



APCG

THE 17th ASIA-PACIFIC CONFERENCE ON GIFTEDNESS
Embracing Diversity, Blooming Talents

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Endang Widyorini

Presented a paper titled

OIN91

**The Relationship Between
Intelligence and Executive Function among Gifted Adolescents**

at the

17th Asia-Pacific Conference on Giftedness

July 7th-10th, 2022

Ching-Chih Kuo

Prof. Ching-Chih Kuo
Organizing Committee Chair, The 17th Asia-Pacific Conference on Giftedness



教育部國民及學前教育署
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THE 17th ASIA-PACIFIC
CONFERENCE ON GIFTEDNESS

7-10 July 2022 Taipei

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THE 17th ASIA-PACIFIC
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7-10 July 2022 Taipei

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We look forward to welcoming you at the conference in July!
Stay safe, happy, and healthy!

Kind Regards,

Ching-Chih Kuo

Ching-Chih Kuo, Ph.D.

Chairperson of 2022 Asia-Pacific Conference on Giftedness Organizing Committee

The 17th APCG

Asia-Pacific Conference on Giftedness



Proceedings of

the 17th Asia-Pacific Conference on Giftedness: Embracing Diversity, Blooming Talents

Edited by Ching-Chih Kuo, Hsiao-Ping Yu, Wei-Ren Chen, Yen-Wei Chen

Published 2022 by Department of Special Education, National Taiwan Normal University

Sponsor: K-12 Education Administration, Ministry of Education, ROC (Taiwan)



Proceedings of the 17th Asia-Pacific Conference on Giftedness: Embracing Diversity, Blooming Talents

Sponsored by

K-12 Education Administration, Ministry of Education, Republic of China (Taiwan)

Under the Auspices of

Ministry of Education, Republic of China (Taiwan)

Organized by

Department of Special Education, National Taiwan Normal University

Co-organized by

Asia-Pacific Federation on Giftedness
Special Education Center, National Taiwan Normal University
Chinese Association of Gifted Education
College of Education, National Taiwan Normal University

**Published by Department of Special Education,
National Taiwan Normal University**

First Published in October, 2022

ISBN (PDF)

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Editors:

Ching-Chih Kuo

Hsiao-Ping Yu

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Proceedings of the 17th Asia-Pacific Conference on Giftedness:

Embracing Diversity, Blooming Talents

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Contents

Preface	1
Introduction of the 17th APCG, 2022, Taipei	3
Ching-Chih Kuo, Chang-Hsin Liu, Wan-Hsuan Liu	
Full Papers	14
A. Conception and Characteristics of Giftedness	15
1. Differences in psychological correlates between talented and typical undergraduate students in Hong Kong: some preliminary findings	16
Anna N N Hui, Siu Fai Chan, Timothy Darsono	
2. Using metaphors to examine preservice teachers' opinions on creativity	26
Beyhan Can, Şule Gucyeter	
3. Gender differences in personality traits of gifted adolescents	34
Madlena Arakelyan	
4. Shifting notions of giftedness and talent in the digital age	40
Kun-Ming Lien	
5. The relationship between intelligence and executive function among gifted adolescents	46
Endang Widyorini	
B. Twice-Exceptionality	52
1. Strength-based approaches for supporting twice-exceptional learners: preliminary findings from a systematic quantitative literature review	53
Michelle Ronksley-Pavia, Janis Hanley	
2. Investigating the metaphorical perceptions of pre-school and classroom teacher candidates toward twice-exceptionality	66
Mehmet Gürbüz, Mehmet Atilgan	

3. Angel of rare disease – life story on the talent development of a twice exceptional student Li-Jung Lin, Tsuei-yuan Lai	75
4. A case study on the learning experience of inclusive education for twice exceptional students Wan-ying Lin, Tsuei-yuan Lai	82
C. Program Implementation	87
1. Online STEAM education programme for gifted young girls during the covid-19 pandemic Manabu Sumida	88
2. Early childhood math education program based on Sternberg's theory of successful intelligence: development and effects Jeong-Im Koh, Kyungbin Park	94
3. The impact of Talents-Unlimited-Theory based activities on the development of divergent thinking skills and the development of motivation for creativity among primary stage students Fatema Matar	103
4. The implementation of gifted education in Indonesia Fadhilla Najmi Qinthara, Fitriani Yustikasari Lubis	121
5. A study on the effectiveness of high school gifted students participating in leadership associations Chi-chien Chang, Tsuei-yuan Lai	130
D. Curriculum and Instruction	137
1. Developing inquiry abilities: independent study curriculum-concept and cases analysis Kai-Ju Huang, Shu-Hau Jang	138
2. Effectiveness of note-taking on students' science performance in inquiry-based science learning Mei Huei Li, Yung Chiau Tsao	145

3. A meta-synthesis analysis on EFL: gifted students Tuğba Aydın Yıldız	154
4. Enhancing the use of augmented and virtual reality in the teaching of gifted students: suggestions for the current practice Engin Karaduman, Avni Yıldız	162
5. English curriculum design combined with the special needs of gifted education Chien-Chi Chu, Chien-Hong Yu	169
6. Curriculum development of the original English book reading instruction for the intellectually gifted children Zihui Wang	177
7. Project based learning applied in mathematics and science learning Kun-Ming Lien	183
E. Social-Emotional Adaptation	192
1. A study on the data analysis of research literature on family parenting styles of gifted students in Taiwan Hsin-Hung Wu, Tsuei-yuan Lai	193
2. Everybody can shine: assessment for learning in everyday lessons Eva Suk-mei CHIU	203
3. Experience sharing on the implementation of the cope and grow model through ODYLP for music talented high school students Ting-Yu Ou	209
4. A narrative exploration on the reconciling multiple identities of a gay medical student Tzu-Hung Wei, Tsuei-yuan Lai	217

F. Researches in Gifted Education	229
1. Adolescent leadership in Taiwan: exploring the relationship among multiple assessments and their predictor variables Sheng-Min Cheng	230
2. Arts-based research in gifted education: thoughts from researchers and educators Gizem Guryil, C. Owen Lo, Rachel C. Lin-Yang, Harry Killas, Yuen Sze Michelle Tan	237
3. Explanatory factors predicting reading success of academically gifted students through the perspective of ecological model Mehmet Hilmi Saglam, Talha Goktenturk	243
4. A cross-country comparison of the development on gifted education acts, policies, and practices in Taiwan and Finland Yu-Jung Tsao, Chien-Hong Yu	253

Preface

Thanks to all of the participants who attended the 2022 Asia-Pacific Conference on Giftedness. As the Chairperson of the Organizing Committee, I would also like to extend my great appreciation to the K-12 Education Administration, Ministry of Education and National Taiwan Normal University for their full support to this international conference during this very hard time of Covid-19 pandemic. My sincere appreciation also goes to President of the Asia-Pacific Federation on Giftedness (APFG), Dr. Usanee Anuruthwong for authorizing Taiwan to host this conference. Through the sharing and discussion of professional knowledge and experience, I believe we all gained rewarding experiences and new insights into global trends in cultivating talents and encouraging talent development, which is the core of gifted and talented education.



During the four-day conference, around 1000 participants from 40 countries and regions have joined us at National Taiwan Normal University and on Cisco Webex platform. They are from Armenia, Australia, Austria, Bahrain, Brazil, Canada, China, Croatia, Germany, Hong Kong (China), Hungary, India, Indonesia, Iran, Ireland, Israel, Japan, Macao, Malaysia, Mexico, the Netherlands, New Zealand, Niger, Norway, the Philippines, Romania, the Russia Federation, Saudi Arabia, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, the United Arab Emirates, the United Kingdom and the United States. We have had 11 keynote speeches, 3 symposium sessions, 1 workshop session, 100 oral presentations and 34 poster presentations that are contributed by all the participants.

Words cannot express my appreciation for all the speakers and presenters for your excellent contribution and inspiration. My special appreciation also goes to people who kindly submitted full papers, which have been collected and included in this Proceedings. Your presence, together with your expertise, experience, and knowledge certainly have helped make this event an intellectually stimulating and memorable one. Again, Taiwan is most honored to host this conference. Thank you all for your participation.

Prof. Dr. Ching-Chih Kuo

Chair, Organizing Committee, 2022 Asia-Pacific Conference on Giftedness

THE 17TH ASIA-PACIFIC CONFERENCE ON GIFTEDNESS

Newsletter - July 7



The 17th Asia-Pacific Conference on Giftedness took place on July 7th, attracting over 600 guests, scholars, teachers, and students around the world to participate. The opening ceremony was emceed by Associate Professor Christine Chifen Tseng, and the ceremony started with the brilliant piano and violin performances by Gavin Chen and Emily Tsai.

Then, Political Deputy Minister of Ministry of Education Ching-Hua Tsai gave the congratulatory address, welcoming all the attendees in Taiwan and online from 39 countries with passion. The conference gathered everyone with the theme "Embracing Diversity, Blooming Talents." Taiwan was honored to be the host of the conference and sincerely appreciated the participation of all the attendees. President of National Taiwan Normal University Cheng-Chih Wu also gave his blessing in the opening ceremony, hoping the conference to succeed and attendees to have fruitful experience during the four days.



Subsequently, the first keynote speech invited Professor Del Siegle from University of Connecticut, USA. Professor Siegle began with "elephant in the room" to explore how to balance the identification of gifted education and provide services for the gifted students. Nowadays, the merit-based human development leads schools to spend millions identifying the qualification of the gifted, but it doesn't require schools to provide services for these gifted students, which is the question worth re-thinking at the current phase. Professor Siegle suggested "Three-Legged Gifted Education Service Approach" to conclude that providing service is more crucial than identification.

Professor Robert J. Sternberg from Cornell University, USA gave the next speech and shared that giftedness is usually conceived of a transactional personal characteristic. When identified as "gifted", people are expected to perform well in all aspect, and in exchanged, they receive special benefits. The problem with this transaction between the individual and the school is that it takes into account the egocentric needs of the individual but not, sufficiently, the common good of the world. We should pay more attention to the identification and especially the development of transformational giftedness, which is giftedness directed toward creating a better world--toward making a positive, meaningful, and enduring difference to the world as a whole.

KEYNOTE SPEECH FROM ROBERT J. STERNBERG



At the same time, in the workshop, Dr. Tobias Schüttler shared aerospace-related school student research projects, which indicate that stimulating project with clearly defined objective groups of gifted school students can raise their limits of previous knowledge. By means of self-structured team action they are enabled to conduct targeted research and develop a defined innovative result.

The first day of the conference also had six venues for paper and poster presentations. The inclusive education of "Embracing Diversity, Blooming Talents" has been the critical issues we are working on. The speakers and presenters of this international conference come from 40 countries worldwide. The research results fully demonstrate the value for creating high-quality learning environment, and inspiring students' talents.



PAPER PRESENTATION



Sharing and discussing with partners for gifted and inclusive education from different countries online and in person must ignite more inspirations. We are looking forward that students with special needs are able to learn joyfully with peers.

The Relationship Between Intelligence and Executive Function among Gifted Adolescents

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Executive function is a term for a number of complex cognitive processes that are interdependent and critical to purposeful, goal directed behaviour (Lezak, et al, 2004). Miyake, et al. (2000), EF as a cognitive process (Working Memory, Inhibition, Cognitive Flexibility) which is a thorough coordination of processes in achieving a certain goal. (a) Working Memory is one of the main cognitive processes underlying thinking and learning. WM is necessary because it allows internal representation of information to guide decision-making and open behaviour; (b) Cognitive Flexibility /CF is often called mental flexibility, mental shift and is closely related to creativity; (c) Inhibitory control (IC). IC is the ability to inhibit attention to the distractor thus enabling selective and sustained attention. The ability to inhibit strong behavioural tendencies can help make a person flexible to changes that may occur, as well as obey social decency.

Chichekian & Shore (2017) said that gifted adolescents with this enormous potential, they have good cognitive flexibility (able to categorize problems into meaningful and able to make relevant solutions), metacognition (related to EF and self-regulation), strategic planning, prioritize complexity and troubleshooting, has an excellent memory (developed WM to solve problems), and has a broad knowledge of things. Previous studies have stated that there is a relation between EF and intelligence. As research conducted by Arffa (2007) states that full-scale IQ is significantly related to EF. EF are considered necessary to be able to better understand human behaviour in all its aspects. EF are those skills that can help the person adapt to a continuously changing environment and suppress any non-desirable behaviour, through self-regulation and adaptation, for their own benefits (Bernal, et al.2021).

But in fact, although gifted students have very high intelligence, there are also weaknesses that are owned, one of which is EF. Some gifted children were found to have poor EF. The lack of EF ability in gifted students makes various problems that will have an impact on themselves and others. Silverman (2013) mention the problems faced by students related to EF, namely problems in planning and organizing that interfere with school performance, lack of time management, work is often done at the last moment, less able to sort verbal and written expressions, inability to express how

to get answers, impulsiveness, and make decisions without careful thought. The ability to solve problems, plan and manage time in doing tasks requires good cognitive flexibility). Likewise, to control oneself and control emotions related to Inhibitory Control, as well as the ability to analyse, think, reason, and learn requires working memory.

Executive function is a term for a number of complex cognitive processes that are interdependent and critical to purposeful, goal directed behaviour (Lezak, et al 2004). Executive functions refer to a variety of correlated abilities ranging from simple voluntary initiation and inhibition of behaviour to those involving complex planning, problem solving, and insight. Planning problem solving, and insight certainly correspond to psychological and even lay concepts of "intelligent behaviour". However, evidence for a relationship of intelligence tests to executive function measures is inconsistent and not strong (Arffa, 2007). The purpose of this research, in order to know the relationship between intelligence and executive function (EF) in gifted children. The hypothesis: (a) there is relationship between Intelligence and EF of the gifted adolescents; (b) There is a relationship between three domains (Working Memory, Cognitive Flexibility, and Inhibitory Control) in Executive Function and Intelligence in gifted adolescents.

METHOD

Participants in the study were students in special class for gifted students with IQs above 130, total 132, they are 73 boys and 59 girls. Age of 13-15 years. IQ is measured by CFIT. EF data collection using neuropsychological test tools, namely Wisconsin Card Sorting Test (WCST) and Stroop Colour and Word Task online version of Psytoolkit.org, Trail Making Test (TMT), and Digit Span.

RESULTS

From statistical analysis. The results showed there was no significant correlation between Intelligence and Executive Function (measured by Wisconsin Card Sorting Test (WCST) in gifted adolescents ($r=0,311$; $p>0,05$). The results of statistical analysis IQ with the three domains contained in the EF showed different correlations; Likewise, the Cognitive Flexibility/CF domain as measured by the Trail Making Test (TMT) there is not find a significant correlation ($r=-0.418$; $p>0.05$). There is a significant correlation for Intelligence and Working memory/WM of the Backward Digit Span measuring instrument ($r=0.347$; $p<0.05$), and There is a significant correlation between

Intelligence and Inhibitory Control/IC of the Stroop Colour and Word Task ($r=0,241$; $p<0,05$).

DISCUSSION

The first hypothesis is not accepted. It means that there is no correlation between Intelligence and Executive Function. According to Arffa (2018) Intelligence is a concept developed in psychology and in particular the psychometric tradition, executive function is a concept created in the domain of cognitive neuroscience. It is not surprising that the two remain as parallel concepts in the explanation of human cognition. Research has shown that, when viewed as a whole, executive functions are only partially according to the psychometric concept of intelligence. Therefore, it is evident that some elements of executive function, or rather, certain executive functions clearly correspond to intelligence, while some do not refer to intelligence. If uses the key difference between metacognitive –or simply “intellectual”—executive function, and emotional/motivation – or just a non-intellectual—executive function, it becomes proven that general intelligence can be equated with metacognitive executive function but not with emotional/motivational executive function. It has recently been proposed that cognitive tests knock general-domain executive processes; executive process is intercepted overlapping across cognitive tests so that they are needed more often than specialized domains (Kovacs & Conway, 2016).

Several studies have shown that not all domains of EF are affected by intelligence. The most highly correlated with intelligence is WM (Friedman, et al, 2006; Fugate et al, 2013), especially in adolescents (Giofre et al, 2013). Gifted adolescents have better working memory than non-gifted adolescents (Leikin, et al, 2013; van Viersen et al, 2014). There is clearly a close relationship between intelligence and working memory, and both play an important role in a variety of developmental areas during childhood. Interestingly, both involve prefrontal areas of the brain. This raises the question of whether, when solving problems involving working memory, more intelligent individuals show more activity in the prefrontal brain relative to those who are less intelligent (Neubauer and Fink, 2009).

In gifted children, WM-related self-control mechanisms are also associated with Inhibitory Control (IC). Gifted children can inhibit irrelevant information and divert information processing so that new information that should be remembered can be well received. In gifted children, the corpus colosum is larger than normal children so that there is more space in the brain to channel information from one part of the brain to another and in the end the two parts of the brain can be synchronized properly

(MacIntyre, 2008). WM is the capacity that underlies complex cognitive processes and this ability is possessed by gifted children (Dehn, 2011).

This study indicate that intelligence is not related to the Flexibility Cognitive (FC). Several previous studies have found that intelligence is weakly or even unrelated to flexibility cognitive (Benedek, et al 2014; Friedman, Miyake, Corley, Young, DeFries, & Hewitt, 2006). This is because, FC is able to see things from different points of view.

The results of this study indicate that intelligence has a significant correlation with inhibitory control/IC. This is probably because gifted adolescents have a larger gray matter area than non-gifted adolescents (gray matter area is the site of the cell body and is the most active site in the brain, consists of nerve cell bodies, and is a structure that houses the nucleus of neurons, which serves as a sign of self-control. Gray matter also works for higher level learning). Therefore, gifted adolescents have good cognitive control so that even though the brain demands continuous activation from other parts of the brain, gifted adolescents can still control themselves to commit to their tasks (Miyake, et al, 2010)

Carlson, Zelazo, & Faja (2013) state that EF is not influenced by intelligence, but is more influenced by socioeconomic factors, gender, culture, language, parenting, gene-environment interactions, and sleep patterns. The first factor that affects EF is socioeconomic factors. The level of education of parents also affects the EF and language development of children. In addition, children who often move places of residence, trauma, childhood stress can also affect EF. Briggs, et al (2008) conducted research on gifted children and found that they were culturally, linguistically, and ethnically different and students were not identified as gifted children.

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