E·A·S·E
East-Asian Association for Science Education

The Newsletter of
The East-Asian Association for Science Education
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http://theease.org

Vol.8, No.3
No. 0031
September. 30, 2015

Beijing Normal University
No.19, Xinjiekouwai Street
Beijing, China
+86-10-58805862
Fax: +86-10-58802075

Promoting Science Education Reform Through Research

We are very pleased to invite EASE members and other science educators and scientists to the forthcoming EASE 2015 conference. This conference will be held at Beijing Normal University, Beijing, China, on 16–18 October, 2015. Beijing, the capital of China, is the country's political, cultural, and educational center, where tradition and modernity coexist harmoniously. We are sure that you will enjoy the history, vigor, beauty, modernity, and diversity of Beijing.

The theme of the EASE 2015 Conference is "Promoting Science Education Reform Through Research". The conference aims to build an international platform for science education practitioners, researchers and policy-makers throughout the East Asia regions and around the world to share and discuss how to promote science education reform through research.

You can download the Conference programme at:
http://ease2015.csp.escience.cn

Invited Speakers (in alphabetical order)

Anderson, Charles W.
Michigan State University, USA

Bob Kibble
The University of Edinburgh, Scotland

Chan-Jong KIM
Seoul National University, Korea

Hsiao-Ching She
National Chiao Tung University, Taiwan

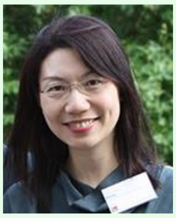
Jonathan Osborne
Stanford University, USA

Knut Neumann
University of Kiel, Germany

Lei Wang
Beijing Normal University, Beijing

Norman G. Lederman
Illinois Institute of Technology, USA

Shulin Ding
Beijing Education Technology and Equipment Center, Beijing



Alice Siu Ling WONG
The University of Hong Kong

Takuya Matsuura
Hiroshima University, Japan

Weiping Hu
Shaanxi Normal University, Xi’an

Xiufeng Liu
University at Buffalo, SUNY, USA

Asia-Pacific International Conference for Physics Education: Physics Literacy for the 21st Century

Hyunju Lee (Ewha Womans University)

On August 27 and 28, we held Asia-Pacific International Conference for Physics Education at Ewha Womans University, Seoul, Korea (Organizing professor: Sung-won Kim at Ewha Womans University). The conference was supported by Asia Pacific Center for Theoretical Physics (APCTP) and Ewha Womans University. Foreign and domestic scholars and students who had special interests in Physics Education participated in the conference. The theme of the conference was "Physics Literacy for the 21st Century." Nine scholars provided insightful talks under the theme: Michael R. Matthews (University of New South Wales, Australia), Kazuo Kitahara (Kyoto University of Science, Japan), Youngmin Kim (Busan National University, Korea), Jongwon Park (Chonnam National University, Korea), Wheijen Chang (National Changhua University of Education, Taiwan), Nason Phonphok (Srinakharinwirot university, Thailand), Kyungho Lee (Seoul National University, Korea), Chanju Kim (Ewha Womans University, Korea), and Namhwa Kang (Korean National University of Education, Korea). We also offered oral presentation and interactive poster sessions where post-doctoral researchers and graduate students could share their research findings with other researchers. The participants enjoyed having the conference and building international friendships in Asia-Pacific regions. Here are the some brief abstracts of the talks from the invited speakers.

Talk 1. The Contribution of History and Philosophy of Science to Physics Education: The Example of Pendulum Motion

By Michael R. Matthews (University of New South Wales, Australia)

This book has four new chapters: The Enlightenment Tradition in Science Education; Joseph Priestley and Photosynthesis; Science, Worldviews and Education; and Nature of Science Research. All previous chapters have been fully updated and expanded. The work explains how history and philosophy of science contributes to the resolution of persistent theoretical, curricular and pedagogical issues in science education. The argument shows why it is essential for science teachers to know and appreciate the history and philosophy of the subject they teach and how this knowledge can enrich science instruction and enthuse students in the subject.

Through its historical perspective that takes in Ancient Greek society, through medieval times, the Scientific Revolution and associated European Enlightenment, to modern times, the book reveals to students, teachers and researchers the foundations of scientific knowledge and its connection to philosophy, metaphysics, mathematics and broader social influences.

Detailed arguments are developed about constructivism, worldviews and science, multicultural science education, inquiry teaching, values and teacher education and nature of science (NOS) research. Relevant aspects of contemporary US and UK national science curricular documents are discussed and evaluated.

The book strives to demonstrate to educators that HPS is an engaging subject that should be at the core of their own professional development; and conversely to show historians and philosophers that their own expertise and scholarship can be utilized in science education debates, curriculum development and classroom teaching.

The book reinforces the understanding of science teachers as belonging and contributing to the important scientific and philosophical tradition that has had such enormous social and cultural influence among all nations; it contributes positively to teachers' sense of professional identity and to their understanding of being an educator.

Talk 2. Promotion of Science Literacy of Citizens and Professionals for Collaborative Society

By Kazuo Kitahara (Tokyo University of Science, Science Council of Japan)

In 2008, Science Council of Japan (SCJ) published the report “Towards Science Literacy for the 21stCentury”, defining the scientific knowledge, skill and concepts to be shared among all people for sustainable democratic society. On the basis of this report and by the demand of MEXT, in 2010 SCJ published the report “Towards Quality Assurance of University Education” proposing the necessity of Subject-Specific Referential Standard (SSRS) to be shared by universities and started discussions to clarify the core knowledge, skills and concepts of academic areas to be taught in university education for the collaboration of professionals of diverse areas towards the better future of the society. SCJ has published already Subject-specific Referential Standards (SSRS) for 20 academic areas, including engineering, earth science, biology, laws, economics, management and so on. SSRS for Electrical engineering, Mechanical Engineering, Material Engineering show some common frame of engineering areas; what (objects) should be transformed by which (tools) into better forms (goals) on the basis of basic physics. The goals should be combined with the knowledge of human and social science.

Talk 3. Demonstrations as Road Maps to Integrate Multiple Conceptions: 15 years of Reflection

By Wheijen Chang (National Changhua University of Education)

Based on the past 15 years of devising and modification, this talk illustrates that physics demonstrations may not only help students to overcome misconceptions, but also to initiate abstract conceptions (physics artifacts) and to integrate multiple conceptions. However, it is not easy to achieve the expected pedagogical outcomes, since intensive instructional scaffoldings are highly demanded for students to successfully reason the conceptions underlying the observed demonstrations. Repeated implementation and modification is needed for the teacher to gradually grasp the scope of the required instructional scaffoldings. In order to fulfill the pedagogical goal of conceptual integration via showing demonstrations, strategies including (1) spiral teaching sequences, (2) in-class dialogues, (3) linkage of concept maps, and (4) emphasis of causality and limitations of physics principles were adopted. Teaching models including topics of mechanics, electricity, and thermodynamics will be discussed, and successful and unsuccessful experiences will be also shared.

Talk 4. Demonstrations as Road Maps to Integrate Multiple Conceptions: 15 years of Reflection

By Nason Phonphok (Director of Science Education Center Srinakharinwirot University, Bangkok Thailand)

Sharing of ideas and experience of teaching core principle of laws of physics as well as opinions behind defining some physics quantities with non-mathematical approach will be presented. Questions like how students who earn high score in mathematical based problem examination really understand physics as well as how well they can apply physics to solve their everyday life problems or to explain the nature will be mentioned and discussed. Should more everyday life related physics be provided to 21st century students?

Talk 5. Competency-based Curriculum Reform: What Competencies are for Physics?

By Namhwa Kang (Korea National University of Education)

Currently, the Korean national curriculum is undergoing a revision to finish before the end of September 2015. One of the key curriculum emphases of the revision is competency. International examples of competency-based curriculum and a theoretical review point at the necessity of differentiating general competency from subject-specific competency and clarifying their relationships. In order to make the competency-based curriculum successful, key competencies that are expected to be achieved need to be explained in detail to the extent to which curriculum implementation in schools can be guided. In this talk, I review the competencies promoted in educational communities and science education community. Then, I discuss how those general and science-specific competencies are related to physics education. Finally, I discuss some drawbacks of competency-based curriculum reform movement.

New Suggestion for Science Education Using Educational Programming Language to Change Software-Centered Society

Yohan Hwang (Kyungpook National University)

Recently, Software (SW) Education is spotlighted in South Korea. A large group of Korean computer scientists have strongly suggested the inclusion of programming education in the curriculum for a long time. In fact, programming education has been already operating as regular classes of STEM education in U.S. These classes were called c-STEM (computer-STEM) or STEM-c by computer scientists. In Korea, SW education policies were flowed just 1 year ago. This goes with the emphasis of Computational Thinking in NGSS (Next Generation Science Standard) of U.S. Computational Thinking is defined as "thinking ability that enables to solve problem being based on basic principle and concept of computing effectively" by International Society Technology in Education (ISTE) & Computer Science Teachers Association (CSTA).

Ministry of Education in Korea has announced that SW education will be a required subject in the 2015 revised National Curriculum, and Guide of Operating SW Education was released (February, 2015). It is the exceptional case to apply some of new policies before taking effect of new curriculum totally. This shows that Ministry of Education puts much emphasis on adopting SW education. The Guide of Operating SW Education, along the capability of Computational Thinking, states that all students need to achieve the following three learning goals: 1) Understanding the use of SW in Life, 2) Algorithm and Programming, and 3) Computing and Problem solving skills.

Although many research findings suggest that programming lessons are very effective strategies to enhance students' thinking abilities, traditional ways of programming lessons often let students be frustrated due to the difficult programming languages. SW education, recently suggested, is using Educational Programming Language (EPL). EPL is designed for improving algorithmic thinking (AT) and problem solving ability. "Scratch" is one of popular EPLs that was developed by Lifelong Kindergarten Group of media research center in MIT. Instead of using complex programming languages, it suggests the use of different shapes of blocks as an alternative method. EPL is not complex or enormous as compared with general-purpose program languages. EPL is simply operated by "drag and drop". Association of Computing Machinery (ACM) claims "programming education is needed through EPL for Algorithmic thinking" (IEEE-CS & ACM, 2001). Algorithm is routine for solving problem and Algorithmic thinking (AT) is also a very crucial competency of Computational Thinking. Thus, CT can be performed role of solving complex problem of every life efficiently because AT is helpful to solve problem effectively.

"Scratch" is one of SWs to improve CT, creative problem solving ability, and designing ability of students. Furthermore we can watch and confirm our thinking or experiment process that expressed by blocks as algorithm. This is helpful to repeat an experiment or improve the experiment process.

Over the past couple of years, we have conducted science inquiry lesson through using Scratch program, Bitbrick as physical computing and Sciencecube as MBL (Microcomputer Based Laboratory). Bitbrick is one of materials for physical computing that computers become the roles of response or sense of people using sensor, program or output (Kim, Yoo, 2014). Microcontroller, Arduino and Embedded are typical examples. Physical computing has an advantage of realization about their thinking be based on SW. That is help to enhance curiosity, activeness and task commitment and can make learning immersion.

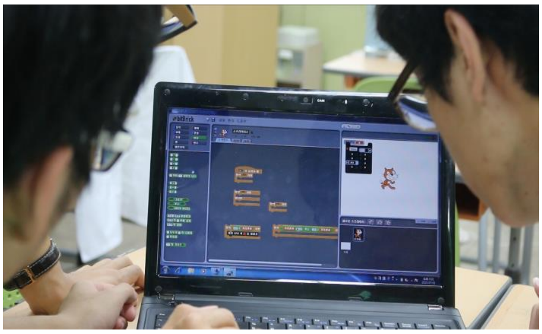


Figure 1. Students practicing the "Scratch" program

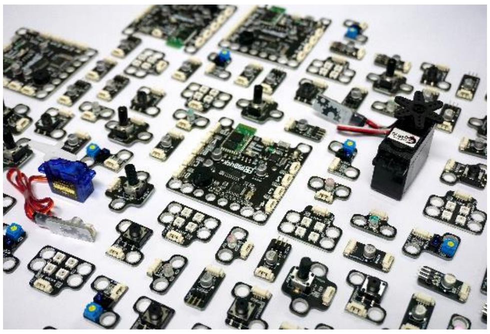


Figure 2. "Bitbrick" set

Recently, educational using boundary is broader through physical computing enables collecting & operating data by connecting with SW. In Korea, a special event entitled "Software Edu Fest 2015", was held by NAVER (one of the biggest portal site companies) and Ministry of Education and Ministry of Science, ICT and Future Planning. A large number of teachers from different areas over the country participated in the competition. We took part in this competition and applied SW education to science inquiry. The students who took part in this class responded that SW made science experiment more interesting, relation between SW and science education was existed, helped to enhance logical thinking & CT. Also, self-directed learning, curiosity of science and task immersion were increased by science education using SW.

** Kyungpook National University is sponsored by Ministry of Education as Human Resource Management for STEAM at BK21+.

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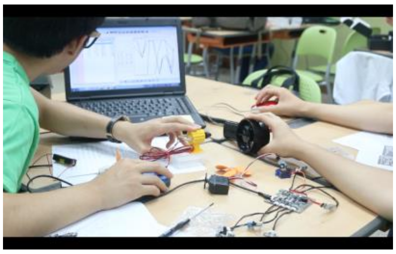

Figure 3. Students engaging in their task using Bit-brick set and sensor of Sciencecube.

Using DSLR Camera for Astronomical Education and Research

Soojong Pak[a], Woojin Park[a], Hyunjin Shim[b], Myungshin Im[c]

[a]Kyung Hee University, [b]Kyungpook National University, [c]Seoul National University

Astronomers take pictures of celestial objects for their research data. Amateur astronomers and secondary school students also take astrophotographs to get beautiful images of planets, stellar clusters, nebula, and galaxies. These days advanced and popularized technology makes the quality of commercial CCD and CMOS cameras of backyard telescopes to be compatible to that of research observatories. The critical difference between the professional astronomy and the amateur astronomy is whether the intensity on the image is quantized or not. If serious amateur astronomers or students can measure and standardize their own astrophotograph images, they can experience and participate astronomical research activities.

Astronomical photometry is to measure the brightness of celestial objects. The magnitude differences between different filters are defined as a color: the key parameter to deduce the temperature, metallicity, and gravity of the stars. Astronomers use CCD cameras with specially designed filter systems, e.g., a Johnson-Cousins UBVRI filter system (see Figure 1 as an example). On the other hand, consumer digital cameras, e.g. Digital Single Lens Reflex (DSLR) cameras, use an RGB Bayer filter system which consists of a mosaic of red (R), green (G), and blue (B) filters on the grid of the photo sensors (see Figures 2 and 3). The band pass functions of RGB in the Bayer system are similar to those of BVR in the Jonhson-Cousins filter system, but the RGB colors cannot be directly applied to the astronomical research.

In order to utilize the astrophotograph images taken by DSLR cameras, we develop a series of equations to convert the observed magnitudes in the RGB Bayer filter system into the Johnson–Cousins BVR filter system. The new transformation equations derive the calculated magnitudes in the Johnson–Cousins as functions of RGB magnitudes and colors. The filter transformation uncertainties are 0.04 - 0.06 mag which are acceptable to certain bright transient objects, e.g. supernovae and gamma-ray bursters (GRBs). We also plotted the Hertzsprung-Russel diagrams of the open clusters, M52 and IC4665, using images from our DSLR camera. The details of this filter transformation results are published in Advances in Space Research (Park et al. 2005, http://dx.doi.org/10.1016/j.asr.2015.08.004 or http://arxiv.org/abs/1501.04778).

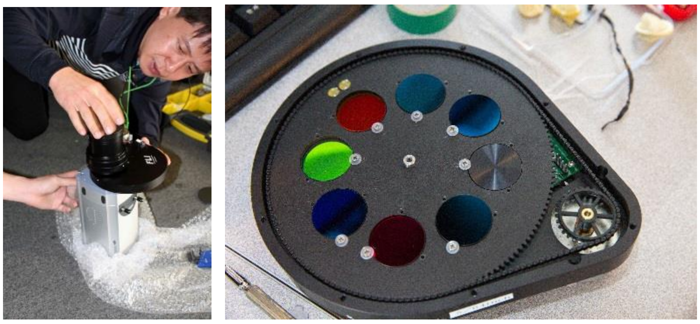

Figure 4 - Astronomical CCD camera and filter wheel of CQUEAN (Park et al. 2012, Publications of Astronomical Society of the Pacific, 124, 839).

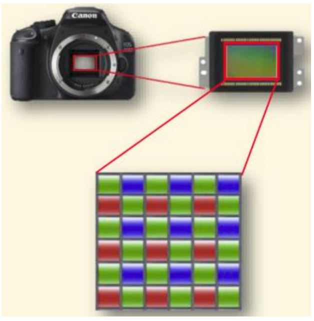

Figure 5 - Structure of Bayer filter system (https://en.wikipedia.org/wiki/Bayer_filter). We use an IR-filter removed Canon DSLR camera (EOS 550D) for our experiment.

Figure 6 - DSLR Camera and backyard telescope at Hwasangdae observatory. We took our RGB data at this amateur astronomer's private observatory in Hongcheon-gun, Gangwon-do, Rep. of Korea.

For more information, please contact the authors.

[a] School of Space Research, Kyung Hee University, 1732 Deogyeong-daero, Giheung-gu, Yongin-si, Gyeonggi-do 17104, Republic of Korea, E-mail: soojong@khu.ac.kr

[b] Department of Earth Science Education, Kyungpook National University, Sangyeok 3-dong, Buk-gu, Daegu, Republic of Korea

[c] CEOU, Astronomy Program, Department of Physics & Astronomy, Seoul National University, 1, Gwanak-ro, Gwanak-gu, Seoul, Republic of Korea

Practical Principles for Engineering Integration into School Science Curriculum

Younkyeong Nam (Convergence Research Center, Sungkyunkwan University, South Korea)

Introduction

Recently, national science education reform documents in many developed countries have recommended engineering integration into school curriculum as a potential direction for improving student interest and achievement in STEM discipline. (e.g. NGSS Lead States, 2013; Ministry of Education, Science, and Technology [MEST], 2010; Morgan, Jones, & Barlex, 2013). Considering the inter-disciplinary nature and unlimited scope of engineering discipline in our future society, engineering integration into school science curriculum would be a very useful approach not only to prepare students for 21st century STEM careers but also to promote STEM literacy for all (e.g. Korea Institute of S&T Evaluation and Planning [KISTEP], 2014; NRC, 2009)

However, engineering integrated science teaching is a new pedagogical approach that has only recently been introduced in South Korea over the past few years. While there has been a widespread national movement in STEAM(Science Technology, Engineering, Art, and Mathematics) education, engineering integration in science classrooms rarely receives attention from science educators in South Korea (Bae & Geum, 2009; Baek et al., 2011; Kim & Kim 2014; Lee et al., 2013). There are as yet no national guidelines or standards that define the scope of engineering education and practical aspects of meaningful implementation of engineering integration into school science classrooms.

To better support school science teaching that should be relevant to the students' interests and future careers, we need more resources and clear guidelines to suggest effective ways of implementing engineering integrated science teaching and further supporting teachers' curriculum development (Kim & Kim, 2014; Kwon & Ahn, 2012). In this article, I proposes practical principles for integrating engineering into school science curriculum based on a literature review. I also discusses challenges of teaching engineering in school science classrooms and suggest way to improve efficiency of engineering integrated science teaching based on my experience of training science teachers and teaching engineering integrated science curriculum in K-12 school settings.

Practical Principles for Engineering Integration

There has been increasing evidence that supports the necessity of engineering integration into school science classrooms. This includes: 1) student interest in and positive attitudes toward engineering and engineering-related careers (e.g. Koszalka et al., 2007; Lachapelle et al., 2012); 2) improvement of knowledge and skill acquisition in science and engineering disciplines (e.g. Apedoe, et al., 2008; Kwon & Park, 2009); 2) increased scientific literacy and problem solving skills (e.g. Brophy, et al., 2008); and 4) development of positive self-efficacy and career aspirations in science and engineering (e.g. Burgin, McConnell, & Flowers III, 2014).

However, there is no consensus about the scope of engineering integration in science classrooms (Brophy et al., 2008; Cunningham & Carlsen, 2014; Moore et al., 2015). The NGSS, a recently released national science standards in U.S. define the scope of engineering integration with science as "engineering design." The authors of the NGSS stated, "It is important to point out that the NGSS do not put forward a full set of standards for engineering education, but rather include only practices and ideas about engineering design that are considered necessary for literate citizens" (NGSS Lead States, 2013, Appendix I, p. 3).

"Engineering design" provides a pedagogical approach for how to present the core ideas of engineering practice in science classrooms (e.g. Guzey, et al., 2014; NRC, 2009). "Engineering design" has been described in many ways and called by various terms in engineering education literature, including "engineering design cycle," "engineering design process," "design research model," and "engineering design challenge" (e.g. Billiar, et al., 2014; Hjalmarson & Lesh, 2008; Lee et al., 2013). Moore et al. (2013) summarized three common components of engineering design: 1) defining the problem and conducting background research, 2) planning and implementing an engineering design, and 3) testing and evaluating the design. While engineering design has common component ideas and steps, it is not a fixed step-by-step procedure but rather a flexible process based on the problem solving context (NGSS Lead States, 2013, Appendix I, p. 2).

In addition to "engineering design," there are more practical principles that are repeatedly mentioned in many STEM education documents for meaningful integration of engineering into science classrooms (Billiar, et al., 2014; Brophy et al., 2008; Glancy & Moore, 2013; Guzey et al., 2014; Hjalmarson & Lesh, 2008; Moore et al., 2015; NRC, 2009; Roehrig et al., 2012). The second practical principle of engineering integration is "collaborative and teamwork context". Engineering is a "highly social and collaborative enterprise" in which the social interaction between engineers, clients, and others who have a stake in the engineering project is a crucial component of successful engineering design (NRC, 2009, p. 38). Thus setting the engineering project in a collaborative context is critical not only for improving students' collaboration skills but also for helping them to understand the nature of science and engineering (Brophy et al., 2008).

The third practical principle of engineering integration is, "incorporation of important science and engineering knowledge". Teaching relevant science and engineering disciplinary knowledge is crucial to fulfill the premise of engineering integrated science education, which is not only to improve student interests but also to increase achievement in STEM discipline. One of the most general and highly recommended pedagogical approaches to incorporating science and engineering disciplinary knowledge is to use "engineering design" as a culminating activity to provide contextualized opportunities in which students can apply developmentally appropriate science content knowledge to design solutions (e.g. Guzey et al., 2014; Moore et al., 2013). However, the scope and valid methods of implementing this principle in real classrooms is never clarified in the STEM education literature (Cunningham and Carlsen, 2014)

Fourth, "engineering habits of mind" is also considered an essential component of defining meaningful engineering practice (e.g. Brophy et al., 2008; Moore et al., 2013; NRC, 2009). There are also a number of characteristic attributes that could distinguish engineering practice from general scientific investigation and ways of thinking (NRC, 2009). Researchers have identified problem solving skills and knowledge specifically required in engineering practice that are not always an indicator of authentic scientific investigation. These include "Systems thinking, creativity, optimism, communication skills and attention to ethical consideration" (e.g. NRC, 2009, p. 5; Moore et al., 2013). Such problem solving skills and knowledge are often called engineering thinking or engineering habits of mind.

The last practical principle of engineering integration is "realistic and relevant problem solving context". The engineering problem context should be realistic and relevant to student experience. Presenting realistic engineering problems motivates students to engage in engineering projects because "they see the purpose in engaging in them, not because of their future utility but because of their inherent value" (Glancy & Moore, 2013, p. 5). Engineering problem solving that is relevant to students' personal experience is also important because it offers a learning context where students can apply their personal knowledge and experience and gives students an opportunity to realize the benefits and consequences of engineering work in their everyday lives (Brophy et al., 2008; Burgin et al., 2014).

Challenges for Effective Implementation of Engineering Integrated Science in School Context

One of the major purposes of the recent national STEM education effort is to improve South Korean students' interest and confidence in science disciplines (MEST, 2010). Researchers in South Korea have been advocated the necessity of school science curriculum reform that should be more relevant for the students' future career not only to improve students' interest in science but also students' career aspiration in STEM related field (Bae & Geum, 2009). However, engineering integration with school science did not get enough attention from school science teachers. There are many reasons that could explain this situation. In the following, I suggest three ways to improve quality and amount of engineering integrated science teaching in K-12 school settings based on my experience of training teachers and teaching engineering integrated science curriculum.

First, we need more systematic support for in-service teachers. Research has suggested that the majority of K-12 science and mathematics teachers lack engineering knowledge and experience, as well as how to utilize engineering to connect other STEM subjects (e.g. Cunningham & Knight, 2004; Oware, et al., 2007). During last five years, teachers suddenly confronted the new accountability of engineering integrated teaching without clear guideline or resource to develop and implement engineering integrated science curriculum. Thus, more systematic teacher professional development is necessary to support in-service science teachers' pedagogical knowledge and skill of engineering integrated science teaching.

Second, we need to re-design national science curriculum based on the engineering integrated pedagogical approach. Under the current national science curriculum designed without considering engineering integration. Students hardly recognize the relevance between school science and their everyday life situation that is highly dependent on new technology and engineering, and consequently their interest in science might decline sharply.

Finally, national science policy makers and teacher educators need to encourage STEM discipline teachers to work collaboratively. In most of the schools, science lessons are strictly taught as a separate discipline from other engineering and technology courses without collaboration between science and engineering discipline teachers (Bae & Geum, 2009). Systemic collaboration between STEM discipline teachers improve teaching efficiency by reducing the class time of teaching separate discipline and increasing teachers' lesson preparation time.

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About the author:
* Younkyeong Nam, Ph.D
2012 – 2015: Assistant Professor in Science Education, The College at Brockport – State University of New York
2011-2012: Post-Doctoral Research Associate, STEM Education Center, University of Minnesota –Twin Cities
2004-2005: Visiting Scholar, Department of Educational Psychology, University of Minnesota Twin Cities
1999-2004: Science Teacher, Ulsan City, South Korea

Towards a New Future for Science Learning

Chun-Yen Chang *(National Taiwan Norml University)*

With the ongoing development of technology, educators are undertaking to incorporate innovative technology into their teaching to improve science learning. Researchers in the field are also attempting to utilize new techniques and integrating different disciplines to explore learning processes from a fresh perspective. My exploration therefore is trying to map out steps towards a new future for science learning.

In response to the ever expanding learning opportunities presented by technology and science education, my research interests in recent years have intuitively converged interdisciplinary learning sciences, e-learning, as well as science communication. In following paragraphs, I would like to share with you, our ongoing and future works in these three influential fields.

1. An Integrative Research Framework of Education, Cognition, Nerve, and Gene

During the past decade, research into genetics and neuroscience has provided some exciting breakthroughs for cognitive science and education. In our opinion, the integration of multiple disciplines into the Education, Cognition, Nerve, Gene (ECNG) research framework will provide a powerful approach for exploring the mechanisms of human learning behavior. Using a next generation sequencing chip on the Ion PGMTM system, as well as high throughput sequencing to analyze targeting genes, we explore the relationship between genes, cognitive and learning. In addition to utilizing fMRI and MEG, we are devoting our effort to developing portable EEG detector to monitor individuals' real-time brain wave, to understand how different task influence individuals' brain activity.

Up to now, the most important discovery of the ECNG framework is that we found the association between catechol-O-methyltransferase (COMT) polymorphism and academic achievement in a high-stakes, real-life setting. It was indicated that students bearing homozygous for the Met allele tended to perform more poorly in academic achievement (i.e., their performance on the Basic Competency Test, an annual national competitive entrance examination) as compared to the other groups. This crucial finding was published on the SCI journal Brain and Cognition, as well as was reported by the New York Times Sunday Magazine and became the daily top forwarded article of New York Times online edition (see Fig. 1). This is one of the highlights of my career, based on decades of interdisciplinary research.

Figure 1. The COMT study was reported by the New York Times Sunday Magazine (February 8, 2013).

2. Web-based Instant Response System: CloudClassRoom

Instant response system is regarded as a useful tool to reform classroom learning because: 1) it can nurture a sense of classroom participation and thus help students feel accountable for the academic task exercised in the class; and that 2) the real-time data collected by clickers can assist teachers in tailoring feedback to address students' difficulties in real time. However, to deploy instant response systems into every classroom, schools have to invest a lot of money for buying or renting hardware. Furthermore, the distribution and safekeeping of instant response systems in the classroom may be problematic for teachers. My research team has therefore developed CloudClassRoom (CCR, see Fig. 2), a web-based instant response system (IRS) (URL: http://ccr.tw/ for the basic version and http://pro.ccr.tw for the professional version), to solve the aforementioned difficulties in at a lower cost compared to other similar IRS. CCR is written in HTML 5.0 and works on every Internet-capable device without further software or plug-ins installation. Therefore, CCR enables teachers and students interact with each other by using their own devices, such as PCs, laptops, PDAs, smart phones, or tablets. CCR has several features that are more advanced than the conventional instant response system, including text response, multimedia presentation, instant group formation, and teacher-student role swapping. Eight different language versions of CCR have been released so far.

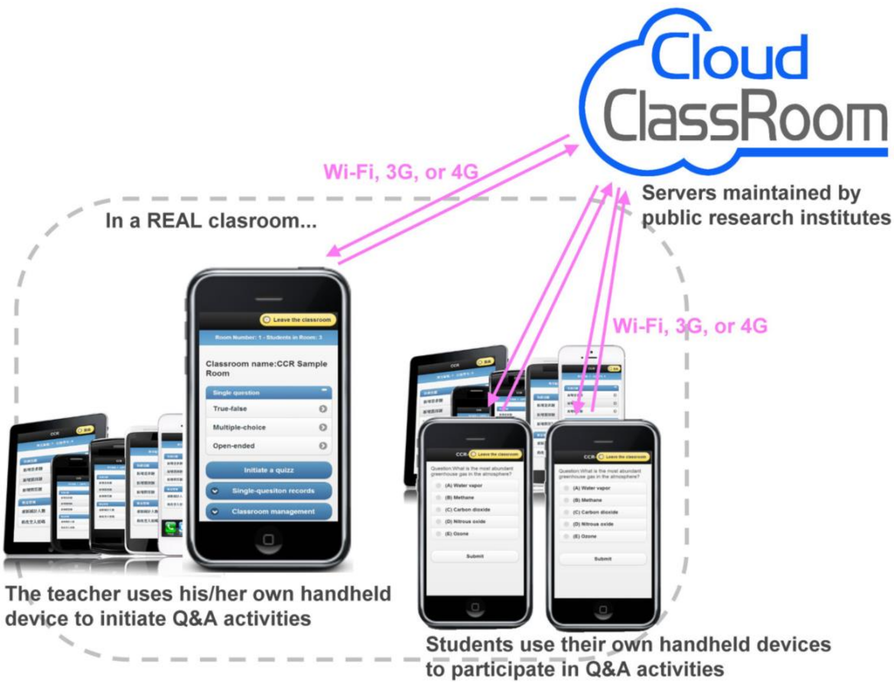


Figure 2. Illustration of how the CloudClassRoom (CCR) works.

To date, more than 500 teachers have registered in CCR, and more than 3000 classrooms have been established on CCR. Over 10000 classroom activities have been conducted by using CCR. In addition to practical application of CCR, an analytic framework has been established to understand how students learn with CCR. Academic papers related to CCR have been published in journals and presented at international conferences.

3. Different Science News Project

Collaborating with Television Broadcasts Satellite (TVBS; the biggest satellite telecommunication provider in Taiwan), we proposed the *Different Science News* (DSN) project with the aim of combining the TV news media and science education. Starting in the summer of 2014, the DSN series was regularly broadcasted three days a week (i.e., Wednesdays, Thursdays, and Fridays), on the most popular Taiwanese news channel (i.e., TVBS News) at prime time of 10:30 PM, with the purpose of reaching audiences after working hours. A total of 156 episodes were produced. These episodes have three features in common: (1) Concise: 90 seconds of challengingly condensed scientific contents; (2) Topicality: Recent or current public issues found in the news, and (3) Localization: Surveying from Taiwanese perspective (see Fig. 3).

According to the Nielsen ratings of Taiwanese TV channels, every night each piece of the DSN series has, on average, reached 300,000 audience members with an average age range of 30 to 54 years. According to the rating system, on a daily basis, the DSN is normally second to only one Taiwanese TV series episode, or another TVBS news channel with major news stories. The DSN project has foreshadowed real needs and realities in the local developments of science communication and science education and may ultimately add a new learning dimension for science education of the next generation.

Figure 3. Screen captures of actual broadcasting of Different Science News.

Conclusion

In this article, I briefly introduced my current research work which I am excited to share with you. Although these achievements are beneficial in promoting science education, I believe much more work is still needed. The future of science learning, requires not only the support of researchers and teachers but the involvement of all people, from every walk of life. It is hoped that our research work will give rise to a new insight and more innovative possibilities, not only for the scientific community, but for benefit of the people and society we live in.

The upcoming of an EASE Science Education Book!

Science Education Research and Practice in East Asia:Trends and Perspectives

Despite the fact that many East-Asian countries/regions have been front runners on large-scale international assessments such as Programme for International Student Assessment (PISA) and Trend of International Mathematics and Science Study (TIMSS), the voices and perspectives of these countries/regions have not been adequately presented in the mainstream discourse of international book publications. In addition, unique and innovative science education studies are prominently emerging in both domestic and international science education journals in the East-Asian region.

The coming book is edited with a unique approach. In addition to its well-structured themes, all chapters are co-authored/collaborated by renowned scholars from regions of East Asia, including, China Mainland, Hong-Kong, Japan, Korea, and Taiwan. The joint efforts of up to forty renowned scholars portray the science education in East-Asia broadly and deeply. The book successfully integrates and consolidates the research findings, curricular development, and science teaching practices that have shaped ongoing educational agenda and student learning outcome in an unprecedented approach.

This book is edited by:

Prof. Huann-shyang LIN, who is a Chair Professor of National Sun Yat-sen University, Taiwan, the Editor-in-Chief of International Journal of Science and Mathematics Education, recipient of 2013 EASE Distinguished Contribution Award through Research, and the former Vice-President of EASE Association,.

Prof. John K. Gilbert, who is Professor Emeritus, The University of Reading, Visiting Professor, King's College London, Adjunct Professor, Australian National University, and Editor-in-Chief, International Journal of Science Education(SSCI).

Prof. Chi-jui LIEN, who is the Adjunct Professor, Former Vice President of National Taipei University of Education, and the 3rd President of EASE Association (2012, 2013).

To ensure all chapters are authored by appropriate scholars from each region, the Editorial Team invited Regional Coordinators from each of 5 regions. Those are:

China Mainland: Prof. Weiping HU, Shaanxi Normal University
Hong Kong: Prof. Wing Mui Winnie Mui Winnie SO, Hong Kong Institute of Education
Japan: Prof. Masakata OGAWA, Tokyo University of Science; the 1st President of EASE (2008, 2009)
Korea: Prof. Jinwoong SONG, Seoul National University; the 2nd President of EASE (2010, 2011)
Taiwan: Prof. Huann-Shyang LIN and Prof. Chi-jui LIEN; the 3rd President of EASE (2012, 2013)

Provisional Chapters of this book include:

Chap. 1: Why we study the history of science education in East Asia: A comparison of the emergence of science education in China and Japan
Chap. 2: Trend and Development of School Science Education in Taiwan, Hong Kong, and Korea
Chap. 3: The Advent of Science Education for All: A Policy Review across East-Asian Regions
Chap. 4: National/Regional Systems of Research Training in Science Education
Chap. 5: Science Education Research Trends in East Asian Areas—A Quantitative Analysis in Selected Journals
Chap. 6: Research Trends of Science Education in East Asia (1995 – 2014)
Chap. 7: Diversity Dilemmas of Science Education in East Asia
Chap. 8: The Comparison of Elementary School Science Textbooks in among East Asian Countries and Regions
Chap. 9: Primary school science teacher training in East-Asia
Chap. 10: Pre-service Education of High School Science Teachers
Chap. 11: Science Education Reform and the Professional Development of Science Teachers in East-Asian Regions
Chap. 12: Affective aspects of science education
Chap. 13: Science Learning in Informal Environments in East Asia: Focusing on Science Museums
Chap. 14: Introducing Modern Science and High Technology in Schools
Chap. 15: Curriculum integration among science, Technology, Engineering, and Mathematics

The Book Project was seeded when the EASE Association announced its "Call for Book(s) Proposals" in the 2013 General Assembly, July 5, 2013. In response to the announcement, Prof. Huann-shyang LIN organized an editorial team and came up with a proposal. The proposal, then, was reviewed and approved by a Committee, chaired by the Vice-President of EASE, Prof Young-min in Nov. 2, 2013 and formally became an approved EASE Project. With the great support from the EASE President (2014-), Prof. WANG Lei, Beijing Normal University, China Mainland, and all Regional Coordinators and Authors, this book is scheduled to be published in these coming months.

The book of presenting the trend and perspectives of science education research and practices in East-Asia, one of the leading regions around the world in students' science learning achievement, provides a platform for science education researchers to showcase their research development and present their perspectives and practices of science education. This book intended not only to serve as references, but also complement existing perspectives from western countries. Insights gained from the integration and consolidation of East-Asian developmental trends and perspectives would allow science educators, teachers, and policy makers make wise decision for future advancements.

The book information, including abstracts, all chapters' authors and content of some chapters will be revealed and presented in the 2015 EASE Conference from Oct. 16-18, held in Beijing. The book will be seen in Amazon and other on-line book stores and could be also accessed through Kindle and Google Play platform when published.

Announcing a New Journal and a Call for Papers

Asia-Pacific Science Education [APSE]

1. What is Asia-Pacific Science Education (APSE)?

APSE is the international journal that Korean Association for Science Education (KASE) publishes in collaboration with Springer. APSE seeks to provide researchers in the Asia-Pacific region with a central channel for disseminating research about issues in science education in Asia to both the regional and international research community.

2. What is the focus of Asia-Pacific Science Education (APSE)?

APSE seeks to provide researchers with a central channel for disseminating research about issues in science education in the Asia-Pacific region to both the regional and international research community. Hence, scholarly works of interest need to encompass the wide diversity of the journal's readership. An explanation of the context of the work and its significance are expected for readers who may be unfamiliar with the work's local or regional context. Additionally, APSE supports executive summaries written in the local language in addition to English abstracts in order to increase accessibility to non-English- speaking populations and to expand the readership of APSE.

3. **What kinds of papers does APSE publish?**

APSE publishes original articles examining on-going educational problems associated with science learning and teaching in the Asia Pacific region. APSE's scope is broad in both methodology and content. We accept research conducted at all levels, including early childhood, primary, secondary, tertiary, workplace, and informal learning as they relate to science education. The Editorial Board invites scholarly manuscripts employing various methodological approaches, including qualitative research designs as well as quantitative research designs. APSE also publishes theoretical papers, position papers, and critical reviews of literature on emerging issues in the field of science education.

4. **How are papers in APSE published?**

APSE will operate as an Open Access (OA) online journal using a continuous publication model where articles are made available immediately.

5. **How to submit manuscript?**

Manuscript submission is available at https://www.editorialmanager.com/APSE. Detailed expectations for manuscript preparation and submission will be accessible via the Instructions for Authors section of our website (http://www.apse-journal.com/authors/instructions/research)

Each year, APSE will support the article processing fee for a small number of distinguished papers that have been submitted by EASE members. To receive the support the article processing fee (Editorial Waiver), please note that you need to ask an editorial waiver when you submit your paper. You can follow the instruction as below to request a waiver.

- Click the button that says 'View Publication Charges' after you clicked the button that says 'Build PDF for my Approval'.
- This will open a new 'APC Agreement window'.
- There will be three payment option listed below. Select the option that says, 'I would like to request a waiver of the article-processing charge for this article'.

6. **Workshop of APSE in upcoming 2016 EASE conference**

In upcoming 2015 EASE conference in Beijing, there will be workshop about APSE. Sonya N Martin and Hye-Eun Chu will run the workshop and other editors will also be available for questions and to share their perspectives.

- DATE: Friday October 16, 2015 from 14:00-16:30
- TITLE: Asia-Pacific Science Education (APSE): Introducing a new avenue for publishing science education research.
- ABSTRACT: Publishing research in academic journals is necessary for securing employment, receiving promotion and tenure, and becoming recognized as a leader in the field of science education. In this workshop, we provide basic information about the top journals in the field of science education and we discuss current issues facing authors as they compete to have their research published in these journals. Specifically, we discuss some key issues related to why we need to publish research, how to choose a suitable journal for submitting manuscripts, and how to navigate the manuscript submission process. As part of this discussion, we provide a basic overview of the process for preparing and submitting manuscripts to journals and we offer an inside examination of how a paper moves through the peer-review process to publication. In the second part of the workshop, we introduce our new Springer sponsored journal Asia-Pacific Science Education. We introduce the purpose of the journal, discuss the scope and aims, and discuss the value of offering an open-access online journal with Springer. Finally, we provide time for a general Question and Answer (Q&A) session where participants can ask their manuscript publishing questions.

If you have more questions, don't hesitate to contact us (apse.journal@gmail.com).

Editor-in-Chief	Jinwoong Song
Co-Editors	Sonya Martin, Nam-Hwa Kang, Hye-Eun Chu
International Coordinator	Young-Shin Park

Call for papers to the local science education meeting in Japan

Title: The 54th Kanto Regional Meeting of the SJST (Society of Japan Science Teaching)
When: Dec 5th 2015
Where: Ibaraki University, Mito, Japan
Abstract submission: Oct 23rd 2015

A little local annual meeting in Japan is challenging. Major conferences of science education in Japan have been exclusive for foreigners, except some keynote speeches, in their long history. However, the 54th Kanto Regional Meeting of the SJST (Society of Japan Science Teaching) opens the door to the international discussion this year. It is going to be held at the College of Education, Ibaraki University, on Sat. December 5th. One page proposal should be submitted by the due date (October 23rd). A special Lesson Study (in Japanese) with the help of grade 3 kids is planned, in accordance with the meeting theme "Back to the Praxis." See you at Mito, Ibaraki, Japan.

Contact: Hisashi Otsuji (otsujih66@nifty.com)
Visit the website. (Hisashi OTSUJI, An Executive Member of Japan)
http://branch1.sjst.jp/kanto/2015English/

The Association for Science Teacher Education: An Invitation to Participate in a Scholarly Exchange

Lisa Martin-Hansen, ASTE President; Professor of Science Education, California State University, Long Beach

The Association for Science Teacher Education is a professional organization comprised of approximately 800 members from countries around the globe. On the website, www.theaste.org, one can find the basic description of the organization. The mission of the ASTE is to promote excellence in science teacher education through scholarship and innovation. Our international association consists of science teacher educators, scientists, science coordinators and supervisors, and informal science educators who prepare and provide professional development for teachers of science at all grade levels.

The annual international conference is held each January and is dedicated to the sharing of research, professional development, and innovative practices regarding science teacher education. Our next conference is January 7-9 2016 in Reno, Nevada, USA. https://theaste.org/meetings/2016-international-meeting/ Conference attendees may be either ASTE members or non-members. We actively encourage all individuals with an interest in STEM teacher education to join us.

Our flagship journal, The *Journal of Science Teacher Education*, edited by Norm and Judith Lederman, provides a key outlet for our members to share their research activities with the larger science education and policy communities. We are eager to publish international perspectives regarding research in science teaching and invite international scholars to submit their work to our journal.

Additionally, ASTE has begun a peer-reviewed, online journal focused upon the practitioner titled *Innovations in Science Teacher Education.* We plan to publish our first issue of this journal in 2016 with manuscripts focusing upon issues related to science teacher education including preservice induction, and inservice teachers. The call for the editors describes the journal's main emphases with articles consisting of "innovative, inspirational and concrete ideas for enhancing teaching for all those associated with preparing and supporting the professional development of K-12 science teachers. Articles will be written by science teacher educators for science teacher educators, in the broadest sense of the word. The journal audience includes those with responsibilities or teaching science content to in/preservice teachers, teaching science methods and related courses to in/preservice teachers, coordinating and supervising science field practice for in/preservice teachers, professional development and instructing in/preservice teachers in all issues connected with science teaching more broadly." As ASTE members are well aware that we must look globally to learn from each other to improve science education, we encourage international science teacher educators to submit articles for this journal.

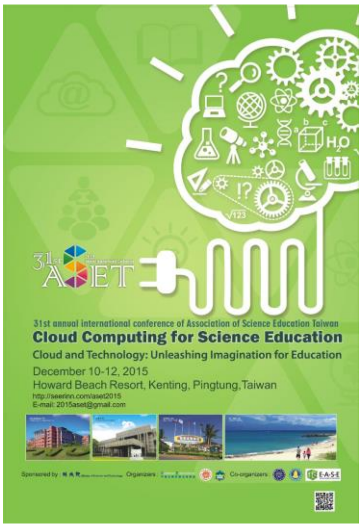
There are several ways one may become an active member of ASTE. There are standing committees and ad-hoc (those that meet when necessary) committees where members may gain experience. We are currently working to establish greater participation from international members and are exploring possible virtual international "regional" conferences as well as other activities. There are opportunities to run for election to the ASTE Board, and to review manuscripts for our journals.

ASTE is currently exploring the possibility of affiliation with the East-Asian Association for Science Education (EASE). We hope to find a way to create more collaboration and to share in scholarly exchanges. We invite you to join us as we actively engage in efforts to best to prepare highly qualified science teachers to meet the demands of the 21st century learning environments.

Upcoming Conferences

The 31st ASET Annual International Conference

The 31st ASET Annual International Conference invites Academician and Professionals to submit their work in this conference. The 31st ASET Annual International Conference aims to provide an opportunity for international researchers and practitioners working in all areas related to science education to present and interact with the latest research, results, and ideas in the field. The conference theme is "Cloud Computing for Science Education", and the conference aims to strengthen relationships between school teachers, researchers, and educators. Articles from science educators, researchers, and teachers related to education in science, mathematics, technology, environment or other fields are welcome.



Website: http://seerinn.com/aset2015/zh-hant/

Important Information
Conference Dates: December 10-12, 2015
Location: Howard Beach Resort, Kenting, Taiwan
Call for paper: October 15, 2015
Early-bird Registration: On/Before October 31, 2015
Deadline of Registration: On/Before November 25, 2015

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