that were revealed and challenged in the social exchanges between teachers and pupils and the testing of their own theory by the pupils. However, a point worth noting is that the hypothesis testing involved here is of a different type to the experiment and control model. In this case, predictions are made that are based on the theory, and those predictions are then tested and the weight of evidence assessed.

Perhaps we can be more relaxed about pupils' misconceptions when we can use them as a resource.

Mayr, E (1997) *This is Biology: The Science of the Living World.* Cambridge, Massachusetts: The Belknap Press of Harvard University Press.

Colin Smith, retired Biology Teacher, currently working as a Research Associate on Work Package 5 of the S-TEAM Project and based at the University of Strathclyde (colin.a.smith@btinternet.com).

Google Science Fair



On the 11 January 2011, Google is launching the inaugural Google Science Fair. We have partnered with NASA, CERN, National Geographic, Scientific American and the LEGO Group to create a new STEM competition that is more open, accessible and global than ever before. We wanted to reach out to educators prior to launch to let you know "the Google Science Fair is coming" and to extend an invitation to schools and teachers to get involved early in what we hope will be a large global initiative.

The Google Science Fair is a global competition that any student aged 13 - 18 from around the world is eligible to enter.

Students can enter as individuals or as teams of up to three. There is no entry fee and registration and submission will happen online. The deadline for submissions will be the 4 April 2011. The Science Fair will culminate in a "once in a life time" celebratory event at Google headquarters in California in July 2011 where finalists will compete for internships, scholarships and prizes in front of a panel of celebrity scientist judges including Nobel Laureates, tech visionaries and household names.

We want to celebrate and champion great young scientific talent and give students from around the world the opportunity to compete for amazing experiences, prizes, scholarships and internships.

We hope you are as excited about this upcoming competition as we are are! To sign up for fun and free resource kits for your classroom or school (Google bookmarks, stickers, posters and more!) and a reminder notification when GSF registration opens, please visit the Google Science Fair at: google.com/sciencefair

Best,

The GSF Team

Mini-symposium, Reading, 20-21 June 2011, UK

IOSTE
International Organization for Science and Technology Education

20-21 June 2011 (welcome reception on 19th)

Contemporary Issues in Science and Technology Education

The symposium is open to all working in the field of science and technology education, including established researchers, Masters and Doctoral students, and practising teachers in schools.

We invite papers on completed empirical research and theoretical issues in science and technology education.

In the first instance, send a 1000 word abstract in Word format to the coordinator, John Oversby (j.p.oversby@reading.ac.uk) including the frame for the research, the research questions, methodology, outline data, analysis, interpretation, implications, and selected references, for empirical papers and parallel areas for theoretical papers by December 31st 2010. Abstracts will be blind reviewed and invitations for full papers up to 12 pages sent to successful authors by January 30th 2011, to be received by March 30th 2011. We intend to seek a publisher for presented papers.

Oral papers at the symposium will have 20 minutes followed by 10 minutes discussion. If there is sufficient response, we will also accept posters for a special session.

Reading is close to Heathrow and Gatwick airports by frequent public transport, and easily accessible from budget airline Stansted and Luton airports.

IOSTE home page: www.ioste.org. Symposium home page www.IOSTE-NWE

The registration fee and other details will be available by October 2010

The International Conference on Teaching Science and Mathematics using Toys and Hands-on Activities, 4-7th July 2011, Thailand

The International Conference on Teaching Science and Mathematics using Toys and Hands-on Activities, 4-7th July 2011, Thailand

TOPICS

The conference will cover abroad range of topics on the use of toys and hands-on activities in scientific and mathematical research and teaching. The topics include, but are not limited to:

- Folk toys
- High-Tech science toys
- Using a laser beam in teaching science and mathematics
- Using a data-logger for science experiments
- Digital equipment for teaching science
- Environmental science activities
- Multimedia Learning in Science and Mathematics
- Science Exhibitions and museums
- Science Show
- Application of The Geometer's Sketchpad and Graphics Calculators

Etc.

TENTATIVE PROGRAMME

DAY 1: Monday July 4, 2011
- Registration
- Opening Ceremony
- Keynote Address
- Plenary Lecture 1
- Workshop 1: Environmental Science
- Workshop 2: Pottery and gardening
- Reception dinner

DAY 2: Tuesday July 5, 2011
- Plenary Lecture 2
- Plenary Lecture 3
- Presentation of Papers / Posters
- Concurrent workshop 3 and 4
- Exhibitions of Science Toys

DAY 3: Wednesday July 6, 2011
- Plenary Lecture 4
- Presentation of Papers / Posters
- Concurrent workshop 5 and 6
- Poster session
- Concurrent workshop 7 and 8
- Farewell Dinner

DAY 4: Thursday July 7, 2011
- Cultural Show
- Science Show
- Exhibitions of Science Toys
- General Discussion
- Closing Ceremony

PROGRAMMES

There will be keynote, plenary lectures, conference, paper presentations, poster displays and exhibitions. Details of the programme will be available from **http://www.ssruic.com**

CALL FOR PAPERS

Contributed papers highlighting news and recent development in the areas covered by the conference theme are invited.

THE CLOSING DATE

The closing date for submission of titles and abstracts (not exceed one page) is May 6th, 2011.

On request, the secretariat of the conference will send a personal invitation for participation in the conference. It should be understood that such an invitation is only meant to help participants raise travel funds or obtain visas, and is not a commitment on the part of the organizer to provide any financial support.

LANGUAGE

The language of the conference will be English.

REGISTRATION FEE

4000 Baht (Inclusive: Lunches, Refreshments, Reception and Farewell dinner, Workshop materials, Excursion and Cultural shows)

The organizer will arrange a special exhibition corner for Science Toys and Hands-on Activities from all around the world. The participants who would like to bring some folk toys or activity works from their homeland are very much welcome.

The Future of Science Education, 22-24 July 2011, Singapore

Blending traditional conference formats with 21st century technology, Science Singapore 2011 will be a unique meeting where the latest research and best practice in science education come together, presented by educators from around the world. There will also be multiple opportunities for social gatherings and sightseeing in this fascinating city and surrounding countries!

Features of Science Singapore 2011:
Three parallel presentation strands consisting of
Keynote speakers in science education, web-based technology, and inspiring lives;
Continuous short (20 minute) talks—two per hour with breaks,
45 minute presentations and 90 minute double sessions for interactive, practical workshops.
Session strands scheduled as one block and repeated during the conference for more attendance opportunities;
• Internet networking to promote the conference via Twitter, Facebook. Google, and Email;
• Long distance interaction with breakout groups via internet chats;
• Forums via Skype;
• Live online streaming of sessions;
• Technology mentors for participants;
• Download session videos;
• One half day devoted to “un-conference” format of posted topics, participant voting and flexible scheduling of most popular choices;
• Electronic and traditional message boards;
• “Viewing party” prospects for distance discussions in small local groups;
• Live and eight-hour delay broadcasts of sessions.
Coordinators: John Stiles, Bangkok, Science Educator and Consultant; and Rob Newberry, Singapore, Educational Technology Consultant who organized the first TEDx conference in Bangkok. Conference information: http://sites.google.com/site/scisg2011/

6th Science Centre World Congress, 4-8 September 2011, South Africa

6th Science Centre World Congress
4 - 8 September 2011
Cape Town, South Africa
Science Across Cultures

Science Across Cultures

The 6th Science Centre World Congress will be held in Cape Town, South Africa, 4-8 September 2011. Enjoy stimulating congress sessions, challenging workshops and lively debates. And enjoy all that Cape Town and South Africa have to offer - whale watching, wine tasting, a unique floral kingdom, big game safaris, beautiful beaches, unparalleled scenic beauty, and a friendly and diverse culture. With the theme "Science Across Cultures", the 6th Science Centre World Congress will encourage reconciliation between different cultures and a greater appreciation of the role that science centres can play in highlighting each culture's unique contributions to science, technology and science education.

Registration Fees and Information

Registration for 6SCWC will be opening in September 2010.
Congress Registration Fees
Registration – Early (until 3 June 2011) ZAR 5,525.00
Registration – Standard (until 19 August 2011) ZAR 6,525.00
Registration – Late ZAR 7,525.00
*Registration - Discounted (until 3 June 2011) ZAR 4,250.00
* Residents of low-GNI (gross national income) countries are eligible for a discounted registration fee.
If you would like to make your own accommodation arrangements at a B&B, hostel or guesthouse, the 6SCWC

Congress Secretariat recommends www.capestay.co.za. Please note that the Congress Secretariat can only make bookings at the designated congress hotels and cannot be responsible for accommodation booked independently by delegates.

Rates quoted are per room, per night, including breakfast, including 14% VAT, excluding a compulsory 1% Government Tourism Levy.

More details from the website www.6scwc.org

CARN Conference 2011, 4-6 November 2011, Austria

Bringing a Different World into Existence

The Collaborative Action Research Network (CARN) was founded in 1976. Since that time it has grown to become an international network drawing its members from educational, health, social care, commercial, and public services settings. CARN aims to encourage and support action research projects (personal, local, national and international), accessible accounts of action research projects, and contributions to the theory and methodology of action research. In line with the tradition, we would like to invite academics and practitioners by welcoming a diverse range of contributions, no matter what stage the research is at (from initial ideas through to completed reports and papers). There will also be opportunities to consider methodological issues.

Keynote Speakers
Peter Posch Herbert Altrichter Ingo Eilks Katherine Froggatt

Indicative Themes
- AR for unity and diversity
- AR for coping with the challenges of a knowledge society
- AR and workplace cultures
- AR in teacher education and professional development
- AR in palliative care and in nursing homes
- AR in health promotion
- AR and community development
- AR methodology and methods
- AR and Participatory Research in fields of social work
- AR in science education, environmental education/education for sustainable development
- AR in curriculum development, school development, networking and system intervention

Indicative Dates
30th April 2011 deadline to send a proposal
20th June 2011 answer for the approval of a proposal
1st July 2011 deadline for early bird registration
Call for papers and posters end of January 2011. Participative workshops are particularly welcome.

For more information please visit: http://ius.uni-klu.ac.at/carn

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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ICASE Executive Committee 2011-2013

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For more information about ICASE Executive Committee, you can visit ICASE Web www.icaseonline.net