E·A·S·E
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Update: 2016 EASE Conference in Tokyo
Innovations in Science Education Research & Practice: Strengthening International Collaboration

The one-month's extension of the due date of abstract submission caused an unbelievable number of submissions. At the end of the initial due date, we received about 300 abstracts; but the number increased to 625 at the end of the final due date. While the number of 'accepted' abstracts should be reduced through the review process (which is underway at the time of this writing), over 500 abstracts may survive! The notification of review result will arrive by June 15 (http://ease2016tokyo.jp/call.html). Eleven symposia, 14 workshops and 11 demonstrations are included. Among others, our challenge of developing a new presentation category, Special Poster Session, which provides an opportunity to present 'on-going projects' and/or 'research proposals' in order for the presenters to receive comments and recommendations from the participants (especially from those of other regions). Happily enough, we received 19 submissions. We hope that this session encourages the presenters to develop their research programs further, and the outcomes will be submitted to either oral or ordinary poster sessions of the EASE conferences in the future. (Detailed in Page 2)

Opportunity for
Integrative STEM Education in Science Projects

In response to the global trend of STEM (Science, Technology, Engineering, Mathematics) education, and the Hong Kong Chief Executive 2015 & 2016 Policy Address on enriching the curricular and learning activities of Science, Technology and Mathematics, "Innovations in Science and Environmental Studies" (ISES) aims at promoting a habit of innovation, an understanding of science knowledge and awareness of environmental issues, nurturing STEM integration skills and problem solving techniques via scientific investigations. ISES, formerly coined as the "Primary Science Project Exhibition" and the "Primary Science Project Competition", has been held since 1998. It is a large-scale exhibition featuring primary school STEM projects. Each year it attracts more than 1,000 Primary 4 to 6 pupils and teachers from local schools and schools in the other cities of the Pearl River Delta Region such as Zhongshan, Dongguan, Shenzhen and Macau.
(Detailed in Page 16)

Upcoming conferences

December 08-10 **The 32nd ASET Annual Conference** in Taichung, Taiwan
December 15-18 **The 3rd Asian IHPST Regional Conference** in Busan, Korea
(Detailed in Page 22)

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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
東亜科學教育學會

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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/

Update: 2016 EASE Conference in Tokyo

Innovations in Science Education Research & Practice: Strengthening International Collaboration (Aug. 26~28, 2016)

Chair of the Steering & 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**

Unexpected number of Abstract Submissions

The one-month's extension of the due date of abstract submission caused an unbelievable number of submissions. At the end of the initial due date, we received about 300 abstracts; but the number increased to 625 at the end of the final due date. While the number of 'accepted' abstracts be reduced through the review process (which is underway at the time of this writing), over 500 abstracts may survive! The notification of review result will arrive by June 15 (http://ease2016tokyo.jp/call.html). Eleven symposia, 14 workshops and 11 demonstrations are included. Among others, our challenge of developing a new presentation category, Special Poster Session, which provides an opportunity to present 'on-going projects' and/or 'research proposals' in order for the presenters to receive comments and recommendations from the participants (especially from those of other regions). Happily enough, we received 19 submissions. We hope that this session encourages the presenters to develop their research programs further, and the outcomes will be submitted to either oral or ordinary poster sessions of the EASE conferences in the future.

We do not know why such a big number of submissions could be received. One of the reasons may be our EASE's smart decision that the fifth international conference is held not in 2017, but in 2016, in which no ESERA international conference is planned. Another reason may be that this is the very first international science education conference held in Japan. For the next EASE conference (in 2018), we will need to identify why the number of submissions increased.

Need to Revise Logistics

At the starting point, we estimated about 300 submissions and 500 participants. But right now, we reasonably estimate 500 presentations, and about 1000 participants (total number of author names (duplication excluded) identified as about 1100). The request to Our University, the conference venue, to provide 5 more lecture rooms has been kindly permitted. In addition, we need to introduce a live broadcasting system (with high quality) to deliver plenary lectures, keynote speeches, ceremonies and general assembly to several other lecture rooms for those who unfortunately overflow the main room (only 180 seats) where such events are going on.

EASE 2016 Tokyo Awards Program

The Award Committee of the EASE 2016 Tokyo Conference is pleased to announce our Awards Program. Two types of Awards are offered: **Young Scholar Award** and **Outstanding Paper Award**. Details of application are uploaded to the web page shown above: http://ease2016tokyo.jp/awards.html

Revised Program (Still Tentative)

The main changes in revised program are: (1) The time schedule shifts late by 30 min due to the university facility regulation, and (2) Poster sessions cannot be separated from oral sessions because of too many presentations submitted (Please see the table on the next page).

[EASE 2016 Tokyo Conference Program]

	August 25 (THU)	August 26 (FRI)	August 27 (SAT)	August 27 (SUN)
08:50 ~		Registration	Registration	Registration
09:00 ~ 09:40		Opening	Oral 3 (6 papers/Room)	Oral 5 (6 papers/Room)
09:40 ~ 10:20		Plenary 1		
10:20 ~ 11:00		Plenary 2		
11:00 ~ 11:30		Refreshment	Refreshment	Refreshment
11:30 ~ 12:50		Oral 1 (4 papers/Room) Poster 1, Special Poster 1	Oral 4 (4 papers/Room) Poster 4, Special Poster 4	Oral 6 (4 papers/Room) Poster 3, Special Poster 3
12:50 ~ 13:30	Preparations	Lunch Break	Lunch Break	Lunch Break
13:30 ~ 14:10		Keynote 1, Keynote 2	Keynote 5, Keynote 6	Oral 7 (4 papers/Room)
14:10 ~ 14:50		Keynote 3, Keynote 4	Keynote 7, Keynote 8	
14:50 ~ 15:00	Registration Starts	Break	Break	Break
15:00 ~ 16:00	SIG Meetings	Oral 2 (3 papers/Room)	General Assembly	Awards & Closing
16:00 ~ 16:30		Refreshment	Refreshment	
16:30 ~ 18:30		Symposia 1, Workshops 1 Demonstrations 1	Symposia 2, Workshops 2 Demonstrations 2	
19:00 ~ 21:00			Banquet (Registered Participant Only)	

Encouraging Graduate Students to Engage in the EASE 2016 Tokyo Conference

This time we introduce 'EASE Alumni Mentor Team' in order to help support 'new comers' of graduate students. Right now the Mentor Team consists of more than 10 volunteered Alumni. Also, the conference provides a lecture room as 'Grad Students Exchanging Spot' in which grad student participants freely utilize to communicate with one another or with Mentors. We trust this special Spot can serve as a bridge between two generations of EASE participants.

Registration through the Conference Website

Our conference registration site (http://ease2016tokyo.jp/registration.html) is working. **While the early bird registration (discount rate) ends on June 30, the online regular registration is still accepted on or before July 31. We strongly recommend your registration during this period.** After that on-site registration (cash only) is applied, however we want to minimize this procedure since the registration booth is expected to be too busy. We appreciate your kind understanding at this point.

Registration Booth

Registration Booth will be open at 3:00PM on August 25 at the conference venue. Just drop in and receive your conference bag, which includes your name tag, the official receipt of payment, the certificate of participation, e-proceedings (USB), conference handbook (program book), lunch coupons and so on. **We strongly encourage you to register on August 25** since it will be very crowded in the early morning of August 26th while the opening ceremony will start at 9:00AM.

Registration Number: Important ID for the EASE 2016 Tokyo

We are planning to manage the Registration Booth at EASE 2016 Tokyo **by your Registration Number (for example, [R0XXX])**, not your names, regions, and/or institutions. **Please do not forget your Registration Number** shown in the auto-reply email from the system on your credit card payment, and bring the number with you at the Registration Booth. (Caution: Sometimes, the auto-reply mail is directly delivered into your junk mail box or trash box. When your registration through the website is successfully accepted, the system immediately sends the auto-reply email identifying your registration number. If you do not receive it, please check the junk mail box or trash box before inquiring.)

Ice-breaking & Group Meeting Rooms

In the afternoon (after 3:00PM) of August 25, we will host an (informal) ice-breaking assembly at the conference venue (with free drinks and snacks). Also, we can arrange a room for pre-meeting or SIG meeting if you need one. Please email to ease2016tokyo@gmail.com. Currently, we have some spare rooms available.

Our whole team is working very hard to see your 'smiling faces' at our EASE 2016 Conference in Tokyo.
See you soon!

Announcement of
EASE 2016 Tokyo Conference Awards Program

The Award Committee
Contact address: Ogawa Lab., Dept. of Math & Science Education, Tokyo University of Science,
Shinjuku, Tokyo 162-8601,Japan
http://ease2016tokyo.jp
e-mail: ease2016tokyo@gmail.com

It is our great pleasure to announce our Awards Program sponsored by the EASE2016 Tokyo Conference. Application materials shown below should be sent as an attached file to ease2016tokyo@gmail.com. These should be identified by the abstract submission number and the Award applied, e.g., **Young Scholar Award Application [A0123], Outstanding Paper Awards [A0321]**.

The full paper for the application should be original and have not been published or offered for publication elsewhere. **The submitted full papers shall be used only for our review process of the Awards.** Since we do not have any plan to publish them in any form, the applicants are strongly recommended to submit it to any academic journals in the near future.

Application period: June 15 to July 15 2016 (Japan Time)

Notification:
Award winners will be announced and presented at the Closing Ceremony (August 28). The Certificates of the Awards will be inscribed with the name of the award, the recipient information, and the title of the paper. In addition, the winners of the Young Scholar Awards are awarded Premium (JPY 20,000).

(A) Young Scholar Awards (about 10 recipients)
Applicant's Qualification:
1. Master or Ph.D. candidates or young scholars graduating Master or Ph.D program after 2011.
2. The single author or the first author of the 'accepted' abstract for oral or poster presentation.

Application Materials:
The documents below should be packaged into one zipped folder, and send it as an attached file to ease2016tokyo@gmail.com, under the heading (subject area) of [Young Scholar Award Application].
1. Curriculum vitae (1 page)
2. Publication list (including Conference papers)
3. Scanned copy of student ID card (as current Master/Ph.D. candidates) or a degree certificate
4. A full paper of the accepted abstract

(B) Outstanding Paper Awards (about 5 recipients)
The Outstanding Paper Awards are awarded to authors whose papers (oral presentation only) are judged to be outstanding contributions to the EASE2016 Conference. The number of awardees will depend on the quality of the papers, but should not exceed five.

Application Materials:
A full paper of the accepted abstract

Common Selection Criteria:
The following criteria will be applied:
1. Conceptual/theoretical background
2. Research approach
3. Presentation and interpretation of research

4. Conclusions
5. Craftsmanship/communication
6. Significance of the study
7. Creativity

Common Guidelines for Writing the Full Paper :

- Length: ca. 3,000 to 6,000 words.
- Abstract: ca. 150 words. .
- Language: English.
- Typing: MS-Word format
- Paper size: A4 (210 x 297 mm)
- Font: Times New Roman, 12 point
- Paragraphs: justified, single-spaced (except tables)
- Margins: 2.5 cm each side
- Numbering: Tables (Roman numerals). Figures (Arabic numerals)
- Style: APA Publication Manual 4th. ed., 1994, including the use of three levels of headings, citations and references.

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

We are the "EASE alumni" having the experience to participate in EASE Summer School and Winter School programs. We are planning to hold two events at EASE 2016 Conference in Tokyo, namely the "EASE Alumni Informal Meeting" and "EASE Conference Tour". Now we would like to report our progress:

EASE Alumni Informal Meeting
Date and Time: 25th August (Day 1 of conference), 15:30 - 17:30
Place: To be announced
[Soft-drinks and snacks will be served]

The purpose of "EASE Alumni Informal Meeting" is to re-unite EASE Alumni, further develop our friendship and discuss on current research interests. This free conversation time will also help us to develop EASE Alumni's future plan, and provide guidance for everyone to have an enjoyable time in Tokyo. There are currently 13 members from Japan, Korea, and Taiwan who will participate in this meeting. It is an informal and carefree alumni event. If you are an EASE Alumnus and interested in our meeting, please feel free to contact us by the above email address.

EASE Conference Tour
Date and Time: 26th-28th August (Day 2-4) 8:00-12:30
Place: Grad Students' Exchanging Spot (#845)

The "EASE Conference Tour" is to support students who participate in an international conference for the first time. At present, 12 members from Japan, Korea, and Taiwan Alumni will support the students. Our goal is to communicate with new student participants and provide assistance whenever necessary. We also plan to talk them at tea breaks during the conference. Our booth will be set up at Grad Students' Exchanging Spot (#845). If you would like any support, please come to our booth.

If you would like to know more about our plans and to help/ participate in our plans, please feel free to contact us!

We look forward to seeing you all at EASE 2016 Conference in Tokyo!

Teaching Model of
Developing the Level of Students' Scientific Literacy in the Scope of PISA

Chuan Li[1], Kewen Liu[1], Xiaoying Feng[2]
Beijing Normal University[1], Capital Normal University[2]

Abstract
A teaching model was constructed based on the insight of scientific literacy in the Program for International Student Assessment (PISA). The frameworks and sample items of PISA scientific literacy tests, as well as the present teaching situation for developing secondary school students' scientific literacy were analyzed. Based on this model, teaching practice from physics, chemistry, biology and geography subject were implemented in some middle or high schools in Fangshan district of Beijing, China. Many well qualified study reports, teaching videos, instructional design, instructional evaluation and other outcomes were obtained in the first semester from 2015 to 2016.

Keywords PISA, scientific literacy, the nature of science, scientific inquiry, scientific process and method

Introduction
Program for International Student Assessment (PISA) is sponsored by Organization for Economic Co-operation and Development (OECD), which aims to investigate students' reading literacy, mathematics literacy and scientific literacy at the age of 15 in three years' intervals with a key test field each time. The focuses of both PISA 2006 and PISA 2015 were on science.

There is no doubt that science has a very important role in dealing with some social production and life problems, such as environmental pollution, climatic change, food shortage and energy dilemma, which means that basic scientific literacy is essential for secondary school students to use in the future. In order to make the students' scientific literacy evaluation more operable, OECD published *PISA 2015 Draft Science Framework* in March 2013, which mainly included the introduction, definition, organization, and assessment of scientific literacy. With the guidance of this framework, the test of PISA 2015was carried out in April 2015. Some provinces in Chinese attended, such as Beijing, Shanghai, Zhejiang, and Guangdong, for which the results will be announced in the world. The technology of computer network test was entirely adopted in the PISA 2015, which is different from previous tests. With the use of computer network test, the process of scan-entering after paper pencil test are omitted, and simulating the procedure of scientific inquiry is realized. Examining the method of scientific research and the thinking process of scientific inquiry is intensified by the simulation.

The connotations and inspirations from PISA scientific literacy are obtained after analyzing the frameworks and sample items of PISA scientific literacy tests. Teaching model inspired by those connotations was constructed and combined with the present teaching situation for developing secondary school students' scientific literacy. Based on this model, teaching cases from physics, chemistry, biology, geography subject were implemented in Fangshan district of Beijing, China.

1. Connotations and inspirations from PISA scientific literacy
According to students' skills needed for future life, the framework for PISA 2015 scientific literacy assessment (as shown in the figure 1) covers competence, knowledge, context and attitude, which aims to investigate students' level of capacity, such as explaining phenomena scientifically, evaluating and designing scientific enquiry, interpreting data and evidence scientifically.

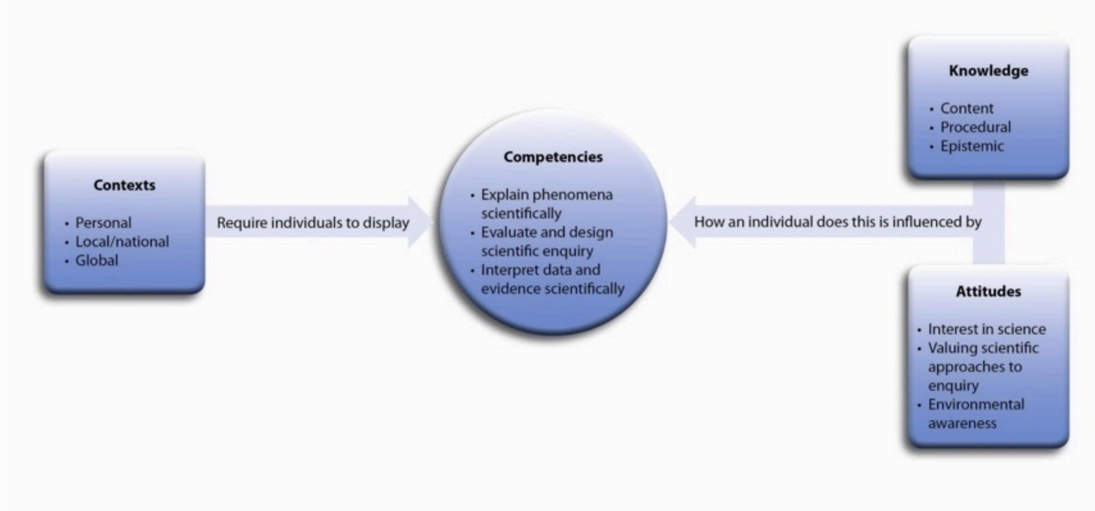

Figure1. Framework for PISA 2015 Scientific Literacy Assessment [1] [2]

There are thirty-five new science sample items and six units in *PISA 2015 Released Field Trial Cognitive Items* approved by the Scientific Literacy Expert Group. These include questions on *Bee Colony Collapse Disorder, Fossil Fuels, Volcanic Eruptions, Volcanic Eruptions, Blue Power Plant, Adjustable Glasses, Running in Hot Weather, Energy-Efficient House*. In every unit, questions arise after the context introduction with the form of text, graphics, tables, and graphs. [3]

From the sample items, we find that PISA 2015 scientific literacy mainly examined students' competence of interpreting data and evidence scientifically, and explaining phenomena scientifically. The types of knowledge involved in most sample items were procedural and content knowledge. In assessment contexts, many items belonged to personal and local/national background, and all of the science themes covering health, natural resources, the environment, hazards, and the frontiers of science and technology were involved in those sample items. It should not be difficult to complete the released questions, since most of them required medium level of cognitive demand. Choice items accounted for most of the sample items. Based on the PISA2015 scientific literacy items and their characteristics, here are some advises:

- The background, i.e. the root of science knowledge, should be introduced in the teaching preparation to enrich the teaching materials;
- The competence of using data or evidence to interpret science phenomena should be intensified; the generation process of science knowledge and the nature of science should be focused and strengthened;
- The scientific method and thinking, particularly the integrality of scientific thought, should be extruded;
- Scientific knowledge can be transformed to scientific problem to develop students' consciousness of research questions.

The impacts brought by PISA scientific literacy test include:

- In the theory study, the connotation of scientific literacy should be redefined from the secondary school students' development for the future life;
- In the theory study, the thinking process to solve problems should be lied emphasis;
- In the theory study, procedural and epistemic knowledge to construct science should be strengthened to pay attention to the nature of science;
- In evaluating the design of science education and teaching, the background hierarchy of the science application should be detailed; and the number of multiple-choice items should be increased;
- Moreover, in evaluating the design of science education and teaching, the procedure to generate scientific data can be simulated by the use of computer to test students' thinking process and key point, which means that secondary students should not only learn science, but also to know why and how they can study science.

In summary, the course to learn science can be focused by the application of scientific method, process and inquiry to develop future talents having awareness of thinking as a scientist.

2. Teaching current situation to develop secondary school students' scientific literacy: taking Fangshan, Beijing as an example [4]

From the result of China PISA independent test and interviews with many science teachers in Beijing Fangshan, there is much development space in some competence of scientific literacy, even though students' average score is improving continually. Teachers' comprehension of the connotation of scientific literacy still needs to be intensified.

Specifically, the main questions in developing secondary students' scientific literacy are as follows:

- Many students lack the competence of obtaining useful information to complete some questions from a large number of background material;
- Some students cannot understand the information in chart, table and graph, and use the information to infer relevant conclusion;
- Scientific knowledge learned from textbook cannot be employed to comprehend science phenomena, matters in social activities, and students cannot understand this idea that science derives from life and is applied to life;
- Many students do not have comprehensive experience of the science research procedure. They lack the knowledge related to science method and cannot correctly use proper method to solve problems in daily life;
- With Internet getting more popular, computer test was applied in PISA 2015 entirety. However, human-computer interactions may influence secondary students' performance because they rarely used computer as a study tool in class before.

The problems in science teaching to develop secondary students' scientific literacy are as follows:

- Science teachers' comprehension of scientific literacy is not thorough, especially in nature of science, scientific approach and scientific spirit;
- In science teaching, some teachers just impart scientific knowledge, and cannot permeate scientific process and method to the learning of science knowledge;
- Many science teachers lack the awareness of finding problem from society to enrich teaching material and using science to understand the social phenomena or solving problems in daily life;
- Some science teachers' comprehension of the idea "process and method" in Chinese new science curriculum reform and the idea about scientific literacy from PISA needs to be embedded deeply.

3. Constructing a teaching model based on the connotation of scientific literacy from PISA

A teaching model is constructed from the practical idea, research design, teaching principles, instructional design and instructional evaluation, based on the connotations and inspirations from PISA scientific literacy and current situation of Fangshan to develop secondary school students' scientific literacy.

3.1 Practical Idea

In the practical idea of experts' guide, teachers' practice and scientific evaluation, the research team, including an expert guidance team, a teaching guidance team, a teaching practice team and a logistics team, were set up by Professor Kewen Liu's science education research team in Beijing Normal University and other education research institutes such as Capital Normal University, teacher training schools like Beijing Fangshan Teacher Training Schools, government education departments, and middle and high schools. Beijing Fangshan Education Commission and other educational bodies were also involved.

- The members of expert guidance team included curriculum and teaching theory researchers in physics, chemistry, biology, geography and other science subjects from Beijing Normal University and Capital Normal University. They were responsible for the improvement of the teaching design, teaching evaluation and study report;
- The teaching guiding team was made up of the instructors and researchers in physics, chemistry, biology, geography and other science subject, for which it selected the topics to teach, built teaching practice team and coordinated the teaching progress;
- Many excellent science teachers with rich teaching experience from middle and high schools in Beijing Fangshan composed the teaching practice team to carry out, prepare the teaching design and teaching evaluation;
- Logistics team constituted by the leaders from Beijing Fangshan Education Commission and the vice president of teaching in every school to launch teaching practices.

Figure 2. Some of the members from the Project to
Promoting Secondary School Students' Scientific Literacy in Beijing Fangshan

3.2 Research Design

With the guidance of Professor Kewen Liu, the final objective of this project was confirmed as promoting secondary school students' scientific literacy by three main research stages including preparation, practice and promotion (figure 3).

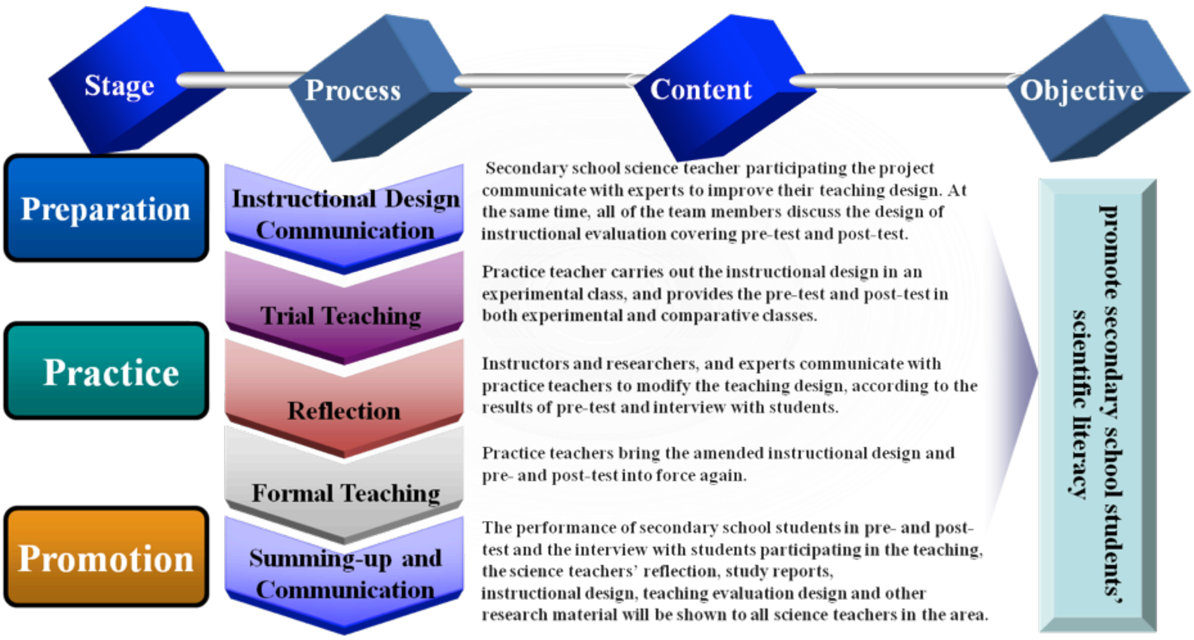

Figure 3. The Research Design of the Project to
Promoting Secondary School Students' Scientific Literacy in Beijing Fangshan

In preparation stage, secondary school science teachers participating the project communicated with experts to improve their teaching design, based on the existing research material about the teaching theme and the connotation and inspiration from PISA scientific literacy. At the same time, members from expert guidance team, teaching guidance team, teaching practice team discussed the design of instructional evaluation covering pre-test and post-test.

Practice stage included trial teaching, improvement and formal teaching. This was drawn upon the principle of practice, reflection and re-practice. In trial teaching, practice teacher carried out the instructional design in an experimental class, and provided the pre-test before teaching and post-test after teaching in both experimental and comparative classes. In improvement, instructors, researchers, and experts communicate with practice teachers modified the teaching design according to the results of pre-test and interviews with students. In formal teaching, practice teachers used the amended instructional design and pre- and post-test into force again.

Based on the work in the teaching practice process, the performance of secondary school students in pre- and post- test, the interviews with students, and the science teachers' reflection, study reports were written by the members from expert guidance team and teaching guidance team, which incorporated existing research materials, instructional designs, teaching evaluation designs and science teachers' professional development in the research procedure.

Meanwhile, to promote other science teachers' professional development and create a higher impact, meetings were held at regular intervals at the start and the end of a semester. The study reports and instructional designs were presented to the science teachers in Beijing Fangshan.

3.3 Teaching Principles

In view of the connotations and inspirations from PISA scientific literacy, the following teaching principles should be noticed in the teaching practice:

- Teaching questions or phenomena can be generated from the background relevant to the teaching content, such as personal, local/national and global circumstances;
- Fundamental assumptions or models are constructed to solve the proposed problems;
- Data or evidence should support the fundamental assumptions or models;
- The law in the data or evidence can be obtained by putting the chart, diagram, graph and mathematical formula into use;
- The proposed questions or phenomena can be solved or explained by using the law from last step;
- The evaluation and reflection of teaching process should be focused.

3.4 Instructional Design

The instructional design included the following: analyzing the teaching content and secondary school students' situation before teaching, confirming the instructional or learning objectives, designing the teaching process, and rethinking the whole teaching practice procedure.

The major task was to analyze the position and role of teaching content of the textbooks and the key parts about the subject content of the teaching theme. The purpose to analyze secondary school students' situation and basic was to identify students' problems, misconceptions and erroneous concepts before learning. Instructional objectives were the aims about scientific literacy connotation existing in the teaching contents, but were the curriculum objectives. Learning objectives were the connotation of scientific literacy, including the competence, knowledge, method and process of science, which can be learnt from the teaching activities.

Table 1. The design of teaching process

Teaching contents line	The core problem line	Circumstances material line	Teachers' activities line	Students' activities line	Design intention

The teaching process was designed by six clues, such as the teaching contents line, the core problem line, circumstances material line, teachers' activities line, students' activities line and the design intention (Table 1). The teaching contents line generalized the main body structure of knowledge, and the logical relationship between different parts of the teaching contents. The core question line was formed after the logical teaching contents had been turned into research questions beginning with what or why. According to the social or life circumstances to produce the research questions, science teachers should list corresponding material as much as possible and choose the material which can effectively summarize many or the whole teaching contents to constitute the circumstances material line. Based on the circumstances material line, science teachers took some measures to resolve the proposed core questions and help secondary school students to master relevant key teaching contents, for which were the main body of teachers' activities line. When science teachers implemented the activities, secondary school students needed to do something to match up teachers' activities. In the design intention, the main aim was to explain what the objectives were about PISA scientific literacy and the ways to embody those objectives. The innovation and improvement points in this instructional design were stated in teaching rethinking.

3.5 Instructional Evaluation

Instructional evaluation was designed to examine the effects of teaching practice and improve the quality of science education in educational research. In traditional instructional evaluation design, there are two classes as experimental and comparative classes whose students' level is approximate and two tests are taken before and after teaching respectively. Besides, items similar to PISA should be designed in the instructional evaluation.

On account of the traditional instructional evaluation and the need of PISA test in front, and the teaching present situation, there are some points in designing the items to evaluate the teaching effects:

- There should be the same items in pre- and post-test;
- The time to finish a test should be controlled in 20 minutes;
- In items form, there can be multiple-choice, true or false and open-ended items, and traditional test should combine with tests similar to PISA to develop the instructional evaluation;
- All items should be connected with the science application in society or life;
- At the end of every item, the competence, the knowledge type, the item form and the cognitive level of demand should be stated, as referring to the open items in PISA 2015 test.

4. The Implement of Teaching Practice Case

According to the teaching model developed, many teaching cases were carried out from September 2015 to January 2016. Examples of topics included: physics topics such as density and its application, friction and its application; chemistry issues such as combustion, fossil fuels, and aluminum and its compounds; biology topics like exploring seed germination process, and natural selection in biology subject; geography topics such as internal and external force to change surface morphology, changeable weather and rainfall.

In implementing this project, there were 4 large-scale concentrated seminars or intercommunions, 13 small-scale teaching and practical activities, 7 middle or high schools and 14 science teachers involved those events, and 15 teaching video achievements and study reports obtained finally.

The practice of combustion in chemistry is an example to explain the application of the teaching model based on the connotation of PISA scientific literacy.

According to the connotation and inspiration from PISA scientific literacy and the existing research about combustion, the key points were to intensify secondary school students' comprehending of the course to build science knowledge about combustion, to help them utilize the scientific methods underlying in combustion theme, and to train their thoughts of settling science questions. Based on those teaching emphasizes, the teaching clue of this theme was designed (in figure 4).

Firstly, science teacher allowed students to list the combustion phenomena as many as possible. Those phenomena could be observed in true life or film and television program by students. Secondly, students' misconceptions - especially in the concept of combustible - should be diagnozed by the questions "what substances are burned in those phenomena" and "what are the conditions of the burning substances". The aim of the second question was to know that in addition to the combustible as the basic condition, reaching the ignition point of the combustible and having combustion improver (such as the oxygen) as a support are the combustion conditions. After analyzing the combustion conditions, science teacher could carry out scientific inquiry with students by considering to control variable. In order to train students' skill of designing the whole scientific inquiry procedure, science teacher should allow all students to design the experimental scheme by themselves or in groups to show their outcomes before performing an experiment. Based on the study of combustion conditions, science teacher analyzed the effects of the proposed combustion phenomena for society and life, including the adverse impact which should be eliminated and positive influence that should be reinforced. This aimed to change students' unilateral acquaintance and overcome their fear for fire. After analyzing the advantages and disadvantages of the combustion phenomena, science teacher could teach how to reinforce or weaken the fire based on the combustion condition and controlled variables, which might help students to understand the philosophy of science such as observing any matter in a dialectical view and anything having two sides. Finally, students should explain the application of the proposed combustion phenomena by using the contents in this lesson, such as the combustion characteristics, the conditions and the effects.

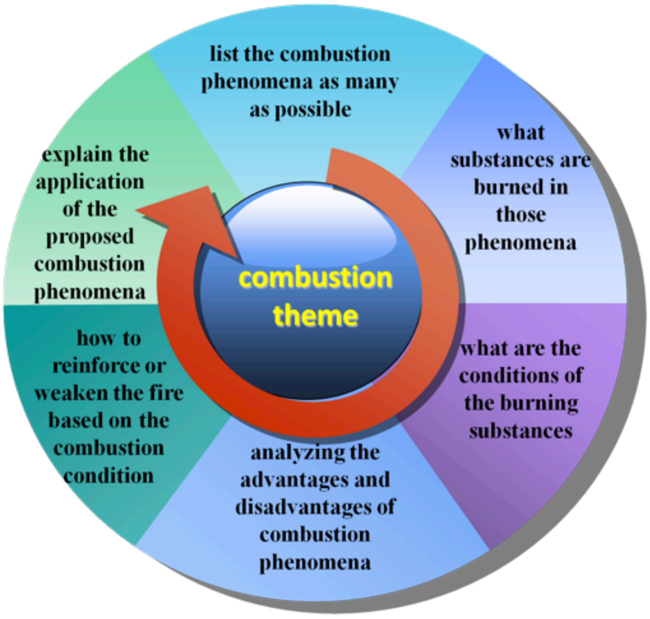

Figure 4. The teaching clue of combustion theme

According to the teaching clue, specific instructional design was made. At the same time, in order to test the students' learning effects and questions before teaching, the research team designed pre- and post- test, drawing on the points in instructional evaluation design. The results by SPSS 20.0 indicated that:

- The experimental class students out-performed the comparative class students. In table 2, the significant number between experimental and comparative classes in pre-test was 0.896> 0.05, which means no difference between them to eliminate the factor of students' level. The significant number between pre-test and post-test in experimental classes was 0.010 < 0.05, but the significant number between pre-test and post-test in comparative classes was 0.314 > 0.05, which means there was a significant difference before and after teaching this theme, according to the teaching models based on the connotation of scientific literacy from PISA.

Table 2. The results of paired sample t-test for experimental and comparative classes in pre-test and post-test

		Coupled difference					t	df.	Sig. (double-tail)
		Mean	Standard Deviation	Standard error of mean	95% Confidence interval for df.				
					Lower-bound	Upper-bound			
C 1	EG pre-test–CG pre-test	.333	12.405	2.532	-4.905	5.572	.132	23	.896
C 2	EG pre-test–EG post-test	-9.750	17.022	3.475	-16.938	-2.562	-2.806	23	.010
C 3	CG pre-test–CG post-test	3.208	15.260	3.115	-3.235	9.652	1.030	23	.314

- The performance of experimental class was better than comparative class performance. According to the figure 5, there were just 5/24 students in experimental class whose scores in post-test were lower than in pre-test. This means that this model improved 80% experimental class students' score; while in comparative class, many students' scores in post-test were lower than in pre-test.

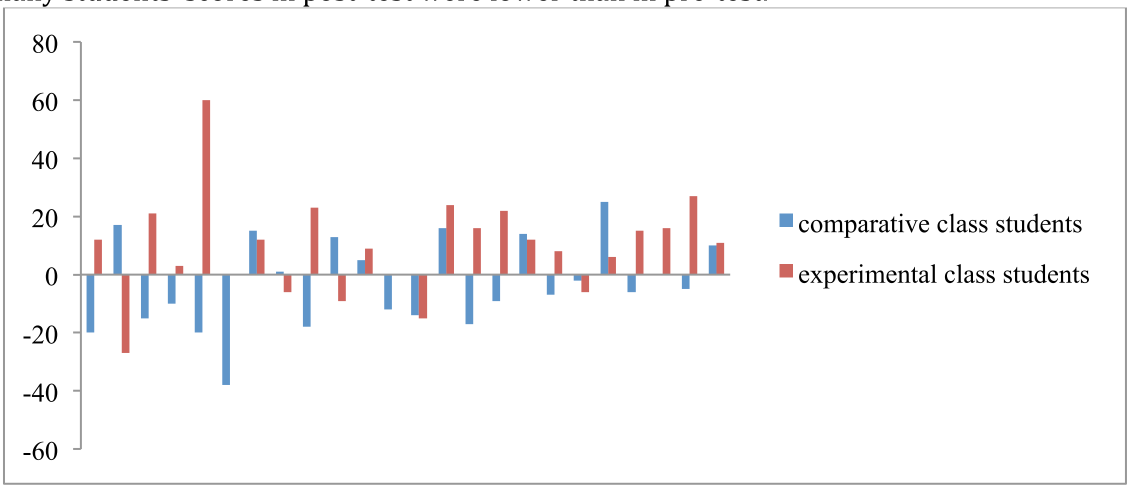

Figure 5. Analysis of students' difference score in pre- and post-test

5. Conclusion

After carrying out the teaching practice for six months, every science teacher and researcher had a profound understanding for the connotation of PISA scientific literacy and the teaching models, especially for the practical idea, research design, teaching principles, instructional design and instructional evaluation. The practice cases have been carried out in the second semester from 2015 to 2016. More outstanding achievements and training more excellent science teachers would be the goals of this project.

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Opportunity for
Integrative STEM Education in Science Projects

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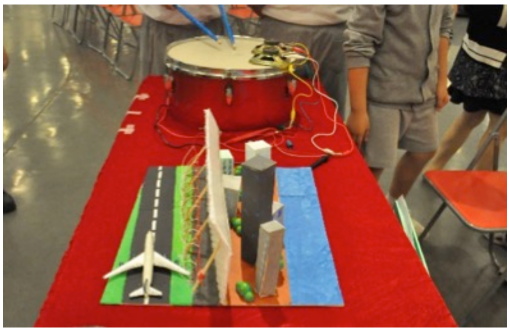
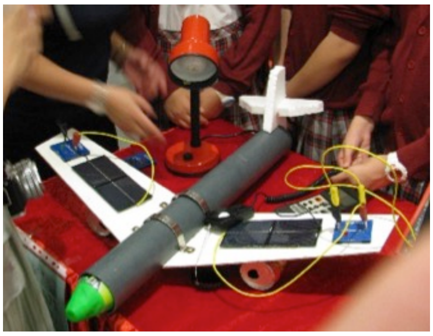
In response to the global trend of STEM (Science, Technology, Engineering, Mathematics) education, and the Hong Kong Chief Executive 2015 & 2016 Policy Address on enriching the curricular and learning activities of Science, Technology and Mathematics, "Innovations in Science and Environmental Studies" (ISES) aims at promoting a habit of innovation, an understanding of science knowledge and awareness of environmental issues, nurturing STEM integration skills and problem solving techniques via scientific investigations.

ISES, formerly coined as the "Primary Science Project Exhibition" and the "Primary Science Project Competition", has been held since 1998. It is a large-scale exhibition featuring primary school STEM projects. Each year it attracts more than 1,000 Primary 4 to 6 pupils and teachers from local schools and schools in the other cities of the Pearl River Delta Region such as Zhongshan, Dongguan, Shenzhen and Macau. It provides a platform for sharing science and environmental inquiry outcomes among primary pupils. To participate in these science inquiry projects, pupils have to work in groups on the shared main theme, integrate and apply science knowledge and STEM skills in their investigation, and share their project outcomes, the scientific principles and concepts, as well as the experiments they used.

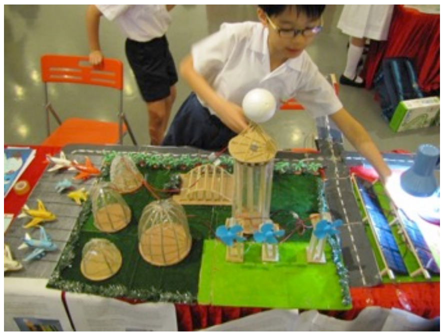
The students' reports have been analyzed to better understand the STEM-related knowledge and skills of these primary pupils. The study of the outstanding inquiries of last year's event revealed that the pupils applied knowledge and skills of STEM subjects in an integrative way (So, 2015). The majority of the studied inquiries (75%) were observed to include contents from 3 or 4 disciplines. In different aspects of their investigations, integration of disciplines was observed. For example, pupils used technological tools like refractometers to gather data for their fair tests. Such learning processes demonstrated the integration of scientific testing methods and the use of technological instruments. This proves that ISES provides an opportunity for pupils to experience integrative STEM learning in an extra-curricular activity setting.



Model of transferring sound into electricity (Po Leung Kuk Camoes Tan Siu Lin Primary School)



Pupils presenting aircraft with a new source of energy (Sharon Lutheran School)



Pupils presenting a green airport model (St. Paul's College Primary School)

Pupils' STEM Work

At the 19th ISES themed "Green Aviation", teams of pupils explored different innovative way in the air transport industry. The 155 inquiries can be sorted into six categories, namely 'Principle and design of aircraft', 'Energy saving, waste less in air transport', 'Noise from aircraft: problem and possibility', 'New green energy & green airports', 'Green flight meals' and 'Others'. The two categories 'Principle and design of aircraft' and 'Energy saving, waste less in air transport' accounted for 35% and 31% respectively of the total inquiries. From the pattern of choosing topics, it is observed that the pupils innovatively explored different aspects of the aviation industry with knowledge, skills and thinking processes from different STEM subjects.

Sharing the project outcomes with the adjudicators and the public

As ISES is moving towards its 20th anniversary, the organizer & co-organizers will continue to provide opportunities for pupils in the Asia-Pacific area to innovate, and will also promote integrative STEM education in the context of environmental issues in our society.

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ToSEF, A Newly Launched Science Education Center in Korea

Jinwoong Song
Chair of BK21 Plus ToSEF (Together Science Education for the Future) Center

'Together' Science Education for the Future (ToSEF), an organization supported by the 'Brain Korea 21 Plus' project, was officially launched on March 1, 2016. The project is a representative program of the Korean government to support education and research of graduate students. As a unique organization representing curriculum education, ToSEF strives to make utmost efforts for the improvement of the science education throughout the world, including Asia for the four-and-a-half years.

We believe that ToSEF has a great potential in becoming a globally renowned research and education institution. Seoul National University (SNU) has continuously demonstrated great potential in the science education sector from its outstanding and talented professors and students alike. ToSEF organization is made up of over 80 members in department of science education in SNU, including 20 faculty members and 3 post-doctoral fellows as well as PhD and master's students.

Confronting the world's efforts in cultivating creative people to prepare for the fast-changing society, ToSEF aims to elevate the science education community by proposing new agendas for our future's society and the corresponding mid-to-long term goals. In this crucial time of world change, ToSEF attempts to become a leading institution in science education to maintain human resources advanced in abilities, and to develop creative science and technology.

"Advancing science via education" and "advancing education via science" is the foundation on which ToSEF desires to build a high caliber science education community that can effectively lead the future's society. By utilizing established competence in both science and education, ToSEF will play a pivotal role in developing the society and education sector overall.

ToSEF would be managed within the following goals:

1) Establish a foundation on becoming a central hub for science education in East Asia, and strive to become a leading research institution for science education in Asia. Ultimately, ToSEF hopes to become a key global ambassador for science education institutions.
2) Prepare a foundation to lead future society by utilizing ToSEF's balanced human resource and potential capability in both areas of science education and cutting-edge science.
3) Adapt to academic future generations by fostering key values such as GloCal research capability, integrated accomplishment and smart update capability.

We are confident that when the BK21 PLUS project nears its end, ToSEF will be one of the top 3 global research organizations representing Asia and leading world science education. For this purpose, international communication and exchange are crucial above all things. Thus ToSEF opens up opportunities for international researchers to participate in ToSEF as adjunct (or visiting) professors, young scholars, or international students. ToSEF also strengthens international collaboration and academic exchange by utilizing established Glocal networks in science education.

The 4th Joint Int'l Symposium on Science Education between SNU and Kasetsart University (Thailand) co-organized by ToSEF

Leaders of ToSEF made a crucial role through the establishment and development of the East-Asian Association for Science Education (EASE). We anticipate that a close relationship between ToSEF and EASE will be further progressed by future coexisting efforts for the improvement of science education of the world beyond East Asia. We hope to plant deep roots of passion and desire and be considered as one of the top advancing institutions of science education. We request keen interest and mutual cooperation of science education researchers in the EASE community.

Contactf us: +82-2-880-7786, http://tosef.snu.ac.kr/

STEAM Professional Development Program
Ewha Womans University for Hong Kong Teachers' Study Group

The STEAM Professional Development Program organized by the College of Education at Ewha Womans University (9–10 May 2016) was an exciting experience for Hong Kong teachers on the implementation of STEAM education in our classrooms. Through seminars and workshops, we were given an overview of the "What? Why? How?" of STEAM Education in Korea as well as the present state of implementation at schools. We were particularly impressed on how the "Art" element are seamlessly integrated into the STEM elements to further nurture creativity, innovation and the sense of diversity to the students. The group was at awe when the shape of bacterial growth was presented not just as a scientific phenomenon but an art form as well. Such an aesthetic expression of life certainly will bring science closer to students' hearts.

Figure 1. A photo slide with art element and a figure with the shape of bacterial growth

Figure 2. Lecture photos in Ewha Womans University

The seminar on the teaching and learning model of STEAM education on "Hands-on, Minds-on and Hearts-on" was the most inspiring. While "Hands-on" learning has been a common practice in most STEM lessons, the "Minds-on" activities articulated the integration of concepts through inference and predication. The "Hearts-on" parts helped students to look into their characters, interests and empathy, for which something educators seldom thought of in delivering STEM courses.

As we all know that teachers are the change agents for all sort of education initiative, teacher professional development and their continuous contribution and innovation are the keys to success. We envied the commitment of the Korean Government on STEAM education the their policy directive and investment in professional development for teachers. The vigorous professional development program provided the Ewha Womans University to teachers has been most impressive. The efforts Korean teachers have made over the past 5 years contributing to STEAM Education have been tremendous and fruitful.

The success of STEAM education in Korea is evidenced in the lessons we observed during our visits to two elementary schools. Students are enthusiastic and engaging in their learning with the well-designed STEAM curriculum.

Figure 3. School visit of Hong Kong group

Finally, we would like to express our special thanks should be to Prof. Sung-won Kim, Prof. Hyunju Lee Dr. Kongju Mun, Dr. Jungsook Yoo and Dr. Yohan Hwang of the Department of Science Education at the Ewha Womans University for their enlightening talks and meticulous arrangements. Our appreciation is extended to Seoul Eung Bong Primary Elementary School and Ewha Womans Unviersity Teacher's Collage Experimental Elementary School for sharing with us their practical experiences in implementing STEAM learning at classroom level and above all, giving us the invaluable opportunity to observe STEAM education at work.

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)

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: September 1, 2016
Inquiries to: Hae-Ae Seo (haseo@pusan.ac.kr)

The 32nd ASET Annual International Conference

Fostering Science as a Lifelong Passion

December 8-10, 2016 @ National Museum of Natural Science in Taichung, Taiwan

On behalf of the Association of Science Education in Taiwan (ASET) and the East-Asian Association for Science Education (EASE), we would like to invite you to join the 32th ASET Annual International Conference. The conference will be held at the National Museum of Natural Science in Taichung, Taiwan, which is recommended as one of "the 15 museums to visit in your lifetime" by the Spanish Association of Museology. The 32nd ASET Conference is also one of the activities recognized by EASE. Detailed information regarding the proposal submission will be announced in the early summer 2016. Please reserve the time and join us!

Conference Website: https://sites.google.com/site/2016aseten/

Important Dates
Paper Submission: August 1 ~ September 15, 2016
Early Bird Registration Deadline: November 15, 2016

Keynote Speakers (by alphabetical order)
Prof. Ching-Sing Chai, Department of Learning Sciences & Technologies, National Institute of Education, Singapore
Prof. Judith S. Lederman, College of Science, Illinois Institute of Technology, USA
Prof. Norman G. Lederman, College of Science, Illinois Institute of Technology, USA
Prof. Huann-shyang Lin, Center for General Education, National Sun Yat-senUniversity, Taiwan
Prof. Jinwoong Song, Department of Physics Education, Seoul National University, Korea

Prof. Wei-Hsin Sun, Department of Physics, National Taiwan University; National Museum of Natural Science, Taiwan

Sponsor: Ministry of Science and Technology
Organizers: Association of Science Education in Taiwan
Graduate Institute of Science Education, National Changhua University of Education
Joint organizer: National Museum of Natural Science
Co-organizers: Graduate Institute of Science Education, National Taiwan Normal University, Graduate Institute of Science Education & Environmental Education, National Kaohsiung Normal University, East-Asian Association for Science Education
Inquires to: aset2016ncue@gmail.com

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