Challenges of Creativity-based International STEAM Camps to Inspire and Motivate Gifted Students

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Abstract
NSTDA is the national science and technology research center in Thailand. One of its missions is to develop and prepare competent human resources in science, technology, engineering, art, and mathematics (STEAM). Organizing STEAM camps for gifted students are among our highlighted activities. We engage and encourage them to express their curiosity, creativity and talents in STEAM. Each year, we organize several national camps and a few international camps. One of camps we organized was at the 15th Asia Pacific Conference on Giftedness:APCG2018 Youth Camp on the theme "Inspiration, Motivation, and Creativity: Leading the way to Giftedness", Keys to our success in this APCG2018 Youth Camp (STEAM camp) were integration of fun, hands-on, open-ended, and challenging problems in a friendly and non-judgmental learning environment. There were two types of sessions: plenary for all participants, and special activities allowing participants to pick and choose activities that suited their individual interests. Each participant was able to select one session out of six break-out sessions. Results from the survey show that the STEAM camp encouraged and developed creativity skills. Overall, the participants' satisfactions score was 3.27 of 4.00 (Excellent level). Furthermore, the STEAM camp had motivated students to have positive attitudes in science, technology, engineering, art, and math, showed by the top score of satisfactions of the Creative Gym activity which got 3.50 of 4.00 (Excellent level). Challenges in running STEAM camps for gifted children from multi-cultural background and covering a wide range of age groups will be presented and discussed.

Keywords: Creativity, Gifted students, international STEAM camp

Introduction

Asia-Pacific Federation on Giftedness (APFG) was founded in 1990 in Manila, Philippines as the Asia-Pacific Federation (APF) and became affiliated to World Council for Gifted and Talented Children (WCGTC) in 1994. In 2010, APF changed its name to APFG and has become an independent organization. The purpose of APFG is to focus Asia-Pacific attention on gifted and talented children or individuals and their valuable potential contribution to the benefit of humankind. Special education administrators, scholars and teachers in gifted and talented education, special education, psychology, and other fields join together with dedicated parents and graduate students to support the mission of the APFG. Over the years, we have been diligently fulfilling the commitments registered at the Bangkok Declaration approved on August 16, 2002 and working on the development and education of gifted and talented individuals in Asia-Pacific region (National Taiwan Normal University, 2015).

The Asia-Pacific Conference on Giftedness (APCG) is a biennial event in the summer, usually July or August providing opportunity to contribute to the global conversation about gifted and talented education. Every two years the event is held at a different location and brings together hundreds of members and attendees and numerous presentations covering latest trends in the education of gifted and talented children. Previously the conference were held in Manila (1990), Taipei (1992), Seoul (1994), Jakarta (1996), New Delhi (1998), Beijing (2000), Bangkok (2002), Daejeon (2004), Taipei (2006), Singapore (2008), Sydney (2010), Dubai (2012), Beijing (2014), Macau (2016), and Bangkok (2018). Daegu, Korea will host the 16th APCG conference in 2020.

The 15th Asia-Pacific Conference on Giftedness (APCG2018) “Inspiration, Motivation, and Creativity: Leading the Way to Giftedness” The National Science and Technology Development Agency (NSTDA), Ministry of Science and Technology, Thailand, would like to extend our warm welcome to invite you to participate in the international conference “The 15th Asia-Pacific Conference on Giftedness (APCG2018)” which will be organized in Bangkok during 20-24 August 2018.

The camp instructors are high-profile professionals who will encourage the students to express their curiosity and creativity through a range of activities, allowing our participants to display and share their talents in art and science, while fostering friendship and cooperation among the future leaders of the Asia-Pacific region. There are 255 gifted and talented children from 13 economies, including 18 teachers and 10 educators. Totally, there are 283 participants from the Asia-Pacific region who participated in this camp.

The APCG2018 features two types of sessions: Plenary Activities, which are meant for all APCG2018 Youth Camp participants and Break-out Session, which allow APCG2018 participants to follow their individual interests. Each participant will be able to select ONE session of the 6 break-out sessions offered because they will be conducted in parallel.

STEM education approaches for developing students through design-based learning methods

- The first of all we will be lead in children get inspired to learn by ask question and do the activities when children brainstorm ideas after choosing a problem to work on and students came up with their creations, they would then export them in sketches on paper. After that, they would create a prototype.
- Finally, they would present their creations to the whole group. Ideas for STEAM Camp design-based learning methods are illustrated in Figure 1.

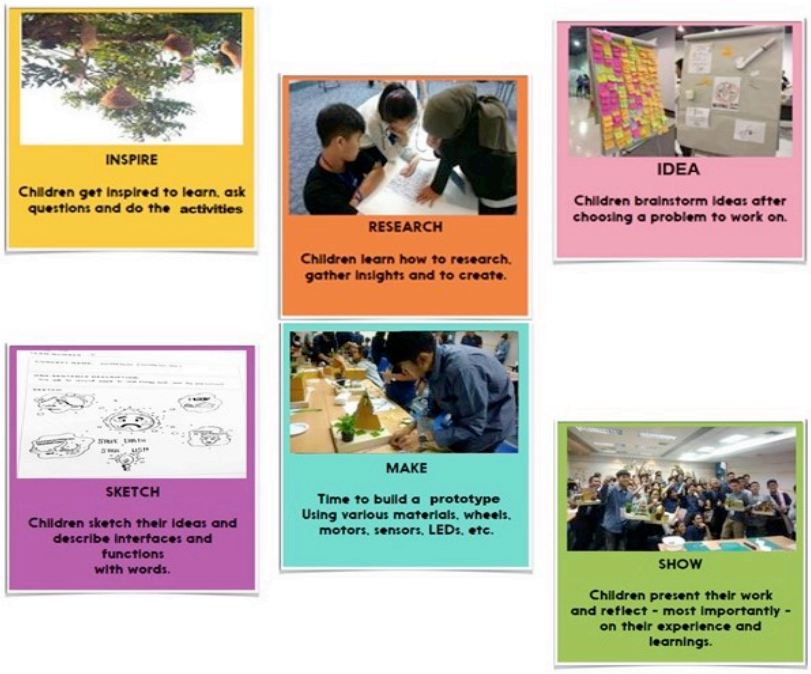

Figure 1. Ideas for STEAM Camp design-based learning methods

Objective

The conference is designed with the objective to increase public awareness, generate enthusiasm among stakeholders in the government, academia, and private/non-government sector, which hopefully will lead to the development of future knowledge in this field as well as suitable policy and strategy for the education of gifted and talented students. It will bring leaders in gifted education from around the globe to share their knowledge, expertise, and practices.

The Camp Content

- The activities designed for the Camp were meant to encourage the students to express the curiosity and creativity through various activities.
- Connect the network of gifted students from around the world

The APCG2018 features two types of sessions: Plenary Activities, which are meant for all APCG2018 Youth Camp participants and Special Camp, which allow

APCG2018 participants to follow their individual interests. Each participant will be able to select ONE session of the 6 break-out sessions offered because they will be conducted in parallel (NSTDA, 2017).

Plenary Activities

1. Creativity Gym

Lecturer: Mr. Purin Phanichphant, is a San Francisco, California-based interactive artist & designer and a Professor of Visual Communication and Sketching at University of California.

Objective: To boost participant's creative confidence by showing them anyone can be a creative problem-solver.

"Creativity Gym", students experienced the process of idea divergence and convergence. The students benefited a lot through learning how to make their creativity works not only by building on others' ideas but also by working together as a team (Figure 2).

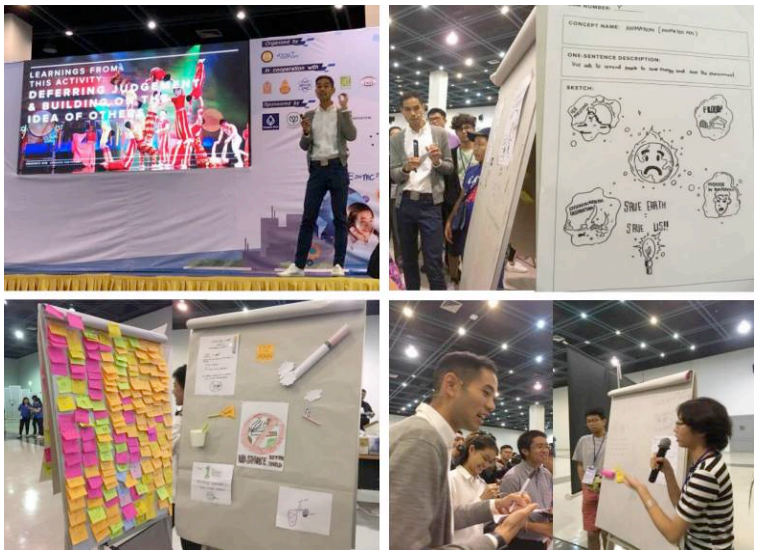

Figure 2. Creativity Gym by Mr. Purin Phanichphant

2. The Creative in You

Lecturer: Miss Vararom Pachimsawat, is a founder of the Dance Centre School of Performing Arts and the Friends of the Arts Foundation.

Objective: To learn and have a better understanding of our mind and body through movement and breathing and to encourage the unlimited the creativity.

"Creative in You", through this class, students could develop their multiple intelligences and build up their social skills. In case you would like to enjoy students' astonishing creative performances. All exercises will consist of encouraging participants to use their unlimited imagination and creativity includes using some tools that are available (Figure 3).

Figure 3. Creative in You by Miss Vararom Pachimsawat

3. Create Art by Applying Math

Lecturer: Professor Jin Akiyama, is director of the Mathematical Education Research Center at the Tokyo University of Science, and professor emeritus at Tokyo University.

Objective: To help participants know presenting magic tricks with mathematical explanations

"**Create Art by Applying Math**", this class make you can design your own mysterious magic-tricks and create artwork like M.C.Escher's, all while being a young mathematician. Through this magic, the professor explained to the student the idea of binary system. In his class, Professor Jin Akiyama demonstrated the close relation between art and math to make students understand that creativity could be a part in the field of mathematics (Figure 4).


Figure 4. Create Art by Applying Math by Professor Jin Akiyama

The Break-out Session Summary (Special Camp)

Special Camp which allow APCG2018 participants to follow their individual interests. Each participant will be able to select ONE session of the 6 break-out sessions offered because they will be conducted in parallel.

1) Learning by Drawing

Summary: This activity taught students drawing the process of producing visual representations, which helped encourage students' motivation for learning and understanding science (Figure 5).

Figure 5. Learning by Drawing by Dr. Sasivimon Swangpol

2) Tie-Dye Tissue Paper STEAM Workshop

Summary: Learn and play geometry with tie-dyeing. To create colorful geometric pattern from natural colors. STEAM education is an integrated the Science, Technology, Engineering, Arts and Mathematics as access points for guiding student inquiry, and critical thinking (Figure 6).

Figure 6. Tie-Dye Tissue Paper STEAM Workshop by Mr. Surat Intasang

3) Tiny Khon Mask Making

Summary: Learning the history of the Ramayana, performed as a stage production. Participants will make their own delicate Tiny Khon masks (Figure 7).

Figure 7. Tiny Khon Mask by Mr. Phongsathorn Rodjaktuk and team from Khon Village the Salaya

Design Thinking for Kids

Summary: Learning to understand and practice. Design thinking process through the designing of the Universal House. The Key Components of Universal House Design: Accessibility, Connectivity and Emotionality (Figure 8).

Figure 8. Design Thinking for Kids by Mr. Noppadon Thuaksuban and Mr. Varut Luengwattanakit

4) Fun Thai Sweets

Summary: Learning to make Thai Sweets and the scientific techniques to create specific flavors come from flowers and plants and selecting proper ingredients from natural raw materials. It is made from glutinous rice flour, coconut and sugar for make innovative Bua Loi (Figure 9).

Figure 9. Fun Thai Sweets by Dr. Masubon Thongngam

5) Smart Entrepreneur

Summary: How to think like an entrepreneur, in terms of target-market analysis and strategy. Learning the concept of customer analysis and trading strategy and how to think like an entrepreneur, in terms of target-market analysis and strategy. The students will be divided into teams of 4 which will form a nest development company in the fictional city (Figure 10).

Figure 10. Smart Entrepreneur by Dr. Panwong Kuntanawat

Conclusions

A summary of the results of the 15th Asia-Pacific Conference on Giftedness (APCG2018) Youth Camp. There are 242 participants participated to do the surveys in this camp. The types of applicants are 222 children from 13 countries (91.7%), teachers 12 people (5.0%) and educators 8 people (3.3%). There are 109 participants are Male (44.48%), and there are 111 participates are Female (45.90%). Otherwise is not identity gender there are 22 participants (9.10%). There are 54 participants of Grade 5-6 (22.40%).The results of the 242 participants approximately 86% from 283 participants were summarized as follows:

Table 1. General data of participants

Description	Participants (person)	Percent
Type of applicants		
• Teacher	9	5.00
• Educator	8	3.30
• Student	222	91.70
Total	**242**	**100.0**
Gender		
• Female	109	45.00
• Male	111	45.90
• Not identify	22	9.10
Total	**242**	**100.0**
Education Level		
• Grade 5-6	54	22.40
• Grade 7-9	83	34.40
• Grade 10-12	77	32.00
• Not Identify	28	11.20
Total	**242**	**100.0**
Age		
• 10-12 yrs (Primary School)	48	19.80
• 13-18 yrs (High School)	179	74.00
• Not identify	15	6.2
Total	**242**	**100.0**

There are 179 participants' ages 13-18 years as a High school level. The percentage is 78.85 and then, ages 10-12 years are 48 participants as a Primary School level. The percentage is 21.15 from 227 participants to do these surveys. The satisfy evaluation of High school get score more than Primary School

The main conclusions of the study may be presented in a Conclusions section, which may include the main findings, the implications and limitations.

This is a criteria of score of **Quality of the overall APCG2018 Youth Camp** are:

Excellent	gets	4 score
Good	gets	3 score
Average	gets	2 score
Need to Improve	gets	1 score

Solutions

(Maximum score-Minimum score)/Interval of score = 3/4 = 0.75

Interval of score	Meaning
3.26 - 4.00	Excellent
2.51 - 3.25	Good
1.76 - 2.50	Average
1.00 - 1.75	Need to Improve

Reference: *Likert, R. (1961). New Patterns of Management. New York: McGraw-Hill Book Company Inc.*

Table 2. Result of Evaluation of Quality of the overall APCG2018 Youth Camp

Descriptions	Frequency ($\overline{X}$)	Result
1) Welcome and Reception Summaries		
1.1 Welcome Reception/Orientation	3.26	Excellent
1.2 Open ceremony	3.29	Excellent
1.3 Closing ceremony	2.93	Good
2) Excursion session Summaries		
2.1 National Science Fair Visiting	3.10	Good
2.2 Thai boxing Activity	3.44	Excellent
2.3 Travel to Muang Boran Historical Park	3.36	Excellent
3) Plenary Activity Summaries		
3.1 Creativity Gym (Mr.Purin Phanichphant)	3.30	Excellent
3.2 Creative in You (Ms.Vararom Pachimsawat)	2.88	Good
3.3 Create Art by Applying Math (Professor Jin Akiyama)	3.14	Good
4) Special Camp Summaries	3.50	Excellent
5) Venue Summaries		
5.1 Document-APCG2018 Youth Camp Book	3.36	Excellent
5.2 Sirindhorn Science Home	3.36	Excellent
5.3 Convention Center, Thailand Science Park	3.47	Excellent
5.4 Meals/Refreshment Breaks	3.09	Good
5.5 Staff Support: Quality of service/ service mind	3.56	Excellent
TOTAL	**3.27**	**Excellent**

From the table 2 shown data about satisfy evaluation from 242 participants in APCG2018 Youth Camp, with further classification by 5 categories. The most satisfactions in Quality of the overall APCG 2018 Youth Camp was Excellent, the frequency (Mean) is 3.27 out of 4.00.

Key to our success in the STEAM camp were integration of fun, hands-on, open ended and challenging problem in a friendly.

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