

## **OCTOBER-NOVEMBER 2013**

#### Welcome to the ICASE October-November 2013 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 network of science teacher education associations, institutions, foundations and companies, working together to promote science and technology education around the world. ICASE facilitates communication and cooperation at national, regional, and international levels.



International Council of Associations for Science Education

http://www.icaseonline.net

To be included on the listserve for notification of future newsletters please follow the guidelines on <a href="http://www.icaseonline.net/news.html">www.icaseonline.net/news.html</a>

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**OCTOBER-NOVEMBER 2013** 

## ICASE News



Jack Holbrook

## ICASE General Assembly, held 29th September 2013





#### Delegates and observers present at the ICASE General Assembly, held in Kuching, Sarawak, East Malaysia

During the General Assembly, voting representatives of ICASE member organizations approved the ICASE Strategic Plan and accompanying Implementation Plan, and discussed the preliminary findings of the ICASE financial audit. The creation of the Global Science Education Fund (GSEF), as well as potential new projects were discussed and approved. Minutes of the General Assembly including a report on ICASE acitvities over the previous 3 years will appear on the ICASE website.

Elections were held during the General Assembly and we welcome three new members to the ICASE Executive Committee:

Dr. Bulent Cavas, President-Elect;

Dr. Manabu Sumida, Regional Representative for Asia;

Dr. Sue Dale Tunnicliffe, Regional Representative for Europe.

As per the ICASE constitution (<u>www.icaseonline.net/const.html</u>), these members will officially take up their positions from the 1st April 2014. In addition, two chairs of ICASE standing committees were appointed by the ICASE Executive, effective with immediate effect:

Dr. Baohui Zhang, Chair of the Research Standing Committee;

Dr. Gultekin Cakmakci, Chair of the 2016 ICASE WorldSTE Committee.

All other positions were filled by re-election, or re-appointments (see page 16/17 of this newsletter)



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#### The General Assembly approved the following:

#### 1) ICASE Strategic Plan

The ICASE Strategic Plan, anchored on a vision associated with **Excellence in Science Education** by the year 2023, was approved by the ICASE General Assembly. Details of the Strategic Plan can be seen on <u>www.icaseonline.net/const.html</u>. Within the plan ICASE also puts forward its mission towards this vision as one of **Leadership**. This has been agreed by Executive Committee members.

#### 2) ICASE Implementation Plan

The ICASe implementation plan to follow-up on the strategic plan was approved by the General Assembly on the 29<sup>th</sup> September 2013. This is now being established under six major themes and elaborated **for the medium to long term.** The plan will be placed on the ICASE website and will be elaborated in future ICASE newsletters.

#### 3) Global Science Education Fund (GSEF)

The GSEF, seen as a key development for ICASE in enabling it to play a strong role in promoting its Strategic Plan, was approved by the ICASE Governing Body, represented by the voting members present at the General Assembly. Further information on the GSEF will be made available on the ICASE website www.icaseonline.net/const.html.

#### **ICASE Membership**

Moving ahead from the near collapse in membership in the 2004-2007 period, currently, there are 27 organizations from18 countries (3 from Africa, 7 from Asia, 2 from Australia-Pacific, 4 from Europe, 1 from Latin America and 1 from North America) contributing to the financial administration of ICASE through paid membership fees for 2013. In addition, there are many organizations actively participating with ICASE that are simply unable to pay membership fees due to the economic situation in their respective countries. ICASE thanks UNESCO, as well as all Member Organizations, for their participation, assistance and support. http://www.icaseonline.net/link2.html

#### The Role of ICASE

ICASE provides opportunities for member organizations and their representatives to promote excellence and innovation in science teaching and learning for all through:

- \* maintaining network connections to science organizations around the world;
- \* offering opportunities to serve in international leadership positions on the ICASE Executive Committee, Standing Committees and international research initiatives;
- \* disseminating information to members of international science organizations through a listserv and publications;
- \* publishing research articles in the ICASE newsletter and in the peer-reviewed ICASE journal, Science Education International; and
- \* attending and presenting at ICASE regional events, seminars and workshops.

In addition, ICASE member organizations and their representatives receive reduced conference registration fees for attendance at all ICASE World Conferences. <u>http://www.icaseonline.net/membership.html</u>



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## ICASE WorldSTE Conference

Over 450 ICASE attendees from 34 countries were present at the ICASE World STE2013 Conference on the island of Borneo in Kuching, Malaysia. We thank UNESCO and all delegates for their contributions and active participation throughout the conference via presentations, poster sessions, panel discussions and input to the Kuching Declaration.

The Kuching declaration, focusing on generally applied actions and directions that need to be examine and possibly used over the next three years to lead to improvements in Science and Technology Education, as well as Sustainability or Environmental Education, will be available on the ICASE website pending final UNESCO review (see <a href="http://www.icaseonline.net/const.html">http://www.icaseonline.net/const.html</a>).



**Opening Ceremony** 



#### ICASE WorldSTE Conference

# Address by Ben Akpan, President of ICASE, at the Opening Ceremony of the 4<sup>th</sup> ICASE World Conference on Science and Technology Education Monday 30 September, 2013

On behalf of the Executive Committee and members of the International Council of Associations for Science Education (ICASE), I am delighted to welcome you all to the 4<sup>th</sup> World Conference on Science and Technology Education held here in Kuching, Sarawak, Malaysia. I welcome most especially Professor Datuk Kadim, Vice Chancellor of UNIMAS and Mr Gijzen, Director of the UNESCO Regional Science Bureau for Asia and the Pacific. ICASE is very grateful for the enormous support provided by both UNESCO and UNIMAS towards this conference.

It is noteworthy that this conference, which marks the 40<sup>th</sup> year of the founding of ICASE, is being held in Asia, as the region has a special place in the history of the organisation. In the 1950s and 1960s there was a general movement in various parts of the world to reform science education. There were at the time some challenges in the sector and core teachers were required in each country to help generate and implement ideas. It was thought that the ideal body for such intervention was science teacher associations (STAs) with membership spanning the entire educational spectrum. STAs could represent the authentic voice of the science teaching profession. Fortunately, they were already in existence in some countries. International co-operation was required to strengthen existing associations. UNESCO was anxious to act in this direction. Thus at the UNESCO Regional Workshop on the Teaching of Integrated Science, held in the Philippines in 1970, UNESCO was requested to facilitate exchange of information among STAs in Asia. As a first step, UNESCO collaborated with the Science Teachers Association of Singapore and the Singapore National Academy of Sciences to organise a meeting of leaders of STAs with Singapore as venue in June 1972. The main outcome of that meeting was the call for the establishment of an international federation of STAs, providing a forum for groups of people with similar ideas and goals and with similar problems to share their concerns and hopefully find solutions. Events moved very swiftly afterwards and ICASE was formally inaugurated in April 1973 at the University of Maryland in the USA with eleven members while Professor David Lockard, Director, Science Teaching Centre at that university was elected as the first President of ICASE and Mr Dennis Chisman as Secretary and Treasurer. Within ten years the membership grew to 44. The objectives of ICASE have since then been to:

- Extend and enhance the work of its member organizations.
- Provide and support activities and opportunities to enhance formal and non-formal science and technology education worldwide.
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- Establish and maintain an international communication network.
- Encourage and support the establishment and development of professional science and technology organizations, especially where none currently exists in a country.



In striving towards these objectives, ICASE activities have centered on:

- Helping business/industry to form partnerships to support and interact with science and technology education organizations.
- Promoting science and technology education research and its application to teaching.
- Promoting the exchange of science teaching personnel.
- Liaising with several organizations in an international movement to address the challenge of providing appropriate science and technology education for all.

The Governing body of ICASE is its General Assembly, consisting of one delegate from each member association together with any members of the Executive Committee who are not delegates. The Governing Body delegates the operation of ICASE to an elected Executive Committee, comprising of a President, President-Elect, Past-President, Secretary, and Treasurer and up to eight members elected on a geographical basis. The Executive Committee has the power to appoint chairmen of standing committees to further specific ICASE activities.

At a recent meeting in Penang, here in Malaysia, ICASE has set about developing strategic plans for the future. This includes re-examining the goal of ICASE in order that by its 50<sup>th</sup> Anniversary in 2023, the vision of the Association to provide the foundation and leadership in '*Delivering Excellence in Science Education Worldwide*' could be realized. Thus moving forward, ICASE envisions its role as helping to develop and sustain science teacher associations so that all science teaching is enhanced through collaboration, innovative methodologies and connections throughout the globe. In this direction, ICASE mission is to deliver and co-ordinate, enact and disseminate research, collaboration and resources that enhance the impact and growth of science education and science teacher associations throughout every continent. Indeed, ICASE is working on a range of actions designed to improve its fiscal position, fundraising strength, reporting and transparency of its financial position, accountability and adherence to due process, membership strength, and to assure that the organization has a permanent headquarters in the near future.

I am grateful to the world conference team led by Elaine Horne and Scott Campbell for the excellent arrangements they have put in place for this conference on the theme 'Live Science, Love Learning, Create Change'. I also wish to acknowledge the support of all speakers, the Executive Committee of ICASE towards the success of this conference. I commend specifically the exemplary role the ICASE President-Elect, Professor Teresa Kennedy, has played towards the holding of this conference. I like to end by extending a very warm invitation to everyone to participate in the next ICASE World Conference. This is being scheduled for Turkey in 2016.

Permit me to thank everyone for attending this conference as I do hope that you will find the experience particularly rewarding as we look forward with appreciation to your continued support for global science and technology education as a celebration of humanity's greatest, strongest, and most enduring heritage and one that continuously expands, elevates, and ennobles the frontiers of liberal education in our age.

Thank you all.



## NEW ICASE PROJECT called SMILES

A new ICASE Project has been approved by the ICASE General Assembly to follow up on Project 2000+, a project initiated by ICASE and UNESCO to promote Scientific and Technological Literacy for All. The SMILES project aim is to introduce a *Student Motivational, Inquiry-based Learning with an Education through Science* approach (hence SMILES). It is designed to support ICASE member organisations who wish, in turn, to use the ideas to support their member science teachers, teaching at the junior and senior secondary level (grades 7 upwards). The proposal is that ICASE runs/guides, through master trainers and exclusively for the benefit of key personnel indentified by ICASE member organisations:

- a) **Professional Development programmes** that are geared at persons who will wish to be involved in running their own professional development for science teachers within an interested, ICASE member organisation;
- b) **Exemplary Science Teaching Materials,** based on the SMILES philosophy and approach (seen as appropriate, with adaptation, for any science curriculum and operationalising 21<sup>st</sup> century skills and scientific literacy for all)

The major focus of the project is to offer ideas on a *Needs-Based* professional development approach on all, or a selective number of the following:

- a) Student Motivation and Context-based approaches that impact on students' intrinsic motivation.
- b) Inquiry-based Learning related to Student Centred Teaching.
- c) Goals of Science Education in a 21<sup>st</sup> Century and an Education for Sustainable Development focus.
- d) The Nature of Science and the changing Nature of Science Education.
- e) Scientific and Technological Literacy (STL) based on the long ICASE history in Project 2000+.
- f) Class Environment and Teacher Self-Reflection impacting on extrinsic motivation of students.
- g) Interdisciplinary teaching befitting a context-based approach related to key competences.
- h) Educational theoretical ideas such as Constructivism, Self-determination and Self actualisation.
- i) Student Assessment particular related to ongoing (formative), educationally meaningful feedback.

Also included is an introduction to the proven philosophy and guidance on the use of related Science Teaching Materials in the classroom situation, as well as the self-creation of such materials, based on an interrelated 3stage philosophy, taken from the science education literature. The ICASE project is especially designed for ICASE to play a Leadership role in **promoting Excellence in Science Education** as per the ICASE Strategic plan approved by the general Assembly. The professional development programmes and development of teaching/learning materials, although designed for science teachers, are not offered to teachers directly, but rather by ICASE offering support to interested member organizations (who in turn, with or without the help of ICASE) support their own science teacher members or contacts. For expressions of interest and more information contact:

Dr Janchai Yingprayoon, chair, ICASE standing committee on Science Education Centres (<u>janchai@loxinfo.co.th</u>) or Dr Jack Holbrook, chair, ICASE ad-hoc committee for Projects (jack@ut.ee).



## 1st Meeting of the Latin American Science Education Research Association

At its first meeting in northern Brazil, the Latin American Science Education Research Association decided to becoe a memebr of ICASE. ICASE welcomes the association and looks forvard to fruitful interactions.

The President of LMSERA is Dr Cersar Mora from Mexico.

The president is Dr. Cesar Mora from Mexico (see photo – centre figure).

The photograph also show Dr Antonio Cachapus (left) from Portugal and Dr Christiane Gioppo (Brazil) – the ICASE latoin American representative during a seminar in the conference on Science Teacher Education.





## **Primary/Pre-secondary Science**

## **The Cartesian Diver**

#### **Emma Wiffen and Steven Sexton**

For this edition of the ICASE newsletter, the following primary/pre-secondary activity was written by Emma Wiffen. Emma is currently a second-year student teacher in her initial teacher education programme at the University of Otago in New Zealand. In 2012, Emma completed the compulsory science component of her course, which introduced her to the Nature of Science and its importance in relation to the science learning area of the New Zealand primary school curriculum. In 2013, Emma is taking an optional paper in education through science which has its emphasis in how to incorporate science in classroom activities. In this activity, which Emma submitted as part of her course assessments and has given her permission to be used; she demonstrates her understanding of the Nature of Science and how to engage students.

## **Cartesian Diver**

The Cartesian Diver, named after French philosopher René Descartes, has been around for many years and adapted many times during its existence. The version I have made has been constructed out of low cost, recycled material. There are no batteries or electronics in the design. These factors, combined with the ease of construction and excellent content knowledge that can be taught in conjunction with it, make this a very



an be made and played with in a science classroom.

The materials required for this are generally available and easy to access. It only demands small paper clips, one small rubber band, a clear soda bottle with a lid (nothing smaller than 1.5 litres), and a straw (clear is best because it allows you to see exactly what is happening to the 'diver'). Scissors and a ruler are also needed for the construction.

Limited construction difficulty means this toy could be created with children of all ages. Younger children may need help with measuring and cutting their straw, and possibly filling the whole bottle. But everything else should be fairly easy for them to cope with.



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I made my Cartesian Diver in less than ten minutes. If you were teaching this to children in a classroom you should manage it in a lesson. Once they have constructed their toy, the science behind it can be discussed. Then you could move on to modifications that could be made and see how successful they may or may not be.



To construct a Cartesian Diver, you first need to measure and cut your straw to about 6 inches or 15 centimetres. Then bend it in half and ensure there is a hard crease where you bent the straw. Once you have bent the straw, wrap a rubber band around it a few times to hold the ends together. With the rubber band attached to the ends of the bent straws, the paperclips are then added as weight. Pull the outside end of the paper clip out and hook it on to the rubber band. Make sure you hook the clips downwards so there is no chance of them falling off.







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It is hard to know how many clips will be needed; the best way to find out is trial and error. I used a large jar, placing my diver in and adding more clips until the diver was almost submerged, but not completely. Once you have put on the right amount of clips you can fill your water bottle up. Place the diver in, twist on the cap, and you are ready to go. The final step is to apply force to the bottle to sink the diver, then release to watch it rise again.



The diver, made from a straw, contains an air pocket because it is not fully submerged in the water. When nothing is done to the bottle, the diver floats because its density is lower than that of the water due to the air. However, when the applied force of squeezing the bottle occurs the diver then sinks. This happens because we cannot compress water, it is virtually impossible to compress a liquid or a solid. Air on the other hand, can be



The water pushes inside the straw, compressing the air bubble. With less air in the straw, it has a heavier density. Gravity then acts on the diver and it sinks. When you release the applied force on the bottle, the diver rises back to the top again. The water is no longer compressing the air and the bubble can return to its normal size so it is buoyant again.

There are a number of different reasons for children to play. The types of play involved in the Cartesian Diver are to practice content knowledge and to re-enforce content knowledge.



The Cartesian Diver is in the Physical World strand of science for the New Zealand curriculum. This Physical World strand provides explanations for a number of things, including forces and energy. Without forces, this toy would not work at all.

The Nature of Science is the overarching strand in science with four achievement aims. Understanding about Science, Investigating in Science, Communication in Science, and Participating and Contributing in Science. Understanding about science is about asking questions about the science. <u>The purpose of these questions is to lead into further exploration and a deeper understanding</u>. Questions that could be asked about this toy and its science are: What would happen if we used something other than water in the bottle?; What would happen if we use two different liquids with different densities in the bottle?; and could we then have two divers, one in each liquid?. When students ask questions about the science it shows that they are thinking about how the Cartesian Diver works.

<u>Investigating in science</u> often comes after the questions the children have asked about the science. **Most of the questions could lead to further activities and constructive play to find out what will happen**. Limitations can arise with time constraints; if the class only has a few sessions to work on this particular activity then students may not get to investigate everything they would like to. Another constraint can be materials and costs. Sometimes you just do not have all that is required at your disposal to use. Some materials may be hard to source, or too costly to supply for a whole classroom. To mitigate a problem like this, you may be able to get enough material for a few Cartesian Divers that groups could make.

<u>In the Communicating in science strand</u>, children build their vocabulary in order to have a better understanding of the science they are being taught. There are a few important words the children should be able to understand and use when learning about, and discussing the Cartesian Diver. The children should be able to use the terms *applied force, density, compression, and buoyancy.* The emphasis here is using the vocabulary appropriately to discuss or describe what is happening as they play with their Cartesian Divers.

<u>Participating and contributing is the fourth strand</u> of the Nature of Science. This is where the learning needs to be linked to the children's world and their daily lives. For starters, the children have participated by creating their own Cartesian Diver and discovering how it works.



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So then, we go on to how the science contributes to their world. A real life example of what we have learnt is a human diver. When they are on the surface of the water they Florat, because they are less dense then the water due to the mount of air in their buoyancy compensator. When they release air from it, the weight belt makes their density heavier than the water and they sink. Children will understand that the divers float to being with, without the aide of the weight belt, as they are likely to have had experience swimming.

Another example of this, for older students, is submarines. Submarines use tanks of compressed air to control their density. Both work like the Cartesian Diver and children with an interest in either of these will particularly enjoy learning about the science behind the Cartesian Diver and relating it to human divers and submarines.

#### **Final Comments**

Emma has used her emerging understanding of science in the New Zealand curriculum to explain how and why a Cartesian Diver is relevant, useful and meaningful learning for students.

In other cultural contexts, the reference to divers and submarines may not be as applicable in how to explain why this activity is able to contribute to students' understanding of science and how it influences their world.

New Zealand, being an island natin, is why Emma chose to relate this activity back to a real-world activity many New Zealand students would understand.



## **Calendar of Events**

22nd Symposium on Chemistry and Science Education to be held at the University of Bremen, 19-21 June 2014

# Science Education Research and Education for Sustainable Development (ESD)

## Rationale

The 22<sub>nd</sub> Symposium on Chemistry and Science Education will coincide the end of the United Nations worldwide Decade of Education for Sustainable Development (DESD) spanning from 2005-2014. Already in the past, the Dortmund-Bremen-Symposia on science education focused the question of how science education research can help to improve science teaching and learning, and also which are the objectives to be followed. In recent years, debate on the challenge of the sustainable development of our future added another dimension towards this discussion. This additional focus and the coincidence with the end of the DESD provoked the organizers of the symposium to entitle the 2014 symposium:

## "Science Education Research and Education for Sustainable Development (ESD)"

This title simultaneously maintains and further develops many topics of the past symposia, in which we discussed the orientations and directions of science education research, questions of contemporary and successful science learning, and the role of research on science teacher education for it. The symposium in June 2014 will reveal and evaluate all these aspects even more in connection to a goals and strategies focusing Education for Sustainable Development within science education.

#### The main questions addressed will include:

- What does science education research revealed about students' and teachers understanding of sustainability issues and ESD?

- Which curricula and pedagogies are available to strengthen ESD in science education on secondary and tertiary level and what do we know about their effects?

- What do we know from research about fostering and hindering factors concerning the implementation of science education operated by an ESD approach?

- What do we know about attitudes, motivation and PCK of practicing teachers concerning sustainability issues and ESD in science teaching?

- How is science teacher training for ESD (pre- and in-service) operated and what do we know about the development of teachers' competencies in successfully applying ESD in science classes?

- Which research-based strategies do we have for implementing ESD thoroughly into to chemistry and science teaching by fostering science concepts simultaneously?

- What consequences does the interdisciplinary nature of most sustainability issues have for chemistry and science education?

- Which role might the informal and non-formal educational sector play to support ESD?

**Information** The 22nd Symposium on Chemical and Science Education at the University of Bremen will take place as announced. The symposium will start on Thursday (19 June 2014) at 10:00 a.m. and will be closed on Saturday (21 June 2014) at 2:00 p.m.



- **Call for posters**: The symposium will include a poster exhibition with poster short presentations. All poster contributors will be invited to contribute to the book of invited papers after the symposium. Applications for posters (authors, title, abstract of 5-10 lines) are welcome before January 03, 2014. A maximum of 25 posters can be accepted. Contact Ingo Eilks for further information at ingo.eilks@uni-bremen.de.

Provisionally, oral presentations are invited from speakers from 12 different countries and include: Avi Hofstein (Rehovot, Israel) and Ingo Eilks (Bremen, Germany) Franz Rauch (Klagenfurt, Austria) Debbie Corrigan (Melbourne, Australia) Shu-Nu Chang Rundgren (Karlstad, Sweden) John Oversby (Reading, United Kingdom) Susanne Bögeholz (Göttingen, Germany) George Bodner (West Lafayette, USA) Vania Gomez Zuin (Sao Paolo, Brazil) Rachel Mamlok-Naaman (Rehovot, Israel) Jesper Sjöström (Malmö, Sweden) Nicole Garner (Bremen, Germany) and Martin Gröger (Siegen, Germany) Andy Dicks (Toronto, Canada) Jan Alexis Nielsen (Copenhagen, Denmark) Yael Shwartz (Rehovot, Israel) Thomas Roßbegalle (Dortmund, Germany) Mageswary Karpudewan (Penang, Malaysia) Maija Aksela (Helsinki, Finland) Ute Stoltenberg (Lüneburg, Germany)

#### **Conference chairs**

Prof. Dr. Ingo Eilks, Institute for Science Education (IDN), Didactics of Chemistry, University of Bremen, Leobener Str. NW2, D-28359 Bremen, Germany, *ingo.eilks@uni-dortmund.de* Prof. Dr. Bernd Ralle, Department of Chemistry, Didactics of Chemistry I, Dortmund University of Technology, Otto-Hahn-Str.6, D-44227 Dortmund, Germany, *bernd.ralle@tu-dortmund.de* 

#### Information about venue, programme, travelling, accommodation:

http://www.chemie.uni-bremen.de/eilks/symp2014/index.html

#### **Final programme**

The final program will be published by January 2014 on the web at *http://www.chemie.unibremen.de/eilks/symp2014/index.html*.

## **Conference fees and registration**

A conference fee is not raised. Costs for travelling, accommodation and social events are on the participants.

Although the symposium is free of any charge a registration for the symposium will be warmly requested. This is done to allow better planning. For the social evening a binding registration will be requested. All information and the registration form will be published on the web accompanying the final program in January 2014.





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# **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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#### **Regional Representatives**



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## **OCTOBER-NOVEMBER 2013**

# **ICASE Executive Committee 2011-2013**

#### **Chairs of Standing Committees**



Safety in Science Education James Kaufman E-mail: jim@labsafetyinstitute.org



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For more information about ICASE Executive Committee, please visit the ICASE Website <u>www.icaseonline.net</u>