Welcome to the ICASE January/February 2019 Newsletter!

The ICASE Newsletter is a publication containing current information about ICASE initiatives conducted by ICASE member organisations, and topics of interest in the field of science education. The table of contents for this issue is in the right-hand column. The International Council of Associations for Science Education (ICASE) was established in 1973 by leadership at the United Nations Educational, Scientific and Cultural Organization (UNESCO) to link national science teacher associations and to extend and improve science education for children 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 internationally. ICASE facilitates communication and cooperation at national, regional, and international levels. The ICASE Strategic Plan (2013-2023) calls for ICASE member organisations to adopt a position of Excellence and Leadership in Science Education.

http://www.icaseonline.net

Over the past 40+ years, over 200 organizations have been members of ICASE. Currently, there are 32 organizations from 30 countries contributing to the financial administration of ICASE.
www.icaseonline.net/membership.html

The ICASE Newsletter is distributed to Member Organisations and through them to their members

To be included on the listserve for notification of future newsletters please follow the guidelines at:
www.icaseonline.net/news.html

Read or Submit a Manuscript to the ICASE Journal:

Science Education International

For information please visit our Journal web page:
http://www.icaseonline.net/seiweb

Contents of Newsletter

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ICASE World Conference on
Science and Technology Education
2-6 December 2019
Pattaya, Thailand

The 6th World Conference on Science and Technology which is organised by ICASE is scheduled for Suan Nong Nooch Garden Pattaya-Thailand from 2-6 December 2019. The theme of the conference is **The Future of Science and Technology Education**.

ICASE World Conferences are meant to further the vision and mission of the ICASE Association. The first World Conference was held in Penang, Malaysia in 2003. This was followed by other conferences in Perth, Australia (2007); Tartu, Estonia (2010); Kuching, Malaysia (2013) and Antalya, Turkey (2016). The International Conference Committee with the unflinging support of ICASE President, Bulent Cavas; the Local Convenor, Janchai Yingprayoon and all Local Organizing Committee members; is arranging a delightful conference for you.

Supported by renowned keynote speakers and presenters, the conference promises to be very rewarding. In addition, you have an opportunity to visit historical sites around the region by staying at the conference hotel with an offer of accommodation and board on payment of highly discounted fees.

We look forward to receiving you in Pattaya-Thailand and do hope that you are able to arrive on 2 December 2019 as recommended.

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ICASE World Conference on Science and Technology Education

STRANDS

The theme of the ICASE World STE Conference: The Future of Science and Technology Education

Strands for the ICASE 2019 World STE Conference:

Strand 1: Science teachers and STA role in promoting 21 century skills

Strand 2: STEM Education

Strand 3: Teaching and learning resources

Strand 4: Collaboration between formal and non-formal science learning contexts

Strand 5: Curriculum Development, Evaluation and Assessment

Strand 6: Innovation & Entrepreneurship in Science Education

Strand 7: Sustainability and Environmental Education

Strand 8: Information and communication technologies in science education

Strand 9: Career awareness in STEM related fields

Strand 10: Teacher Education & Professional Development

Strand11: Textbooks standards

Strand 12: Science Education Policy

Strand 13: Cultural, Social and Gender Issues

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IMPORTANT DATES

Conference dates: 2 – 6 December 2019

Paper submission period: 1 December 2018 – 30 September 2019

Notification of acceptances: 15 October 2019

Deadline for payment of registration fee: 15 October 2019

http://www.icaseonline.net/icase2019/

WORKSHOPS

Workshop # 1 Creative Science Workshop for Young Lear

Dee Jean ONG, Malaysia

Workshop # 2 Lab Safety

Bob Worley, UK

Workshop #3: Creative Science Toys Workshop

Janchai Yingprayoon, Thailand

Workshop #4: Engineering Workshop

Bulent Cavas, Jack Holbrook

Workshop #5: Ardinuo Workshop

Janchai Yingprayoon

Workshop #6: Seismology Workshop

Suan Sunandha Rajabbat Uni

Workshop #7: Ecosystem in STE

Suan Sunandha Rajabbat Uni.

Workshop #8: Global warming in STE

Suan Sunandha Rajabbat Uni.

Workshop #9: The use of Dinosaurs park in science education

Suan Sunandha Rajabbat Uni.

Workshop #10: The use of botanical garden in science education

Suan Sunandha Rajabbat Uni.

ICASE World Conference on Science and Technology Education

The World Conferences bring together policy makers, curriculum developers, scientists, science and university educators and researchers, science teacher association officers and of course primary and secondary science teachers.

As well as the usual conference sessions, the World Conference organisers timetable discussion sessions for all delegates which lead to the development of a Conference Declaration. The Declaration makes recommendations for world progress in science and technology education for the following three years.

Please check the conference website for information and involvement.

Conference Programme (can be accessed at http://www.icaseonline.net/icase2019/programme/)

Time	Day 1	Day 2	Day 3	Day 4	Day 5
09:00 - 10:00	Free Time	Registration	Keynote # 2	Keynote # 2	Workshop Session-II
10:00 - 10:15		Opening Ceremony	Introduction to Discussion Groups	Coffee Break (10:00 - 10:15)	Coffee Break (10:30 - 11:00)
10:30 -12:00	ICASE Executive Committee Meeting-I (Only for Executive Committee Members)	Keynote # 1	Discussion Groups	Concurrent Session # 3 (10:15 - 11:15) / Concurrent Session # 4 (11:15 - 12:15)	Concurrent Session # 8 (11:00 - 12:00)
12:00 - 13:30	Free Time	Lunch	Lunch	Lunch	Lunch
13:30 - 14:30		Concurrent session # 1	Excursion * Coffee Break	Concurrent Session # 5	Concurrent Session # 9
14:30 - 14:45		Coffee Break		Coffee Break	Coffee Break
14:45 - 15:45	ICASE General Assembly (It will start 15.30)	Concurrent session # 2		Concurrent Session # 6	Conference Declaration & Closing Ceremony
15:45 - 16:00				Concurrent Session # 7 ICASE Executive Committee Meeting-II (Only for Executive Committee Members) 17:00 - 18:00	
16:00 - 17:00		Workshop Session-I			
17:00 - 18:30					
19:00 - 21:00	Dinner	Dennis Chisman's Oration	Dinner		

NEWS FROM UNESCO

## From access to empowerment: UNESCO strategy for gender equality in and through education 2019-2025

"Despite progress in recent decades to expand access to education, more is needed" says the UNESCO Assistant Director-General for Education, Stefania Giannini. For this reason, UNESCO, the United Nations' specialized agency for education, is launching the strategy document "From Access to Empowerment" to articulate the transformative thinking and action that is needed to achieve gender equality in and through education, and the UNESCO's strategic investments towards 2025 to realise this transformation.

The strategy document can be accessed and downloaded online at https://unesdoc.unesco.org/ark:/48223/pf0000369000

The Global Education Monitoring Report is an independent annual publication, which is funded by a group of governments, multilateral agencies and private foundations and facilitated and supported by UNESCO. The 2019 report "invites readers to explore all the factors that perpetuate gender inequalities in schools. It provides tools to enable governments to analyse the situation in their own countries and to develop strategies for change. For the first time, the Report also provides a study of national education plans, focusing on countries with the greatest gender disparities in education" says Audrey Azoulay Director-General of UNESCO. The report can be accessed at https://unesdoc.unesco.org/ark:/48223/pf0000368753
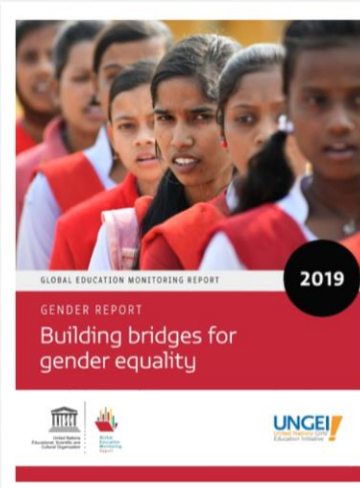
The power of education. Stories from four continents

A migrant family in a refugee camp in Greece seizes upon education to move towards the future. A woman in Burkina Faso attends an evening literacy class to catch up on her missed education. A teacher devotes her life to educating children in an isolated mountain village in India. And an indigenous woman in Guatemala helps other girls fulfil their dreams as she did.

UNESCO selected these four stories to display in an exhibition at the United Nations Headquarters in New York during the months of July and August 2019. Each story vividly brings to life the aspirations of Sustainable Development Goal 4 on education, which is part of the UNESCO-led Education 2030 Agenda, which sets a range of targets to improve access to and the quality of education worldwide.

You can read the stories online at https://en.unesco.org/themes/education/stories-four-continents

International Literacy Day

September 8th was proclaimed as International Literacy Day (ILD) at the 14th session of UNESCO's General Conference on 26 October 1966.

https://en.unesco.org/commemorations/literacyday

ICASE at NSTA 2019

ICASE participated in NSTA's **Global Initiatives Enhancing Science Education**. The event highlighted international activities occurring throughout the world at the International Share-a-Thon and Poster session held on Friday, 12 April 2019. In attendance were ICASE President Dr. Bulent Cavas, ICASE Immediate Past President Dr. Teresa Kennedy, and ICASE European Representative Dr. Sue Tunnicliffe. This annual event provides representatives from around the world with a networking platform within which to share their activities and research through poster presentations and group discussions.
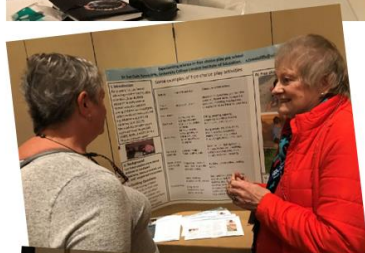
NATIONAL CONFERENCE ON SCIENCE EDUCATION

NSTA

ST. LOUIS
APRIL 11-14, 2019

FRIDAY, APRIL 12

Global Initiatives Enhancing Science Education: An International Share-a-Thon and Poster Session

9:30 AM - 11:00 AM

Room: Grand Ballroom D/E, Hyatt Regency St. Louis at the Arch

Join us to hear about international initiatives and programs on a diverse areas of science education including formal elementary to college science education, best practices, novel content delivery, scientific literacy, policy standards, and informal education.

Speakers:

Teresa Kennedy, International Programs Executive Director, The University of Texas at Tyler
Kabba Colley, Professor of Science Education, William Paterson University
Bülent Cavas, ICASE President-Elect, Dokuz Eylül University
Cem Yildiz, Dokuz Eylül University
Diandra Singh, University of Ottawa
Susan Douglass, Georgetown University
Gabe Kraljevic, Retired Science Teacher
Kimberly Good, Dalhousie University
Darlene Russell, William Paterson University
Kay Lembo, Manager, Queensland STEM Education Network, Griffith University
Emre Karagöz, Dokuz Eylül University
Shauneen Giudice, 7th Grade Science, Delmar Middle School
Tony Bartley, Science Education Professor, Lakehead University
G. Michael Bowen, Associate Professor/District XVIII Director, Mount Saint Vincent University
Elaine Manton, STEM Coordinator, Loreto Grammar School
Michael Odell, Vice President, The University of Texas at Tyler
Ozge Oral, Dokuz Eylül University
Donald Carpenetti, Chemistry Instructor, Craven Community College
Elizabeth Hobbs, Science Teacher, Webster Groves High School
Timothy Goodale, Elizabeth City State University
Juan Jimenez, Illinois Institute of Technology

Session Topic: General Science Education, Informal Science Education

Session Type: Hands-On Workshop

ICASE Posters are shown below:

Attend the 86th Annual NSTA Conference on Science Education and the Global Initiatives Enhancing Science Education event in Boston, Massachusetts on 2-5 April 2020. For more information see https://s6.goeshow.com/nsta/national/2020/index.cfm.

ICASE will post more announcements about next year's international event as information is made available. We hope to see you there!

Safety in Science Education

Ventilation in Laboratory

Dr. Bob Worley

I am mindful of the fact that man schools in the world do not have dedicated labs and science teaching takes place in general-purpose rooms. Some of our schools in the UK have well-built laboratories. However, schools may even be promised new science buildings and, we have found in the UK, that to save on expense, designers reduce the numbers of dedicated labs and the volume of space that teachers and students work in.

In all cases, ventilation is required,

- to provide enough oxygen for breathing,
- to remove carbon dioxide after breathing out,
- to dilute and remove body and other types of odours,
- to dilute and remove any contaminants caused by workplace activities, and
- to remove excess heat and may, if conditioned, provide comfortable working temperature.

The UK Health and Safety Executive (HSE) wish to reduce the number of breathing issues associated with working in enclosed areas. The ranges from lung cancer to sick building syndrome. The latter is a particular problem where teachers are working with 30 children in an enclosed space. It exacerbates symptoms of stress and anxiety, which is higher than average in education than in other professions. In my own case, I know when the carbon dioxide levels are increasing in a room. I feel hot and yet the temperature has not increased significantly. I being to breathe more rapidly and feel suffocated.

A UK laboratory in 1917

In this modern laboratory, the ceiling is much lower, there is more wall space for storage and display but fewer and small windows.

These photos show that rooms are very much smaller in volume than they were 100 years ago.

Opening the windows is not the simple option it once was. Building regulations need to address energy conservation and climate change and are often at odds with ventilation. Windows now have very narrow openings to limit energy loss although teachers remark that it is to stop students escaping or throwing objects out of the windows. On cooler days, windows (often with double-glazing) are shut tight. Some experiments, eg, measuring the heat of combustion of alcohols, require no air movement to be more effective.

A floor area of 85to 90m^2 will just about hold 30 students. Ceilings are about 3m high, giving a volume of about 270m^3. An office of a similar size may well have about 10 workers but in schools we may have many as 31 people within a small volume. HSE Guidance suggests that people in the room require 5 to 8 litres per second, per occupant. This means a minimum of 18m^3 per hour per person or 558 to 892m^3 per hour. I like to this this as about 2 to 3 air changes an hour.

CLEAPSS were asked to look into carbon dioxide in school laboratories. Research had shown that in primary (first) schools the concentration and work rate of students decreased as CO_2 levels increased. Bringing in specialised firms to monitor air quality is expensive but if schools have a CO_2 data logger, they can carry out monitoring themselves. In the following graph, the times when the door was opened at the end of a lesson results in a drop in the level of carbon dioxide. The operation of a Bunsen burner by all the children adds an additional supply of carbon dioxide.

This is the worst example CLEAPSS has monitored. By the end of the day, water was running down the walls and windows. The children and staff reported being completely exhausted being the room.

The school has now replaced these laboratories.

At 5 hours, a class turned the Bunsen burners on.
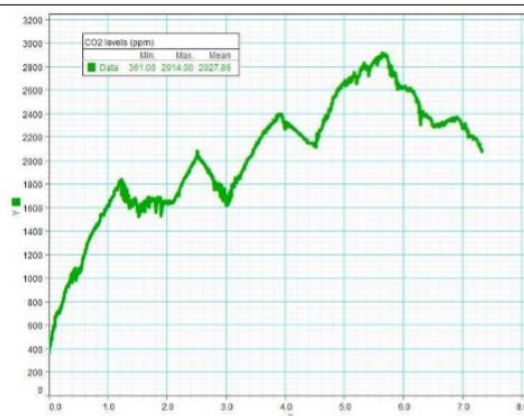
So recommendations from the UK HSE suggest

- The maximum concentration of carbon dioxide should not exceed 5000 ppm during the teaching day.
- At any occupied time, including teaching, the occupants should be able to lower the concentration of carbon dioxide to 1000 ppm.

To achieve this, and in agreement with the principles in BB101, CLEAPSS recommends that laboratories and preparation rooms have 5 ach and chemical storerooms 2 ach.

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Ventilation between rooms can be fraught with issues; odours and dust can be spread from room to room. Our worst incident involved the opening of a new school, where celebration latex balloons (with hydrogen) were burst only to find a person in another room with a latex allergy having to be taken to hospital Another issue is noise: Ventilation systems can be noisy and teachers have been known to turn them off.

Local exhaust Ventilation (LEV)

In laboratories, this means the fume cupboard. If workplace exposure levels for a toxic gas being used are exceeded, then the procedure must take place in a fume cupboard, to protect the employee from being exposed to the chemical.

In the UK, any LEV system must be tested every 14 months to ensure that the removal of toxic fumes is efficient. With the sash window set at 400mm, the flow must be greater than $0.3ms^{-1}$. This level was accepted in the UK for fume cupboards in schools after exhaustive tests at CLEAPSS, using toxic chemicals in the fume cupboard while at the same time monitoring levels of gas just outside the sash window.

There is no maximum limit but above $0.6ms^{-1}$, the fan motor may become very noisy, so much so that teachers have been known to switch the fume cupboard off while the toxic chemical is still being produced in the fume cupboard. At these higher velocities, flames may be blown out and the heating becomes less efficient due to the cooling effect of the incoming air. Readers must check local legislation, as it may well be different in each country.

Another contentious issue is the use of **re-circulatory** or **filter fume cupboards** (see diagram below) where the air containing a toxic gas is passed through a doped carbon filter to remove the toxic gas and the air put back into the room.
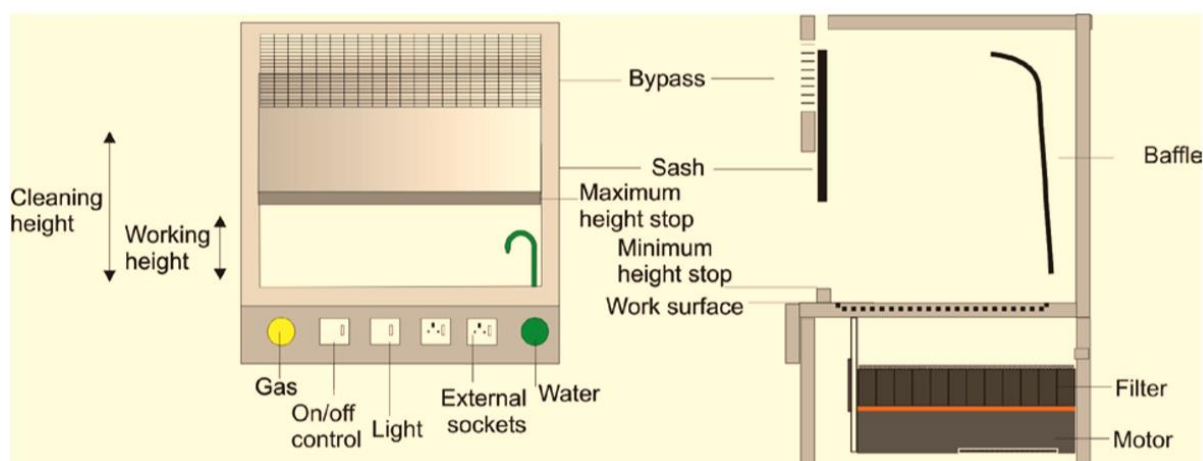
In the UK, we insist on a special educational filter in which the carbon granules are doped with sodium hydroxide and phosphoric acid to remove acidic and alkaline toxic chemicals.

These fume cupboards do work as I have used bromine and other toxic chemicals in them, but they require extra monitoring for the efficiency of the filter. As the toxic gas goes into the filter, the chemical is neutralised, but the number of neutralising sites diminishes on use. When the filter is not working efficiently, a new one has to be inserted. These are heavy and expensive. The replacement of filter depends of the level of use.

Design/technology activities have their own special issues with the removal of wood dust, metal fume etc. This takes place in different parts of the workshops at different times.

Examination of LEV on a 14-monthly basis in DT needs specialised examiners. Our HSE is especially concerned about wood dust, metal fume and paint aerosols because they are used regularly in occupations as well as school.

A recent innovation in schools has been 3D printing which produces odour containing organic chemicals. Advice is now available for 3D printing in schools.

If you wish to know more, you can always contact me via ICASE.

About this resource..

The Health and Safety Executive (HSE) was involved with CLEAPSS in producing this guidance. HSE endorses the guidance, as it follows a sensible and proportionate approach to managing health and safety. It explains how to manage the risks presented by FFF printers.

Click **here** to view.

Related searches:

3D | burns | fumes | G276 | manual handling | particulates | printing | security | trapping

https://www.gov.uk/government/publications/building-bulletin-101-ventilation-for-school-buildings
science.cleapss.org.uk/Resource/G9-Fume-Cupboards-in-Schools.pdf
http://dt.cleapss.org.uk/Resource/3D-printing-in-schools-and-colleges-managing-the-risks.aspx

Bringing computational thinking into STEAM
The purpose of science education in the 4ᵗʰ industrial revolution era.

Young-Shin Park (Chosun University, Korea)

What the 4ᵗʰ industrial revolution means in science education

When we are asked of the purpose of science education, we answer that all people are needed to be equipped with competencies to make decisions of weather the issues they face are right or wrong. For this, we need to know about what issues are, we need to demonstrate its process logically and if necessary, we need to argue and develop claims on the basis of evidences from those experimentations, but finally we need to give up those products if they are against ethics, which is called 'scientific literacy'. But now we need to extend the meaning of scientific literacy. Students need to know how to apply the concepts which they learn. Students understand some concepts and they can argue why those issues are critical or not with the use of those concepts, but we cannot be confident that students have the abilities to use concepts they learn in reframing the problems which they face, applying those concepts, and finally producing some solutions practical to those problems. For this purpose, STEAM (science, technology, engineering, arts and mathematics) education is developed so that students could learn science through other interdisciplinary subjects.
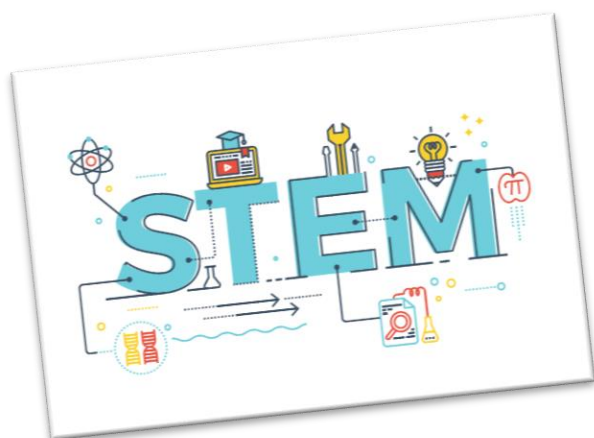
New educational policy: STEAM/STEM education

STEAM is the dominating educational policy in Korea for the last 10 years. Government put the emphasis of developing STEAM programs and employing them into the classroom with a lot of funding. But science teachers from K to 12 have been struggling to understand, develop, and implement STEAM programs as envisioned by the government.

The MOE (Ministry of Education), however, did not give enough time for science educators to research what STEAM education is and why we need STEAM but it spent a lot of funds for science teachers to develop STEAM programs to be implemented since STEAM has been introduced to science educators as well as science teachers. There had been trials and errors in settling STEAM education down into the context of STEAM program. Science has been taught through other 4 disciplines as tools, but surely the other 4 disciplines can be contents in certain points (MOE, 2009).

What do we expect from students through STEAM education? So far, we equip students with inquiry skills to find the answers from their curiosity. But making students to be satisfied with the results from curiosity is not the purpose of science education. We need to equip students to be more creative problem solvers of the issues they face from daily lives in the community through STEAM to meet the purpose of 4th industrial revolution era. At this point, there are some hardships from implementing STEAM into the classroom. Many science teachers are struggling to include the technology and engineering into STEAM program. How do we promote STEAM program to be successful in and out of schools? I could say that the using computational thinking can be one of the solutions for this purpose, STEAM revitalization.

Teachers measure and calculate the most efficient angle for Sun' light at summer and shared the idea of how to extend the curriculum for the practical experiments. Teachers also tried to develop the easiest and most efficient to measure the precise temperature in the room to be connected to automatic sliding roof at different seasons.

The definition of Computational thinking

Jeanette Wing (2006; 2008) describes the idea of breaking down CT into the 'The two A's of Computational Thinking', abstractions and automation. Abstractions are the mental tools that we use. They are the cognitive and intellectual skills that can be utilized to comprehend problems and then deduce and invent methods of solving the problems. The abstraction process includes choosing the right abstractions, operating simultaneously at multiple layers of abstraction, and defining the relationships between the layers. The second A, automation, is about the metal tools. They are the physical equipment, and also any computer software, that is used to help solve problems.

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Some examples of metal tools are computers, calculators, thermometers, and graphing software to help visualize the results. Automation is mechanizing our abstractions, abstraction layers, and their relationships. The second edition teacher resources for computational thinking (ISTE & CSTA, 2011) breaks CT down into nine different skills for students to master. Those skills are data collection, data analysis, data representation, problem decomposition, abstraction, algorithms and procedures, automation, simulation, and parallelization. Park & Park (2018), however, changed the last component of CT, parallelization, into generalization. Parallelization is not appropriate in science learning by its original definition. For example, some people would say that various variables can be checked for photosynthesis to see which variable is more critical that others by carrying out experiments by each variable. In this case, the component of data collection is notified not parallelization. Weintrop et al., (2015) breaks CT down into four major categories and then into a total of twenty-two subset practices. Park & Hwang (2017) also illustrated the use of CT as some concrete practices as connecting them in the science learning context so we can understand how those CT practices can occur and interact each other.

Teachers design the portable seismograph for detecting earth quake and deciding its scale with the use Arduino

Computational thinking in STEAM class in Korea

The inclusion of CT in STEAM is pretty observable and measurable so that we can conclude what kinds of components of CT and how much there are in STEAM program with specific topic. I developed and used 5 different practices of CT (Park & Hwang, 2017) to describe how much those CT practices can be illustrated and interacted each other through the program, climate change. The practices of 'abstracting',' connecting computing' and 'communicating and collaborating' are dominating rather than the other two practices, 'developing computational artifacts' and 'analyzing problems and artifacts. This domination was seen through the 10 lessons with the topic of climate change at middle school where students find the problem by themselves (in the community) and try to get the practical solution (photosynthesis bioreactor tool).

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From this study, I could conclude the developing STEAM program for the purpose of science education in the 4th industrial revolution era must be matched to equip students with competencies of CT. The usage of CT makes STEAM easier in the unit of T and E. Students tried to connect the problem to find out the solution by computational thinking practice. Students tried to evaluate their final product from the view of economics, politics, and environment, which can be more promoted through CT practices (Park & Hwang, 2017). I also found out that the different usage of CT at different levels with the use of 9 components of CT. I developed the STEAM (climate change) program from the elementary school level to high school one which I analyzed by 9 components of CT (generalization included). CT components were differently used at different levels, therefore, it is critical for students to learn required CT practices at expected levels from lower levels (ref: the CT practices of NGSS; NGSS Lead States, 2013).

Mr. Son and Mr. Kim joined the PDP of CT and they showed how their competencies and understandings about CT has been formed and changed.

Students can experience full CT components when they were exposed to contexts though which they faced problem, they decomposed problem into be manageable ones to be researched, and they built the best model by considering all possible factors to be solution. Therefore, it is critical for science program, especially, STEAM/STEM program whose purpose is to produce the practical solution, is the essential context where students can experience all possible CT practices. Lastly, when I worked with three experienced teachers for their expertise in science teaching through PDP program for CT, they showed their competencies as follows; they developed their lessons into two steps with the use of CT in STEAM program. The first step of using CT is one of forming science concepts with curriculum-based through mainly three CT components (data collection, data analysis, and data representation). The second step of using CT is one of applying science concepts with curriculum-revised through the rest of CT components (decomposing, abstraction, algorithm and procedure, automation, simulation, and generalization).

The teachers agreed that starting STEAM class with global issues (like PBL) is pivotal for STEAM program so that students could experience the full range of CT components to be creative problem solvers.

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The Team of CT in Gwangju city of Korea developed portable seismograph and empolyed it to measure how much the earthquake-resistant buldings are safe.

The usage of computational thinking explicitly into STEAM program

When we include CT component/practice into STEAM program, I am very confident that STEAM program can meet the purpose of science education, producing creative problem solvers for the 4th industrial revolution more efficiently and easily. For this, teachers' expertise in understanding and using CT in classroom must be proceeded in advance through the well-developed PDP.

Reference

Computer Science Teacher Association (2011). Computational Thinking Leadership Toolkit Ministry of Education (2015) 2015 revised information Curriculum

NGSS Lead States (2013) Next Generation Science Standards: For states, by states. Washington, DC: The National Academy Press.

Park, Y-S., & Hwang, J. (2017). The preliminary study of developing computational thinking practice analysis tool and its implementation. Journal of Korean Society of Earth Science Education, 39(4), 399-400 p

Park, Y-S., & Park, M. (2018). Exploring students' competencies to be creative problem solvers with computational thinking practices. Journal of Korean Society of Earth Science Education, 19(2), 140-160

Wing, J. M. (2006). Computational thinking, Communication of the ACM, 49(3), 33-35 p.

Wing, J.M. (2008) Computational thinking and thinking about computing. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences, 366(1881), 3717-3725 p.

NEWS FROM THE MEMBER ORGANIZATIONS

Lesotho Science & Mathematics Teachers Association – LSMTA

LSMTA- Maseru held a two days' workshop on the 10th-11th July 2019 at UNESCO. The workshop was sponsored by Department of Science and Technology and UNESCO. Presentations were from: Department of Science and Technology Director, UNESCO General Secretary, District Education Manager, NCDC, Lesotho College of Education lecturers, ECOL (markers and examiners), Thaka- khoali, Invetor world, Pearson and Hlalele H.S maths teacher.

The objectives of the workshopwas to equip teachers on how to disseminate new curriculum, with different strategies on how to treat problematic topics, to share among teachers the challenges on everyday teaching and learning of mathematics and science, and on how to prepare learners for the examination.

Australasian Science Education Research Association – ASERA

New co-editor-in-chief of Research in Science Education (RISE), the official publication of ASERA
A new co-editor-in-chief of RISE has been appointed to replacement Professor Donna King from the start of 2020. A/Prof Kim Nichols is the successful applicant and brings a wealth of experience in science education research. A/Prof. Nichols has been an Associate Editor for RISE and works at The University of Queensland as a STEM educator. A/Prof. Nichols has been appointed for three years and she will work alongside continuing co-editor-in-chief, A/Prof Angela Fitzgerald.

Save the date!! The Next ASERA Conference
ECR Day: June 23, 2020   Conference: June 23-26, 2020.   Novotel Wollongong, Northbeach.

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Australian Science Teachers Association

BUSH BLITZ TEACHLIVE 2019

In brief:

WHERE: Little Desert National Park, Victoria

WHEN: Thursday 24 October 2019 – Thursday 31 October 2019

DURATION: 8 days (6 school days). Depending on your location, you might need an extra day either side of these dates to travel to/from site.

WHO: 5 Australian teachers who teach years 4-12.

        One place will be allocated to an **early career teacher (teaching 3 years or less).

        Two places will be reserved for **members of the state and territory Science Teacher Associations.

HOW: To apply you will need to:

        -- complete an online application form addressing three selection criteria

        -- submit a short, 2 minute video describing why you would like to be involved in this Bush Blitz TeachLive expedition.

What is Bush Blitz TeachLive?

Bush Blitz is a national partnership between the Australian Government, BHP and Earthwatch Australia that aims to discover, document and describe the unique flora and fauna of Australia. It is the world's first continent-scale biodiversity survey providing the knowledge needed to help protect Australia's biodiversity. www.bushblitz.org.au

The STEM X Academy 2020

The STEM X Academy is a five-day residential teacher professional learning program open to Australian teachers across all sectors and levels of experience. The 2020 residential program will be held in Canberra from 5–10 January.

The focus of the program is the development of hands-on, enquiry-based lessons and activities using available materials, and adapting activities using methods to suit your classroom.

The Australian Science Teachers Association (ASTA) is the partner for the organization.

Applications now open for the best STEM PD you will get all year. The 2020 STEM X Academy will run in January. The 5-day program will bring 70 STEM teachers to Canberra to be immersed in a program developed by Questacon and CSIRO. For further information: https://stemx.edu.au/

International Council of Associations for Science Education

Australian Association for Environmental Education

National Science Week 2019

10-18 August 2019

National Science Week is Australia's annual celebration of science and technology. Running each year in August, it features more than 1000 events around Australia, including those delivered by universities, schools, research institutions, libraries, museums and science centres.

This year, the event took place between 10-18 August 2019.

Please visit https://www.scienceweek.net.au/ for the events during the week.

The Science Teacher's Association of Tasmania

Tasmanian Science Talent Search 2019

Destination Moon:
more missions, more
science, more opportunities

In recognition of the 50th Anniversary of the Moon Landing, STAT invites school's entries in its TSTS STEM Challenge.

The Tasmanian Science Talent Search (TSTS) is an initiative of the Science Teachers Association of Tasmania Inc (STAT). The TSTS is supported by an enthusiastic and committed group of sponsors. STAT's philosophy is to celebrate quality science teaching and learning in all Tasmanian Schools through the recognition of outstanding work in a variety of scientific areas.
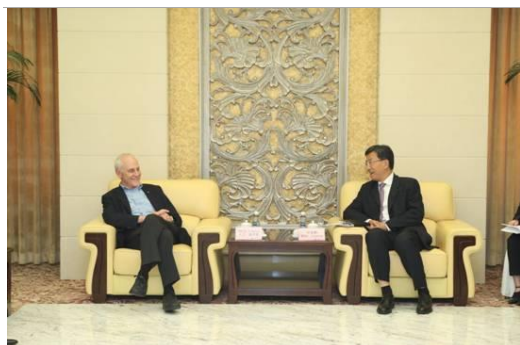
The 2019 TSTS Research Investigation Awards are now open. Entries close 5:00pm, Thursday 19th September 2019.

For more information: http://stat.org.au/tsts/

China Association for Science and Technology

Huai Jinpeng meets with APS President David Gross

Huai Jinpeng, executive vice president of the China Association for Science and Technology (CAST), met with David Gross, president of the American Physical Society (APS), on August 21, 2019.

The two sides exchanged views on how to advance China-U.S. science exchanges and cooperation.

Gwacheon National Science Museum

GNSM hosts Science Education Video Contest in 2019. The '2019 Science Video Contest' is a video contest that freely expresses all science-related fields such as scientific experiments, common sense, theory, maker creation, and other experiences.

https://www.sciencecenter.go.kr/scipia/videoContest/

The Science Museum will also conduct preliminary seminars on how to apply, video production know-how, and video production training for those who wish to participate.

European Science Education Research Association

This year, ESERA Conference is being held in Bologna, Italy. "The first and last time that ESERA was organised in Italy was more than twenty years ago, in 1997, in Rome" says Olivia Levrini, ESERA 2019 Conference President.

The theme chosen for this edition is "The beauty and pleasure of understanding: engaging with contemporary challenges through science education." For more information, please visit: https://www.esera2019.org/

International Council of Associations for Science Education (ICASE)
http://www.icaseonline.net

International Council of Associations for Science Education

UP NISMED and PALS Hold 1st National Convention on Lesson Study

Dr. Maria Helen Catalan
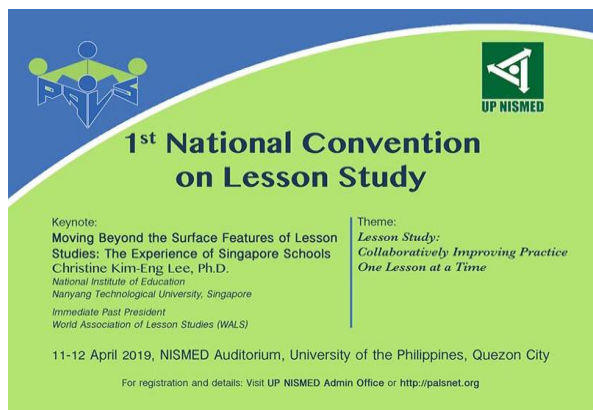
More than three hundred teachers, teacher-educators, administrators, and other stakeholders trooped to the University of the Philippines National Institute for Science and Mathematics Education Development (UP NISMED) to participate in the 1st National Convention on Lesson Study on 11-12 April 2019. With the theme *Lesson Study: Collaboratively Improving Practice One Lesson at a Time*, the convention aimed to 1) update participants on developments in lesson study at the international and local levels; 2) provide a forum for sharing of lesson study experiences and research results related to lesson study; and 3) encourage participants to research lesson study and produce research lessons to contribute in its development and adaptation to the Philippine educational context.

Dr. Fidel R. Nemenzo, Vice Chancellor for Research Development, University of the Philippines-Diliman, gives his message during the opening program of the convention.

The 1st National Convention was jointly organized by the Philippine Association of Lesson and Learning Studies (PALS) and the University of the Philippines National Institute for Science and Mathematics Education Development.

Local and international speakers were invited to give plenary lectures and symposia during the two-day convention. Delivering the keynote address *Moving Beyond the Surface Features of Lesson Studies: The Experience of Singapore Schools* was Dr. Christine Kim-Eng Lee of the National Institute of Education, Nanyang Technological University, Singapore. Dr. Lee, Immediate Past President of the World Association of Lesson Studies (WALS), shared how lesson study made its way to Singapore and how the interest in lesson study in Singapore has grown over the years. She detailed the case of a primary school in Singapore as the teachers went through each of the phases in lesson study. She underlined the importance of having a research stance in the conduct of lesson study. During the open forum, she mentioned that the heart of lesson study is the open class.

Plenary speakers with the officers of PALS and administrators of UP NISMED. (From left: Dr. Marlon Ebaeguin, UP College of Education; Dr. Erlina Ronda, Deputy Director for Research and Extension of UP NISMED and Vice President of PALS; Dr. Christine Kim-Eng Lee, Immediate Past President of the World Association of Lesson Studies (WALS); Father Onofre Inocencio, SDB, President of PALS; Dr. Aida Yap, Director of UPNISMED and Treasurer of PALS; Dr. Masami Isoda, University of Tsukuba; **Dr. Manabu Sumida, Ehime University and ICASE Representative**; and Dr. Arif Hidayat, Indonesia University of Education)

The plenary speakers during the convention were Dr. Masami Isoda of the University of Tsukuba, Japan, who talked about the School Curriculum Management for the Establishment of Learning Community and Teacher Standards and Dr. Manabu Sumida of Ehime University, Japan, who shared how technology can help overcome challenges in lesson study. Dr. Sumida demonstrated how an application he developed can be used in collaboratively analyzing a recorded implementation of a research lesson. Dr. Watari Hanai of Fukui University, Japan, shared his experiences in conducting reflective lesson study and professional learning communities while Dr. Arif Hidayat of the Indonesia University of Education, Indonesia, discussed the results of a research study as Indonesian teachers implemented lesson study. Dr. Teodora Salubayba of the University of the Philippines College of Education (UPCE) outlined the similarities and differences of action research and lesson study. Mr. Marlon Ebaeguin, also from the UPCE, shared how design-based technology can be used in researching lesson study. The convention also included three symposia on how lesson study can serve as a vehicle for teacher leadership development in public schools; examples on how to foster collaborative professionalism through lesson study; and examples of how lesson study was carried out in higher education institutions.

Poster presentations from teachers were also featured during the two-day convention. The posters related the teachers' research data and experiences as they implemented lesson study in their schools.

International Council of Associations for Science Education (ICASE)
http://www.icaseonline.net

UPCOMING EVENTS

The 16th Annual International Conference on Hands-on Science HSCI2019

September 2nd to 6th, 2019

Kharkiv, Ukraine

The 16th annual international conference on Hands-on Science, HSCI2019, will be held in Kharkiv, Ukraine, at the National Technical University "Kharkiv Polytechnic Institute", from September 2nd to 6th, 2019. This year the main moto of the conference is:

Innovative Education in Science and Technology

The Conference will provide the ideal opportunity for presentation of work and in the widest range of perspectives related to Science Education. The Hands-on Science Network is open to all views and approaches on Science Education. However, we advocate an active learning of Sciences through an enlarged use of hands-on experiments in the classroom. The aim of the Conference is to promote friendly and broad exchange of experiences on good practices, syllabus and policy matters, social factors and the learning of science, and other issues related to Science Education and its development.

Proposals are invited for oral or poster presentations, workshops and group discussions, hands-on experiments demonstration sessions, Science Fair booths and exhibitions or science shows/performances.

Important dates:

Abstract submission deadline: until June 28 (at 23:59 CET), 2019

Full paper submission deadline: until July 8 (at 23:59 CET), 2019

Early registration deadline: Friday July 20 (at 23:59 CET), 2019

More Information is at http://hsci.info/hsci2019/index.php

The 28th Conference of the Southern African Association for Research in Mathematics, Science and Technology Education

Hosted by **Rhodes University in collaboration with Nelson Mandela University**

Venue: Nelson Mandela University, Port Elizabeth, Eastern Cape, South Africa

Date of Conference: **Tuesday 14 to and including Thursday 16 January 2020**

Followed by a **Conference Writing Clinic: Friday 17th January 2020** (all day)

2020 Conference Theme: *Fostering Delight in Mathematics, Science and Technology Education*

Conference proceedings will commence on Tuesday morning 14th January with workshops facilitated by invited plenary speakers. The first invited plenary speaker presentation commences on the same day. The conference ends directly after the Gala Dinner on Thursday 16th January 2020. This is a full, three-day conference that consists of various types of presentations, described below and delivered by participating registered delegates.

2020 Plenary Speakers are:

1. **Emeritus Professor Terezinha Nunes** - Oxford University, United Kingdom. Her research is extensive and focuses on numeracy and literacy development covering both cognitive and cultural issues.

2. **Professor Umesh Ramnarain** - University of Johannesburg, South Africa. His main research interest is on inquiry-based science education in South African classrooms with a particular focus on complex and diverse learning contexts.

IMPORTANT FINAL DATES to diarise

Online submission of papers for review: see 1st Announcement	Wednesday 31 July 2019
Review process completed – advise authors of outcomes	Monday 30 September 2019
Final submission of re-worked long papers	Thursday 31 October 2019
Online conference registration opens	Monday 30 September 2019
Application for conference Writing Clinic closes	Thursday 31 October 2019
Payment of registration fees by all presenters[1]	Friday 29 November 2019
Provisional programme released to presenters	Wednesday 4 December 2019

For more information, please visit: https://www.saarmste.org/conferences/conference-info

International STEM SUMMIT

November 21-24, 2019
Shangri-La's Mactan Resort
Cebu, Philippines

photo: www.pnri.dost.gov.ph

Strengthening STEM through Global Crossvergence

Aims & Objectives

- Provide a platform for Global Crossvergence, where ideas and latest findings from STEM research and practice are shared
- Build a community of global STEM leaders who will work together towards innovative solutions
- Articulate future pathways for shared initiatives from sectoral alliances to advance STEM

Participants

STEM leaders in the government, industry, and academe. The summit will be capped at 500 participants.

Summit Details

Background

Developing a STEM literate citizenry who can synergize their skills with the needs of both local and global communities is important if we are to navigate through a rapidly changing world.

This First International STEM Summit emphasizes the imperative for shared efforts among diverse sectors and provides a platform for cross-sectoral dialogue and collaboration among government, academe, and industry.

Thematic Areas

The three-day summit for 2019 will feature sessions from these themes:

- **STEM Situationer:** What are the current status, trends, and directions in STEM?

- **STEM Leadership:** What are effective strategies, practices, and policies in supporting STEM?

- **Making STEM Happen:** How can we engage government, education and industry to work together for STEM?

- Current Trends and Directions in STEM
- Creating Access to STEM Education, Research, and Resources
- Enhancing Quality of STEM Education, Research, and Programs
- Teacher Education and STEM
- Diversity in STEM Education
- Inclusive STEM Education
- STEM Curriculum Models and Cross-curriculum Links
- STEM Education in Informal Contexts
- Educational Policy, Leadership and Management for STEM
- Innovation and Entrepreneurship in STEM Education
- Closing the Industry-Academe Gap in STEM
- Effective Policies that Promote and Support a STEM and Innovation Culture

International Council of Associations for Science Education (ICASE)
http://www.icaseonline.net

STEM LEADERSHIP ALLIANCE

FIRST INTEGRATED STEM LEADERSHIP SUMMIT IN ASIA

ORGANIZED BY
STEM LEADERSHIP ALLIANCE
PHILIPPINE AFFILIATE

INSPIRED BY **UNILAB FOUNDATION**

NOVEMBER 21–24 2019

SHANGRI-LA MACTAN
CEBU CITY, PHILIPPINES

STRENGTHENING STEM THROUGH GLOBAL CROSSVERGENCE

SAVE THE DATE

The International STEM Summit invites submissions for *individual paper sessions* and *workshops*.
If interested, please visit StemSummitPH2019@unilabfoundation.org

International Council of Associations for Science Education

The 34th NSW Environmental Education Conference ActiveNature: Learning, Citizenship and Activism for Sustainability is being held from 3-5 October 2019 at the Kirrawee High School in partnership with Sutherland Shire Environment Centre.

Who should attend?

Environment and sustainability educators, environmental advocacy groups, bushcare and landcare facilitators, environmental activists, school teachers, early childhood educators, businesses, anyone who cares about our environment. We welcome attendance from young grass-roots activists and people with fresh perspectives on these long term issues.

Call for abstracts

Conference organisers are now accepting abstracts for conference presentations, short talks, workshops and posters. Abstracts are due by 5pm on Friday 21 June 2019.

Conference website

For more information and to register, visit the NSW AAEE conference website, at http://www.nsweeconference.org.au/

ICASE Journal - Science Education International

The ICASE quarterly journal is now about to enter its 26th year. From humble beginnings in 1990 when it was created to serve as the dissemination channel for ICASE, the journal has now grown to be a major English language international science education journal, receiving articles from science educators around the world. Thanks to its team of volunteers, the journal follows a strict review process to ensure the research and philosophical articles meet the ICASE criteria as relating to primary or secondary science education, or to pre-service teacher education at the tertiary level. Since 2008, the journal is available as open access, online only, although limited copies of occasional issues are published and distributed to interested science educators.

THE ICASE JOURNAL IS A MAJOR DISSEMINATION CHANNEL FOR ICASE MEMBER ORGANISATIONS AND THEIR MEMBERS. AS SUCH, ICASE GIVES PRIORITY TO ARTICLES SUBMITTED VIA ICASE MEMBER ORGANISATIONS AND IS VERY WILLING TO ASSIST MEMBER ORGANISATIONS IN PREPARING ARTICLES FOR THE JOURNAL (especially with respect to written English).

A major attraction of SEI is that there is no payment for those wishing to publish in the journal. And ICASE welcomes submissions by teachers, higher degree students or science educators in general from around the world. ICASE will do its best to assist authors whose native language is not English.

Before making a submission, please consult the Author's Manual for SEI located at www.icaseonline.net/seiweb for information related to the following topics:

- (a) Copyright
- (b) Plagiarism
- (c) Language
- (d) Material submission
- (e) Formatting
- (f) Artwork & Photos
- (g) The Review Process
- (h) Non-native English authors

And we very much appreciate referencing articles previously published in SEI in your submissions.

ICASE also welcomes new reviewers. If you are interested please contact Dr. Baohui Zhang, Chair, ICASE Research and Publications Standing Committee at baohui.zhang@snnu.edu.cn.

Please refer to www.icaseonline.net/seiweb for the full articles.

SCIENCE EDUCATION INTERNATIONAL
ICASE Online Journal

Science Education International is now indexed in

- AE Global Index Master Journals List 2015
  http://aeglobalindex.com/?page_id=264

- European Reference Index for the Humanities and Social Sciences (ERIH Plus)
  https://dbh.nsd.uib.no/publiseringskanaler/erihplus/periodical/info.action?id=480336

In addition to 6 international indexes, including ERIC, The Asian Education Index, Education Research Complete Database, Index Copernicus Journals Master List, DOAJ Directory of Open Access Journals, and The Education Research Global Observatory.

ICASE Executive Committee 2017-2020

ICASE membership spans the world led by an Executive Committee, with a Management Committee (President, President-Elect, Immediate Past President, Secretary, and Treasurer) responsible for the day-to-day administration and working closely with Regional Representatives and Chairs of Standing Committees. Presidential terms are noted below.

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(Presidential Term: 2014-2017)**
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ICASE Newsletter:
http://www.icaseonline.net/news.html

ICASE Website:
http://www.icaseonline.net/
The ICASE Constitution, Strategic Plan and World Conferneence Declarations can be viewed at:
http://www.icaseonline.net/const.html

Regional Representatives (2013-2016)

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