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

Newsletter
(東亜科學教育學會通訊)

March 31, 2016
Vol. 9. No. 1 (ISBN 2227-751X)

2016 EASE Conference

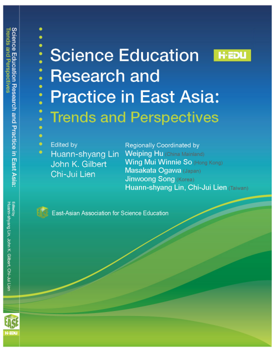
Innovations in Science Education Research & Practice: Strengthening International Collaboration

We believe that innovative findings, ideas, and practices in science education should not be closed within their respective contexts, but shared with science educators from other regions. The EASE statements on ‘mission’ and ‘aims,’ declare that ‘providing a platform for collaboration and cooperation in science education research’ should be one of the key functions of our Association. Recent progress among the EASE members (launching another new journal, Asia Pacific Science Education, and developing several book writing projects) is fantastic, and such efforts should be expanded further. To this end, ‘Strengthening International Collaboration,’ not only among senior science educators, but also among our junior researchers and practitioners, should be highly encouraged and supported.

The EASE 2016 Tokyo is eager to serve as a ‘bridge’ of prospective international collaboration activities. Especially, for the junior scholars, this conference is the way to the next EASE Summer/Winter School Program. (Detailed in Page 2)

Book Release:

The first EASE book, “Science education research and practice in East Asia: Trends and perspectives”



The proposal of publishing a book entitled “Science education research and practice in East Asia: Trends and perspectives” was approved by the EASE committee in 2014. With the collaboration, cooperation, and commitment of regional coordinators (as shown on the following book cover page), chapter authors (as shown under the subtitle of Chapters and Authors), and editors, the dream of having a brain child that is highly associated with EASE and fully developed by members of the association has finally come true. This new book is published by Higher Education Publishing (HEDU) and will be available in May 2016.

(Detailed in Page 8)

Upcoming conferences

December 15-18 **The 3rd Asian IHPST Regional Conference** in Busan, Korea
October 19-22 **The 3rd ISMTEC in 2016** in Bangkok, Thai
(Detailed in Page 12 & 18)

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Join EASE!
If you want to be a member of EASE, contact *here* (wangj@bnu.edu.cn).

• **Publisher**
East-Association for Science Education
東亞科學教育學會

• **Address (Headquarter)**
Department of Curriculum and Instruction, The Hong Kong Institute of Education, 10 Lo Ping Road, Tai Po, New Territories, Hong Kong

• **Homepage**
http://theease.org/

2016 EASE Conference in Tokyo

Innovations in Science Education Research & Practice: Strengthening International Collaboration

Chair of the Organizing Committee **Masakata Ogawa**

Registration **http://ease2016tokyo.jp/registration.html**

Abstract Submission **Due on April 15 , 2016**
Notification of Review Result **Before May 15, 2016**
Final/revised Abstract Submission **Due on July 15, 2016**

You may have already submitted (or be about to submit) your paper, but EASE2016Tokyo is strongly encouraging ***your additional contribution*** to our academic program. As you know, we are ready to set up other formats than the usual paper presentation. They are **symposium, workshop, and demonstration**. In the **symposium** (90-120 min), an organizer can invite 4-5 presenters with 1 or 2 discussant(s). (The organizer needs to submit a summary of the symposium, but there is no need to submit an abstract for each of the presentations.) This format may suit groups with on-going joint research projects, or those who are thinking of a book publication project or an international joint research project in the near future. Domestic association's sponsored symposia are also welcome. For the **workshop**, just as usual, those who have been working on teaching materials development are especially welcome. This is a good opportunity for you to present your teaching materials to other regions' science educators, and you can receive their feedback through discussion. **Demonstration** provides an opportunity for conference participants to touch your teaching and curriculum materials, hands-on materials, etc. in a rather informal way. Why don't you join the conference with your group?

Informal Meeting Opportunity is Ready for You on the 25th

We are happy to host various kinds of informal meetings in the afternoon and evening of August 25th at the conference venue. Since the registration booth will open at 13:00, after finishing the registration, you can enjoy such informal meetings with your colleagues, friends and future collaborators. Among the prospective groups are: Special interest groups, journal editorial teams, domestic association meetings, the EASE Alumni group, groups for a book publication project, groups which are planning to establish an international collaboration project, etc. About 15 rooms (with an LCD projector and fully air-conditioned) are available and we will serve you on a first-come-first-served basis. Near the venue (Kagurazaka and Iidabashi areas, within a couple of minutes' walk), there are various kinds of restaurants (Japanese, Chinese, Korean, Turkish, Italian, French, Indian, Spanish, etc.), which may be a good reason to come together.
For example, see http://bento.com/ra-iida.html

Japan Science Teaching Exhibition Booth (You can buy teaching materials and textbooks on the spot)

The conference is supported by several curriculum material companies (see the company logos on the Conference website). We are planning to open a Japan Science Teaching Exhibition Booth within the conference venue. NARIKA and GASTEC will exhibit various kinds of teaching materials used in Japanese schools. Also, four major textbook companies (Dainippon Tosho, Keirinkan, Tokyo Shoseki, and Gakko Tosho) will exhibit their own science textbooks (from elementary to upper secondary level), which are authorized by the Ministry of Education. This time, they will make a special arrangement for the conference participants to buy them on the spot (cash only).

Banquet: (Only 180 seats available)

Due to the size of the Banquet room, we are very sorry to accept only 180 persons. Once fully booked, you won't be able to click the Banquet button on the registration form.

Hurry up to book accommodation!!

Is this a joke? No, it's not a joke! Please book your accommodation anyway; if you cannot come, it is easy to cancel it, but it is very difficult to find accommodation at a later stage. (Of course, if you prefer expensive luxury hotels, you may book anytime.) Graduate students who want to book one of the Youth Hostels shown on http://ease2016tokyo.jp/accomodation.html, please read the following details carefully.

For these Youth Hostels, booking for an individual or small group use (up to 9 persons) starts from 3 months before the check-in day. For large group use (more than 10 persons), booking starts from one year before the check-in-day. (This means that even if you want to book 3 months before the check-in day, it may be unavailable because of several groups' early booking.) (In addition, Tokyo Ueno Youth Hostel accepts bookings for group use (more than 3 persons).)

EASE2016TOKYO Websites: Access Statistics (on Feb. 26th, 2016)

	Most Active Countries (Regions) I				Most Active Countries (Regions) II				Most Active US States		
	Country (Region)	Hits	Visitors		Country (Region)	Hits	Visitors		US State	Hits	Visitors
1	Japan	50,704	2,447	27	Bangladesh	264	10	1	California	784	234
2	China	11,607	1,309	28	Netherlands	121	9	2	Texas	426	228
3	Taiwan	27,655	908	29	Romania	211	8	3	Ohio	873	28
4	United States	6,424	715	30	South Africa	179	7	4	Nevada	492	19
5	Thailand	7,915	574	31	Lao	385	7	5	Virginia	254	17
6	Korea, Republic of	28,094	547	32	Saudi Arabia	175	7	6	Washington	59	11
7	Ukraine	1,530	425	33	Poland	179	6	7	Massachusetts	366	10
8	Hong Kong	2,735	152	34	Spain	202	6	8	New Jersey	300	10
9	Philippines	3,811	152	35	Mongolia	249	5	9	Oregon	106	8
10	Singapore	3,399	113	36	Brazil	176	4	10	Pennsylvania	294	8
11	Malaysia	3,008	111	37	Portugal	114	3	11	Georgia	91	6
12	Finland	2,106	109	38	Egypt	81	2	12	Utah	151	5
13	Australia	2,662	80	39	Myanmar	199	2	13	Iowa	116	5
14	Canada	1,205	57	40	United Arab Emirates	43	2	14	New York	121	5
15	Sweden	1,768	55	41	Austria	114	2	15	Missouri	42	4
16	United Kingdom	1,780	49	42	Cyprus	70	2	16	Illinois	109	4
17	Ireland	714	48	43	Pakistan	77	2	17	Arizona	56	4
18	India	1,625	41	44	Vietnam	43	2	18	Minnesota	131	4
19	Russian Federation	416	37	45	Brunei Darussalam	114	2	19	Hawaii	145	3
20	Indonesia	927	35	46	Tunisia	39	1	20	Florida	89	3
21	Turkey	1,098	35	47	Uzbekistan	50	1		Total	5,491	633
22	Denmark	1,260	34	48	Croatia	26	1				
23	France	362	27	49	Hungary	1	1				
24	New Zealand	625	25		Unknown	4,371	142				
25	Israel	777	25		Subtotal	172,347	8,365				
26	Germany	657	21		Total	172,485	8,372				

Updates of
EASE Alumni Group contribution to EASE 2016 Tokyo

Kazumasa Takahashi[1], Miku Yoshida[2], Taro Kawahara[3], Masako Yamada[3], Hiroshi Unzai[3]
Hokkaido University of Education[1], University of Copenhagen[2], Hiroshima University[3]
Contact email address: miku.yoshida@ind.ku.dk

East-Asian Association for Science Education (EASE) has convened Summer School and Winter School Programs several times. Many doctoral and master students around the East-Asia region have taken part in these school programs. These students are called “EASE alumni”. Among the EASE alumni, we are currently making plans to conduct an “EASE Alumni Informal Meeting” and “EASE Conference Tour” at EASE 2016 Tokyo. We would like to advise of the progress of these two plans.

1. EASE Alumni Informal Meeting

The purpose of the “EASE Alumni Informal Meeting” is to re-unite EASE Alumni, develop our friendship and discuss current research interests. This meeting will be held on August 25th. So far, free conversation time and discussion are planned.

2. EASE Conference Tour

The purpose of the “EASE Conference Tour” is to support students who are participating in an international conference for the first time. Every student might feel nervous and get worried when attending an international conference for the first time. We also faced the same situation at our first EASE conference. On our tour, we plan to guide a group of students and join them on a tea break.

The two plans are mainly organized by the Japanese EASE alumni and the following alumni in each region;

(In alphabetical order)
Hong Kong: Chan, Kennedy Kam Ho <kennedyckh@gmail.com>
Korea: Park, EunJi <starryblue@snu.ac.kr>
Mainland China: Huang, Ming-chun <hmc91810@126.com>
Taiwan: Chen, Nelson <nelson@mail.nstm.gov.tw>

If you would like to know more about our plans or to help or participate in our plans, please feel free to contact us at the contact email address <miku.yoshida@ind.ku.dk > or please ask your regional contact person.
We are looking forward to seeing you all at EASE 2016 Tokyo!

Message from the new Headquarters Secretary

Peter Zhihong Wan (萬志宏), Ph.D.
The Secretary of the Headquarters of East Asian Science Education Association (EASE)
Assistant Professor,
Department of Curriculum and Instruction, The Hong Kong Institute of Education

It is my great honor and pleasure to be appointed as Headquarters Secretary for three years from 2016. This is a precious opportunity for me to serve the science education community of East Asia and learn from the scholars from different regions.

In the past nine years, we have seen the rapid expansion of EASE as an academic society locally and internationally. Until now, she has organized four academic conferences respectively in Taipei, Gwangju, Hong Kong, and Beijing. In order to cultivate the young generation of science education researchers, EASE has run two summer schools: 2010 in Taipei and 2012 in Beijing, as well as a winter school (EASE-APCTP winter school 2014) in Seoul. Cooperation has been established with the European Science Education Research Association and National Association for Research in Science Teaching (USA). An EASE edited book entitled Science Educator Research and Practice in East Asia: Trends and Perspectives will be published this year. As the most influential academic society of science education in Asia, the expansion of EASE is providing more opportunities both for local scholars to exchange ideas and initiate collaboration, and for international scholars to gain deep insights into education systems of the region whose science learners have consistently achieved excellent performance in large-scale international comparisons such as Trends in International Mathematics and Science Study (TIMSS) and Program for International Student Assessment (PISA).

The development of my academic career has actually paralleled and benefited from the growth of EASE. When I was studying for my PhD degree at The University of Hong Kong, I was informed by my supervisor that EASE was officially established on October 31, 2007. Since then, I started to recognize through EASE the active science education researchers based in East Asia, which helped me gradually become familiar with the academic society. The 3rd biannual EASE conference was held in Hong Kong in 2013 when I worked as a post-doctoral research fellow at The Hong Kong Institute of Education. As a member of the hosting institution, I joined the work of organizing this conference, made a presentation and also won the Young Scholar Award. This award helped me to gain a higher score in the interview where I received a formal academic position as an Assistant Professor. In 2016, the EASE headquarters moved to Hong Kong. Now it should be my turn to contribute to our Society as one member of the new generation of science educators in East Asia.

I will strive to support the work of the new executive group comprising Prof. May May Hung Cheng from Hong Kong as President, Prof. Young-Shin Park from Korea and Prof. Yoshisuke Kumano from Japan as Vice-Presidents, Dr. Jian Wang from China as Secretary, and Dr. Sung-Tao Lee from Taiwan as Treasurer, and the 20 executive members from the five different regions. I would like to thank Dr. Lydia Meichun Wen, Dr. Rui Wei and Dr. Jian Wang who have managed the documents and accounts of EASE and transferred them to the new headquarters.

In order to make us more efficient, we welcome your ideas and suggestions for the planning of future conferences, organizing summer and winter schools, as well as improving the operation of EASE headquarters. Please send in your ideas and suggestions to us at ease@ied.edu.hk.

Practice Oriented Science Education Is Emphasized In China

Science education is an important part of basic education, and the science education reform in mainland China has never ceased. Practice oriented science education is emphasized. Take Beijing as an example. The Beijing Education Commission published *the Teaching Reform Guide for Science Subjects*, in which the overall

requirements include: "Conduct a series of science activities related with daily science questions in junior school grade 7 and grade 8. Encourage students to do simple experiments, makings and small projects. Pay attention to the connection between primary school education and middle school education in science subjects. Cultivate students' scientific literacy". Besides that "constructing an open teaching mode", "strengthening the relationship between science subject teaching and society & nature", "organizing students to take part in off-campus activities, spending no less than 10% of class periods for all subjects of primary school and middle school on on-campus and off-campus practice activities" are also required. The guide especially emphasizes that "the performance of open science practice activities in the three years of middle school will be counted in physics and chemistry scores in the high school entrance examination".
The guide offers some concrete action plans:

> "Choose comprehensive projects, integrate the knowledge content and competence cultivation of physics, chemistry, biology and geography subjects. Give students a chance to find the relationship between science and life, and to apply the scientific method. The activity may be observation, experiments, making, visits, investigations, etc."
>
> "In grade 7, one class should be spent on serial science activities weekly by integrating school-based courses, so as to improve the subject knowledge and competence cultivation of science subjects. In grade 8, one or two classes should be spent on open experiment or science activities monthly, so as to strengthen the experiment exploration competence of students."
>
> "Encourage students to take part in off-campus activities. No less than 10% of class periods of science subjects are used for open science experiment activities. Record and evaluate the students' performance and offer feedback through the students' registration system and information technology."
>
> "Integrate social resources such as museums, science museums, college laboratories and libraries. Cooperate with profit education agencies, and purchase their services. Utilize various course resources offered by Beijing digital schools, high school open key laboratories, and other programs to offer abundant "experiment" study resources and comprehensive menu-oriented services on the website. Strengthen the construction of auxiliary resources for science education."
>
> "Diversify homework forms, enhance homework fun, and regard both written homework and practice homework, so that students have more choices in the contents and forms of homework."

According to *the Teaching Reform Guide for Science Subjects*, there are four changes in the operation of science subject teaching:

(1) Change in course arrangement: students can get an understanding of science subjects earlier. In former times, physics and chemistry were scheduled for grades 8 and 9, but now they are scheduled for grades 7 and 8. At least 10% of class periods of science subjects are used for open science practice activities. National subjects are integrated with school-based subjects, so that students' science activity time is guaranteed.
(2) Change in teaching method: pay more attention to in-class science experiments, especially open experiments, so as to enhance students' experiment exploration competence. At the same time, increase science practice activities, including the scheduled weekly systematic science activities, off-campus interdisciplinary, comprehensive and open science practice activities with the help of social resources.
(3) Change in teaching evaluation: enable students to have opportunities to attend science practice activities and finish relevant homework. The open science practice activity performance will be counted in the high school entrance examination score.

(4) Change in source of teaching activity resources: overcome the limitation of on-campus science subject resources by integrating various social resources such as colleges, museums and libraries as course resources.

In order to help teachers to understand subject reform direction and promote the once-a-week science activities and science experiment instructions, the Beijing Education Commission organized professionals to compile *the Subject Competence Standard and Teaching Guide Series* and *the Open Science Practice Project Handbook for Middle Schools in Beijing*.

Subject Competence Standard and Teaching Guide Series has a separate collection for each subject. For science subjects, physics, chemistry, biology and geography have separate collections. Each subject collection includes three parts, the macro, middle and micro aspects: I. From the macro aspect, follow the course standards and subject reform suggestions to form a teaching guide of the subject, specify the education and teaching value of the subject, combine the results and experience of the subject course reform, present the main problems in subject teaching, and offer suggestions for further promotion of subject teaching reform; II. From the middle aspect, narrate characteristics of subject competence development, specify subject competence standards, and offer concrete teaching suggestions; III. From the micro aspect, provide excellent teaching cases and analysis, help teachers to understand subject development direction, then formulate teaching strategies.

Open Science Practice Project Handbook for Middle Schools in Beijing has two books, one for grade 7 and one for grade 8. Each book contains 50 practice activities for physics, chemistry, biology and geography subjects, used for experiment activities and open science experiment classes.

Fig1. An activity in the medicine institute

Besides, the Beijing Education Bureau has also published *the Notice of Recruiting Unit Providing Open Science Practice Activity Programs for Middle School Students*, which collected more than 1,600 programs within 10 days. Upon evaluation by education research experts, middle school teachers and students, the first batch of 851 programs from 200 resource units were selected. The resource units include technology enterprises, higher institutions, research institutes, social groups and popular science venues, and the programs cover the six fields of nature and environment, health and safety, structure and machinery, electronics and control, data and information, and energy and materials. Students of grade 7 and grade 8 will attend practice activities in the resource units at least five times a semester, including three times organized by the school and two times led by parents. The resource units will record students' performance of the practice activities and upload it into the students' management system. Students will also have opportunities to remark the resource units online after attending activities, which will be the basis for the next-round program selection.

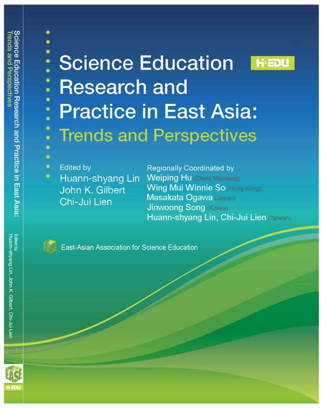
Science practice activities are welcomed by students. Firstly, practice activities usually enable students to experience science achievement or complete an interesting task, such as making a useful integrated circuit, making a computer mouse, using advanced experiment devices to complete an experiment, and seeking evidence to crack a case. All these will enable students to perceive the practical value of knowledge and build the self-confidence of knowledge studying and application. Secondly, it is a great attraction for students to have opportunities to go to companies and scientific research institutions for practice. These places are strange and mysterious for students; thus they will be excited and proud when they have opportunities to maneuver devices in higher institutions or to complete a task in the production process. Thirdly, attending activities in the resource unit enables students of different schools to make new friends quickly by completing tasks cooperatively. It also enables students to expand their social circles, and to get a view of the study life of students in other regions.

The Beijing Education Commission believes that exploration in science practice activities is not only the reform and exploration in science education, but also the exploration in students' growth mode.

The first EASE book,

Science education research and practice in East Asia: Trends and perspectives

Huann-shyang Lin[1], John K. Gilbert[2], Chi-Jui Lien[3]
National Sun Yat-sen University[1], King's College London[2], National Taipei University of Education[3]



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Chapters and Authors

Chapter 1 Why We Study the History of Science Education in East Asia: A Comparison of the Emergence of Science Education in China and Japan. Tetsuo Isozaki, Hiroshima University, Japan; Sundog Pan, East China Normal University, China

Chapter 2 Trend and Development of School Science Education in Taiwan, Hong Kong, and Korea. Chorng-Jee Guo, National Changhua University of Education, Taiwan; Winnie Wing-Mui So, The Hong Kong Institute of Education, Hong Kong; Kongju Mun, Ewha Women's University, Korea; Fiona Ngai-Ying Ching, The Hong Kong Institute of Education, Hong Kong

Chapter 3 The Advent of Science Education for All: A Policy Review across East-Asian Regions. Bangping Ding, Capital Normal University, Beijing, China; Sung-Tao Lee, National Taichung University of Education, Taiwan

Chapter 4 National/Regional Systems of Research Training in Science Education: The Experiences in Japan and Hong Kong. Hiroki Fujii, Okayama University, Japan; Derek Cheung, The Chinese University of Hong Kong, Hong Kong

Chapter 5 Science Education Research Trends in East Asian Areas: A Quantitative Analysis in Selected Journals. Yueh-Hsia Chang, Tamkang University, Taiwan; Chun-Yen Chang, National Taiwan Normal University, Taiwan; Yuen-Hsien Tseng, National Taiwan Normal University, Taiwan

Chapter 6 Current Trends of Science Education in East Asia (1995-2014): With a Focus on Local Academic Associations, Journal Papers, and Key Issues of Science Education in China Mainland, Japan, Korea, and Taiwan. Jinwoong Song, Seoul National University, Korea; Masakata Ogawa, Tokyo University of Science, Japan; Meichun Lydia Wen, National Changhua University of Education, Taiwan; Xiaoyong Mu, Soozhou University, Mainland China; Jiyeon Na, Chuncheon National University of Education, Korea

Fostering the inquiry-teaching competence
of junior high school science teachers
A study from Taiwan

Hsiao-Lin Tuan[1], Su-Fen-Lin[1], Pi-Yun Cheng[2]
National Changhua University of Education[1], National Changhua University of Education[2]

Background

Inquiry-based curricula have been promoted in many nations during the past decade. In Taiwan, the nine-year curriculum emphasizes inquiry-based learning in science classes as well as textbooks. Currently, the Ministry of Education [MOE] is working on the 12-year curriculum movement. This movement connects the science curriculum standards from the elementary, junior high to senior high school levels together and aims to teach students at all levels the core science concepts, integrated science and inquiry activity. Therefore, it is very important to cultivate the inquiry-based teaching competence of all levels of science teachers.

Many Taiwanese science educators have published various journals in the area of inquiry-based science teacher professional development [PD], and students learning outcomes from multiple implementations of inquiry-based instruction. All the results have indicated that inquiry-based instruction can enhance students' various abilities in learning (cognitive and affective outcomes), but we do not know the impact of these studies on classroom-based teaching. Therefore, it is very important for science educators to take action to transform research findings into classroom teaching. This study is to report that the Association of Science Education in Taiwan [ASET] received a project from the MOE to foster junior high school science teachers' inquiry-teaching competence in 23 counties around the northern, central, southern and eastern regions of Taiwan.

When we received the task, we were thinking of effective ways to foster teachers' inquiry teaching competence. Based on the literature, efficacy beliefs are one of the most powerful variables that predict teachers' performance in science classrooms (Cakiroglu, Aydin, & Woolfolk-Hoy, 2012). In addition, teachers need to understand the meaning of inquiry and how to conduct inquiry-based teaching. Teachers' understanding needs to be built by experiencing inquiry and having vicarious experience by reading other teachers' inquiry-based lesson plans. Thus, the rationale for designing the workshop is: learning by doing, learning from having vicarious experiences, and learning through practice. The workshop includes four sessions: (1) Experience inquiry: Having the teachers understand the spirit of inquiry through active participation in inquiry activities, e.g. Barbie Bungee Jump. (2) Introduce inquiry & inquiry teaching: Introducing the essence of inquiry and inquiry teaching. (3) Vicarious experiences: Having the teachers study and discuss previous inquiry-based lesson plans. They learn inquiry-based instruction from exemplary science teachers. (4) Having the teachers practice designing inquiry-based lesson plans. The teachers design an inquiry lesson plan in groups.

We developed a PowerPoint template to cover the above points in the workshop and then invited eight science educators experienced in inquiry-based instruction from ASET to be our lecturers. They could use the PowerPoint template we provided and revise it based on their own expertise. In addition, we also recruited science teachers who have had successful experiences in inquiry-based instruction to be our teaching assistants in each workshop. Finally, we conducted 31 workshops and evaluated each participant's confidence as well as his/her competence gained from attending the workshop.

Participants and evaluation

A total of 658 science teachers (grades 7-9) participated in the workshops, from which 597 valid questionnaires were received. The evaluation instrument was revised from the Inquiry Teaching Efficacy Questionnaire, [ITEQ] (Tuan & Wen, 2005). It consists of three dimensions: teachers' perceptions of their own understanding of inquiry [IC], teachers' perceptions of their own understanding of teaching competence [ICT], and teacher's perceptions of their own guiding inquiry competence [GIC]. At the end of each item, we asked the participants to rank the changes in their competence of inquiry teaching and self-confidence of inquiry teaching. (continued)

Findings

Table 1 provides the demographic information of the participants (next page).

Table 1. Demographic information of science teachers in this study

Demography	**Category**	**N**	**%**	**demography**	**Category**	**N**	**%**
Gender	Male	351	58.8	**Experience of Inquiry**	Yes	355	59.5
	Female	246	41.2		No	242	40.5
Teaching Subjects	Physics and Chemistry	339	56.8	**Science teaching years**	0-5 years 6-10 years	213 147	35.7 24.6
	Biology	149	25.0		11 -15 years	88	14.7
	Others	109	18.3		16+ years	149	25.0
Highest level education	BSc	208	34.8	**Session of Regions 31 sessions (Professor and 2 in-services teachers / session)**	Northern Taiwan 13 sessions	219	36.7
	MSc	228	38.2		Central Taiwan 6 sessions	156	26.1
	Master of science Education	80	13.4		Southern Taiwan 9 sessions	187	31.3
	Others	81	13.6		Eastern Taiwan 3 sessions	35	5.9

Table 1 indicates that of the workshop participants, 58.8% were male science teachers and 41.2% were female; 51.6% had a master's degree in science or science education degree, 59.5% had had previous inquiry experience, and 60.3% had less than 10 years of teaching experience.

Table 2. Teachers' perceptions of their own competence and confidence change

Subscale	Items	Competence Change		Self-Confidence Change	
		M	SD	M	SD
IC	9	3.34	0.81	3.82	0.61
ITC	14	3.41	0.71	3.58	0.59
GIC	7	3.37	0.84	3.75	0.64
All	30	3.38	0.72	3.70	0.54

Note:
Increases in Competence: 5 (very strong changes) to 1 (no changes)
Increases in self-confidence of inquiry teaching:
5 (very strong changes in self-confidence) to 1 (very low changes in self-confidence)

The results listed in Table 2 indicate that our workshop can enhance teachers' confidence in their understanding of inquiry [IC], inquiry-teaching competence [ITC], and competence in guiding inquiry [GIC] to a moderate level. We also discovered that the workshop can increase science teachers' self-confidence more than their competences.

Conclusion

There are many exciting aspects of this study: firstly, we put science education research findings into practice; secondly, we connected science educators and experienced teachers to foster science teachers' inquiry-based teaching competence. Many teachers enjoyed the combination of these two types of speakers in the workshop. Finally, our research findings helped to foster classroom teachers' teaching.

The findings indicate that Taiwanese science teachers participating in the workshops were young in their teaching profession, and half of them were well-trained, having completed graduate programs. Our one-shot workshop brought about changes in these teachers' inquiry teaching competence as well as confidence. However, the challenge is how to make long-lasting relationships with these teachers, experienced inquiry teachers and university science educators. We think the priority is to construct a networking structure so that these teachers and science educators can work cooperatively. Hopefully, through the networking system, we can transform regular science teachers into seed teachers and mentor teachers in inquiry-based instruction. We do not know how long it will take to fulfill the mission, but we believe it is a valuable mission to work on.

Reference

Cakiroglu, J., Capa-Aydin, Y., & Woolfolk Hoy, A. (2012). *Science teaching efficacy beliefs.* In Fraser, B.J., Tobin, K.G., & McRobbie, C.J., (Eds.), *Second international handbook of science education* (pp. 449-461). Springer Science+Business Media.

Tuan, H. L. & Wen, M. C. (2005, Nov). *The development of an inquiry teaching efficacy questionnaire.* Paper presented at the International Conference of Authentic Science and Mathematics (Teacher) Education in the Netherlands and Taiwan. Hsinchu, Taiwan.

Upcoming conferences

The 3rd Asian IHPST Regional Conference

Inquiry in Science and in Science Education:
Historical, Philosophical and Pedagogical Dimensions

December 15-18, 2016 @ Pusan National University, South Korea.
Chairs: Hae-Ae Seo (Biology Education, PNU) & Youngmin Kim (Physics Education, PNU)

Plenary speakers:
Johannes Grebe-Ellis (Bergische Universität Wuppertal):
Hanne Andersen (University of Copenhagen) Iwan Rhys Morus (Aberystwyth University)

This conference follows the previous very successful Asian regional meetings in Seoul (2012) and Taipei (2014). Pusan National University is in Busan, South Korea's second largest city, located on the southern coast of the country with easy high-speed train and air connection to Seoul. The conference will open on Thursday evening with a plenary lecture and welcoming reception in the evening, and Friday and Saturday will have presentations all day. The Conference will close on Sunday at lunch time and a half-day excursion will be offered in the afternoon. A pre-conference research workshop on HPS and Education themes and methodologies will be organized for graduate students and junior scholars.
Proposals for individual papers (1,000 words) and symposia are due by: June 10, 2016. Inquiries to: Hae-Ae Seo (haseo@pusan.ac.kr)

The Visions and 2016 Plans of
the Association of Science Education (ASET) in Taiwan

Hsiao-Ching She (ASET President)
Prepared by Sung-Tao Lee (ASET international committee chair)

The Association of Science Education in Taiwan (ASET) was established in 1988 as a platform for academic research and policy advocates of science education in Taiwan. To promote the quality of science education research and to enhance connections between experts in science and science education domains, the ASET holds an annual conference of science education in every December, which includes plenary speeches, keynote speeches, workshops and research idea sharing and presentations. For establishing the collaboration with science education communities worldwide, the ASET conference was recently transformed into an international conference, and has gradually become the most important academic organization of science education in Taiwan. Recently, ASET has welcomed and encouraged K-12 science teachers to actively participate in and share their science teaching with the hope of promoting science teaching through science education research.

There are five committees in ASET (Awards, Academic, Activities, International and Publishing) in charge of different science education related tasks, activities or projects, guided, initiated or inspired by the board meeting with five chairs from each committee, executive secretary, treasurer, Vice President and President of ASET. For this coming year, 2016, the different undertakings of the five committees will be focusing around the current major themes in the science education community and the new science education policy initiatives in Taiwan.

For the Awards committee, the nominations, reviews and recommendations of the awards of young scholar, science teaching excellence, outstanding paper, outstanding doctoral research and lifelong contributions to science education will be their main tasks. The Academic committee proposed to hold two summer workshops in 2016 summer vacation. The first one is open for all graduate students of science education to participate in, and the topic will be interdisciplinary research design and proposal preparation. The second workshop is open to researchers in science, mathematics, and science education to work together and share their ideas about interdisciplinary collaborations under the big idea of STEM or science education.

The annual international ASET conference will, as usual, be the responsibility of the Activities committee, and another workshop on high school new elective science teaching and evaluation will also be planned and put into practice for secondary science teachers. Many topics related to science education instruction and evaluation will be included in the workshop for preparing science teachers' ability to provide new elective science courses, such as inquiry and problem solving. Although the topic of inquiry teaching is not a new one in the science education community, its design orientations, outcomes assessment and the possible connections with ICT are still worth exploring, especially for senior high school science teachers based on the new education policies to be implemented by the government. It is believed that these supportive activities will be of great help to those in-service science teachers. For the International committee, besides the proposed connections with the Institute of Education in Singapore for 2016 ISEC, the members are also proposing an ASET session in this coming 2016 EASE conference in Tokyo, and the response from the 2016 EASE organizing committee has been positive and encouraging. After the detailed preparations and integrations, a special ASET session on science education research will be seen at the 2016 EASE conference, and all the delegates from EASE regions are welcome to participate in this academic sharing.

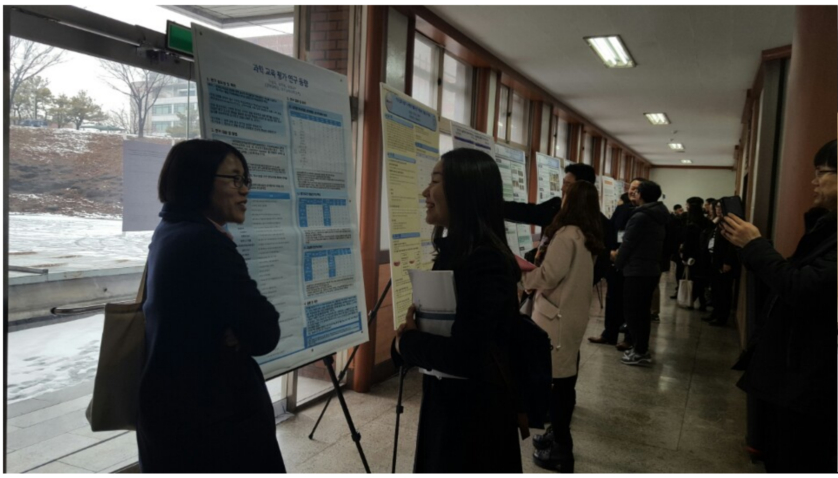
Because of the need to update the textbook of science education for graduate and undergraduate students in Taiwan, the Publishing committee is working on the possibility of publishing a new version of the science education textbook for the younger generations, and some forums on the practices and programs within the new science education policies are also planned to seek consensus from the different perspectives of teachers, parents, teacher preparation universities, government officials and researchers. For better communication in a digital society, the publishing committee will also regularly publish e-news about the current information of science education through our ASET website and Facebook fans website, and ASET members and our friends in EASE regions are all welcome to visit these web pages and give us your precious comments.

Epilogue from
KASE (Korea Association for Science Education) Conference in 2016

Phil-Seok Oh
Kyoungin National University of Education

The 2016 Korean Association for Science Education (KASE) International Conference has been successfully held at Kyungpook National University, Daegu, Korea during January 28-30, 2016. The theme of the conference was The Future of Science Education: International Perspectives, which offered a valuable opportunity for all participants to share cutting-edge studies addressing theoretical and practical questions concerning the future of science education. About 300 science educators and researchers from Korea and around the world including Bangladeshi, China, Hong Kong, Japan, Singapore, Taiwan, U.K., and U.S.A. have participated in the conference. Fifteen plenary and keynote speeches and 125 research papers were addressed to cover a wide range of topics, such as science teaching and learning, assessment in science learning, science teacher education, philosophy and history of science, social and cultural issues in science education, and informal science education.

The KASE (President: Heui-Baik Kim, Seoul National University, Korea) is a national research society for the development of science education in Korea and in the world. The KASE international conferences have been established recently with a global goal of promoting quality science education and research by communications and networking among international science education communities. All members in the KASE hope that the conference can make ongoing contributions to the growth of education and research in the field of science education.




Book Review

Chiu, M.-H. (Ed.). (2015). Science Education Research and Practices in Taiwan: Challenges and Opportunities. Dordrecht, The Netherlands: Springer.

Mei-Hung Chiu
National Taiwan Normal University
Graduate Institute of Science Education
mhchiu@ntnu.edu.tw

The book, Science Education Research and Practices in Taiwan: Challenges and Opportunities, presents the developmental stages and outcomes of research on science education from scholars in Taiwan. Taiwan has become one of the national leaders in science education, with its researchers positioned at the cutting edge. Taiwan covers an area of about 36,000 km^2, smaller than most U.S. states, and has a population of 23 million people. Mandarin is the official national language. As such, science researchers in Taiwan worked extraordinarily hard to overcome language barriers and limited resources to make Taiwan visible on the international stage. As this book details, lessons learned from these efforts are making significant contributions to the field and can inform global science education research and practice.

Taiwan, like the other Eastern-Asian nations, has a history of outperforming other countries on the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA), the international assessment monitoring systems. Such high student performance does not occur in isolation, but is the product of effective teaching and comprehensive research. Since 1999, Taiwan has ranked among the top 10 countries in terms of science education research publications and was ranked third in 2005 and 2007. A number of factors contributed to this success, and they are outlined in this publication.

As the editor of this collection, I outline in Chapter 1 the need for, and contents of, the book. The remaining chapters are divided into four sections. Section 1 provides an overview of science education in Taiwan and is comprised of three chapters. Chapter 2, written by Chorng-Jee Guo and Mei-Hung Chiu, reviews the research projects on science education that were funded by the Ministry of Science and Technology (formally known as the National Science Council) between 1972 and 2012. This review provides a historical perspective on the development of science education research in Taiwan and around the world. Chapter 3 examines the 394 science education research articles published in local journals between 1993 and 2012. The chapter authors, Mei-Hung Chiu, Hak-Ping Tam, and Miao-Hsuan Yen, describe the challenges researchers in Taiwan faced in terms of publishing both locally and in international journals. Chapter 4 is a commentary chapter by Reinders Duit who recognizes the impressive development of research from Taiwan and discusses the directions science education in Taiwan may take in the future.

Section 2 of the book has five chapters about science learning and assessment. Early research in science education in Taiwan focused on students' misconceptions while learning science. Toward the end of 20th century, researchers moved from investigating and diagnosing students' alternative conceptions to developing conceptual change theories and practices for learning science. Mei-Hung Chiu, Jing-Wen Lin, and Chin-Cheng Chou (Chapter 5) analyzed 383 (including international and Taiwanese scholars) conceptual change articles appearing in the four major international science education journals and 86 conceptual change articles from Chinese Journal of Science Education (CJSE). They found that 30% of the articles on conceptual change from the international journals were in the area of physics, followed by biology and chemistry. Likewise, about 30% of the conceptual change research published in CJSE was in the area of physics. The authors also highlight the trends in teaching strategies present in the international journals and CJSE. The international journals shifted from conceptual conflict, to analogy, to model and modeling, and finally to multimedia. Similarly, the trend in teaching strategies in Taiwan evolved from the use of conceptual conflict to multimedia. However, fewer articles in CJSE discussed the theoretical issues of conceptual change in science as compared to the international journals. Fang-Ying Yang (Chapter 6) discusses cultural differences in learning science and describes the role of a learner's epistemic beliefs. She reviewed 106 articles that were collected from the Social Science Citation Index (SSCI) database on the research platform, Web of Knowledge, from 2004-2013. She found that learners from Taiwan were recognized as having lower context cultures compared to Turkey and China.

Hak Ping Tam (Chapter 7) discusses the pros and cons of the two-tier item format for studying students' conceptions of science. He concludes that alternative assessments, such as two-tier test items, allow researchers to identify and interpret learners' perceptions about science content. Yu-ling Lu and Chi-jui Lien (Chapter 8) analyzed the data from TIMSS. They found that school resources and family support had a significant impact on student achievement in Taiwan.

David Treagust summarizes what has been accomplished by science education research in Taiwan (Chapter 9). He discusses the rigorous methodologies and theoretical frameworks upon which the research in Taiwan is based.

In Section 2, the authors describe learning in terms of conceptual change and explain how conceptual change cannot be tested via standard multiple-choice formats. Alternative assessment formats allow for a better understanding of how students construct their conceptions about science concepts. From the review of articles published in international journals by science education researchers in Taiwan, it was revealed that scholars in Taiwan are actively involved in, and contributing to, research trends both locally and internationally. However, there remain areas in need of further research such as developing a theoretical framework for describing the uniqueness of learning science in Taiwan.

In Section 3, the next two chapters discuss how technology is shaping research in science education. Tzu-Chiang Lin and Chin-Chung Tsai (Chapter 10) analyzed several target articles based upon keyword combinations related to technology-assisted science learning and instruction in Taiwan. They found that although various technologies (e.g., mobile technologies, educational games, and augmented reality) were used to strengthen learning, quantitative approaches were still preferred. Ying-Shao Hsu and Hsin-Kai Wu (Chapter 11) describe how they developed and evaluated a technology-infused learning environment in Taiwan. They also propose design principles of technology-infused learning environments to allow for the use of multiple representations for scientific investigation. Both chapters address the progressive development of technology and its role in science education.

The other two chapters in this section discuss innovative technology for science education research. Chapter 12 addresses the use of brain waves to investigate how cognitive abilities and emotions influence learning in science. Chia-ju Liu and Chin-Fei Huang consider the use of electroencephalograms (EEGs), event-related potentials (ERPs), and functional magnetic resonance imaging (fMRI) for diagnosing students' emotional state, scientific creativity, mental rotation, and chemistry learning. One of the findings revealed that mental rotation affected the identification of chemical structural formulas and explained why some students failed to perform well on understanding chemical structural formulas.

Chapter 13 was written by Miao-Hsuan Yen and Fang-Ying yang who used eye-tracking techniques to reveal students' learning processes and problem solving strategies. They found a growing number of publications applying eye-tracking techniques to the educational environment. Research in this area in Taiwan began in 2009.

Changing focus to public communication of science and technology in Taiwan, Chun-Ju Huang (Chapter 14) introduces three elements for promoting science communication in Taiwan (being correct, being popular, and being reflective).

Chapter 15 is a commentary chapter written by Joe Krajcik. He points out the prolific outcomes from research in the area of innovative technology for science learning and instruction in Taiwan. He also comments on the future direction and challenges of design-based research to develop and test innovative uses for technology in school science learning.

The fourth section is about curriculum and teacher professional development. Chapter 16 is a review of research about science teacher education programs, and the chapter was written by Hsiao-Lin Tuan, Kuo-Hua Wang, and Huey-Por Chang who claim that pedagogical content knowledge (PCK) influenced the majority of teacher education research in Taiwan over the past 20 years. They also claim that teacher professional development will shift to technology-infused competence in the near future. Ming-Chin Su, Che-Ming Tsai, Hui-Chi Chang, Wen-Hua Chang, and Chen-Yung Lin (Chapter 17) discuss current science curricula related to knowledge, skills, and epistemic practice that should be included in PCK in order to enhance teachers' competence in teaching.

Finally, the last two chapters discuss how to integrate Paiwan culture into the science curriculum. Huey-Lien Kao, Chih-Lung Liu, Ming-Chou Su, and Chi-Liang Chang present examples of curriculum from indigenous tribes in Taiwan. According to their analysis, indigenous students were still underachieving in mathematics and science compared to other students in Taiwan. To motivate and enhance indigenous students in learning science, contextualized learning materials and experiences should be taken into account when designing curriculum. To connect students' learning experiences with real-world applications, Shiang-Yao Liu (Chapter 19) highlights the importance of using environmental issues as well as socio-scientific issues to cultivate students to be scientifically and environmentally literate citizens.

Chapter 20 is a commentary chapter for Section 4 written by Onno De Jong who advocates for teacher learning communities (TLCs) that can contribute to the development of high quality teaching and curriculum as well as to the adaptation of innovative technology for science education practice.

For each section, I invited internationally well-known scholars in science education to comment on how science education research in Taiwan can forward the field of science globally. In addition, a special chapter (Chapter 21) by Larry Yore, Jim Shymansky, and David Treagust offers their views about the development of science education research in Taiwan and shares their stories of long-time friendship and collaboration with science education scholars in Taiwan.

Both as outsiders and insiders to some extent, the authors take different perspectives and identify challenges that lie ahead for science education in Taiwan. Chapter 22 was written by several international scholars (Derek Cheung, Norm Lederman, Marcia C. Linn, Vincent N. Lunetta, Masakata Ogawa, Onno De Jong, Jari Lavonen, Stella Vosniadou, Lei Wang, Robert E. Yager, and Dana L. Zeidler) who had been to Taiwan for various reasons and who share personal reflections on their visits to Taiwan. These reflections open different avenues for readers to see Taiwan and its role in science education from new and multifaceted perspectives.

As stated in Chapter 23, I took the famous quote, "Philosophy of science without history of science is empty, and history of science without philosophy of science is blind" (Lakatos, 1971) and transformed it into, "Theory without practice is empty, and practice without theory is blind when it comes to science education." Putting theory into practice to improve the quality of science education and to positively influence teaching and learning in school settings are great challenges for science education researchers.

Upcoming conferences

The 3rd ISMTEC in 2016
(International Science, Mathematics and Technology Education Conference)
STEM Education: Preparing a Workforce for the Future

October 19-22, 2016 @ Ambassador Hotel Bangkok, Thailand

Plenary speakers:
Allan Schneitz (Dream & Hope Association, Finland)
Pamela McCauley (University of Central Florida)
Stephon Alexander (Dartmouth University)
Birgit Thomann (Internationalisation of VET/Knowledge Management)

ISMTEC is back! ISMTEC 2016 will be held October 19-22 at the Ambassador Hotel in Bangkok. With outstanding keynote speakers and special presenters, we are looking for another exciting conference, with the theme: "STEM Education: Preparing a workforce for the future". We hope you will consider attending ISMTEC 2016, which is free (except for hands-on workshops). We are also looking for presenters who would like to share STEM strategies, research, lessons and projects with the participants in one (or more!) of a variety of presentation formats. Please visit the web site at http://ismtec2016.ipst.ac.th

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Region	Name	Affiliation	E-mail address
China mainland	Jian Wang	Beijing Normal University	wangj@bnu.edu.cn
	Yan-ning Huang	Capital Normal University	yanningh@126.com
	Kewen Liu	Beijing Normal University	liukewen21@bnu.edu.cn
	Baohui Zhang	Shaanxi Normal University	Baohui.zhang@gmail.com
Taiwan	Chia-Ju Liu	National Kaohsiung Normal University	Chiaju1105@gmail.com
	Ying-Shao Hsu	National Taiwan Normal University	yshsu@ntnu.edu.tw
	Mei-Chun Lydia	National Changhua University of Education	mlwen@cc.ncue.edu.tw
	Sung-Tao Lee	National Taichung University of Education	leesungtao@mail.ntcu.edu.tw
Hong Kong	Valerie Yip	The University of Hong Kong	valyip@hku.hk
	Winnie Wing Mui So	Hong Kong Institute of Education	wiso@ied.edu.hk
	May, May Hung Cheng	Hong Kong Institute of Education	maycheng@ied.edu.hk
	Kwok Chi Lau	The Chinese University of Hong Kong	laukwokchi@cuhk.edu.hk
Korea	Young-Shin Park	Chosun University	parkys@chosun.ac.kr
	Sung Kyung Lee	Cheongju National University of Education	sklee@cje.ac.kr
	Sungwon Kim	Ewha Womans University	sungwon@ewha.ac.kr
	Hyunju Park	Chosun University	hjapark@chosun.ac.kr
Japan	Yoshisuke Kumano	Shizuoka University	edykuma@ipc.shizuoka.ac.jp
	Hisashi Otsuji	Ibaraki University	otsujih@mx.ibaraki.ac.jp
	Toshinobu Hatanaka	Toho University	hatanaka@c.sci.toho-u.ac.jp
	Tetsuo Isozaki	Hiroshima University	isozaki@hiroshima-u.ac.jp