

Establish a stimulating environment for blooming talents of a homeschooling student with twice-exceptionality.

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Abstract

“Outstanding human performance continues to intrigue experts and the public; however, the focus is often on the individual performer or producer with scant attention given to the additive part played by circumstances and contexts.” (Subotnik, Olszewski-Kubilius, & Worrell, 2019, as cited in Ziegler, 2022). In answering the question of whether a person will ever attain excellence, social norms are not very helpful. Instead, one should refer to a specification analysis of the actions we expect to find among persons who demonstrate excellence (Ziegler, 2005). Even nativist talent models had recognized that talent cannot be developed without a stimulating environment. Ziegler (2022) proposed a concept of Environmental Boosters of Talent Development on the 17th Asia-Pacific Conference on Giftedness during the keynote speech. He demonstrated that stimulating environment became clear that certain people (for example, parents and peers), objects (for example, toys, learning materials), settings (for example, libraries, classrooms), and systems (for example, schools and families) play a crucial role for talent development. He developed the Actiotope Model of Giftedness, which promotes a systemic conception of giftedness. The achievement of excellence is interpreted as building a repertoire of highly effective actions. It is a domain-specific adaptation to the environmental conditions in the individual actiotope that is increasingly developed. Learning resources can be used to estimate the potential for environmental booster, and can be categorized into exogenous and endogenous ones (Ziegler, Debatin, Stoeger, 2019). According to the Actiotope model of giftedness, exogenous and endogenous resources needed to develop excellence include five forms of educational capital (economic, cultural, social, infrastructural, and didactic), such as schools for the gifted, gifted teachers, enrichment approaches and five forms of learning capital (organismic, telic, actional, episodic, and attentional), such as intelligence, creativity and learning strategies.

Apart from serving on the Committee Responsible for Identification and Placement of Gifted and Disabled Students, the researcher also leads Taoyuan Autodidactic 3.0 Lab. Taoyuan Autodidactic 3.0 Lab is a project launched by Taoyuan City Government Department of Education in 2018 to foster the values of “Three-type acts of experimental education” including the promotion of educational innovation. This project aims at unlocking students’ learning potentials through a variety of programs, including classic keynote speeches, inquiry-oriented learning courses, curriculum-matching services, as well as field trips and off-campus learning activities.

The purpose of this research is to gain insight into how 2E student build a repertoire of highly effective actions within stimulating environment to make adaptations to the environmental conditions and achieve excellence. This research adopts qualitative research methods and interviews a homeschooling elementary school student with twice-exceptionality as well as his significant others. The significant others include parents, gifted teacher, professor from tutor-matching program. The student’s

achievement is analyzed by his performance at school, productions, academic records using the model of exogenous and endogenous learning resources. How family, schools and the society can provide resources to boost 2E students' talents is further discussed.

To achieve credibility and rigor in information analysis, researchers repeatedly consulted and compared the data, and looked for the connection and context in the data. After constant emendation, a structure corresponding to the research purpose is constructed.

The findings in this study are as follows:

1. Committee Responsible for Identification and Placement of Gifted and Disabled Students should identify 2E students' advantages through comprehensive assessment and label homeschooling 2E students as gifted to secure them match-needed gifted services and enrichment programs at school.
2. In terms of exogenous learning resources, Taoyuan Autodidactic 3.0 Lab played a crucial role as social educational capital, with its programs ranging from curriculum for 3rd graders in elementary schools to university elective courses. In this way, 2E students are able to learn outside the box and focus on developing superior ability (in this case study, programming).
3. As to endogenous learning resources, parents' positive upbringing attitudes and company will support homeschooling 2E students to flex their courage muscles and try something new.
4. A supportive and encouraging system allows 2E students to complete missions and solve problems with the aid of diversified learning resources. Even more, 2E students benefit from positive thinking and high self-esteem, which empowers them to embrace weaknesses, and believe in their own capability and autonomy to learn.

Keyword: Homeschooling Student, Twice-exceptionality, Taoyuan Autodidactic 3.0 Lab, Actiotope Model, Environmental Boosters, Talent Development

Introduction

Twice-exceptional (2E) learners (gifted students with disabilities), have the dual characteristics of both giftedness and disabilities, so they are faced with more challenges and variables in learning. Identification of 2E students is difficult because their strengths and weaknesses mask each other, creating a unique learner profile. The profiles of 2E students are atypical of a gifted student or a student with disabilities (Trail, 2011; Kuo, 2022). Unique characteristics can make it difficult for 2E students to qualify for either gifted or special education services. 2E students are at risk when services are delayed. How teachers can tap into their strengths and weaknesses, and what educational strategies should be implemented to help these students succeed in school and beyond are more important than labeling them as giftedness. Whether they can receive appropriate intervention has a great impact on their success or failure in learning.

In Gagné's Differentiating Model of Giftedness and Talent (DMGT) models, the role of the environment is presented as a determinant catalyst for the expression of innate abilities on performance (Gagné, 2004). In the DMGT 2.0 update, the E (environmental) catalysts have been moved up and behind the I (intrapersonal) component. This partial overlap signals the crucial filtering role played by most I (intrapersonal) sub-components with regard to environmental influences; most current views of psychological processes acknowledge that the bulk of environmental stimuli have to pass through the 'sieve' of an individual's needs, interests, or personality traits. (Gagné, 2013).

“Outstanding human performance continues to intrigue experts and the public; however, the focus is often on the individual performer or producer with scant attention given to the additive part played by circumstances and contexts.” (Subotnik, Olszewski-Kubilius, & Worrell, 2019, as cited in Ziegler, 2022). In answering the question of whether a person will ever attain excellence, social norms are not very helpful. Instead, one should refer to a specification analysis of the actions we expect to find among persons who demonstrate excellence (Ziegler, 2005). Even nativist talent models had recognized that talent cannot be developed without a stimulating environment. Ziegler (2022) proposed a concept of Environmental Boosters of Talent Development on the 17th Asia-Pacific Conference on Giftedness during the keynote speech. He demonstrated that stimulating environment became clear that certain people (for example, parents and peers), objects (for example, toys, learning materials), settings (for example, libraries, classrooms), and systems (for example, schools and families) play a crucial role for talent development. He developed the Actiotope Model of Giftedness, which promotes a systemic conception of giftedness. The achievement of excellence is interpreted as building a repertoire of highly effective actions. It is a domain-specific adaptation to the environmental conditions in the individual actiotope that is increasingly developed. Learning resources can be used to estimate the potential for environmental booster, and can be categorized into exogenous and endogenous ones (Ziegler, et al., 2019). According to the Actiotope model of giftedness, exogenous and endogenous resources needed to develop excellence include five forms of educational capital (economic, cultural, social, infrastructural, and didactic), such as schools for the gifted, gifted teachers, enrichment approaches and five forms of learning capital (organismic, telic, actional, episodic, and attentional), such as intelligence, creativity and learning strategies.

In order to encourage education innovation, experiment, and guarantee learning right and parental choice in education, “Enforcement Act for Non-school-based Experimental Education at Senior High School Level or Below”, “Enforcement Act for

School-based Experimental Education”, “Act Governing the Commissioning of the Operation of Public Schools at Senior High School Level or Below to the Private Sector for Experimental Education” were enacted by Ministry of Education of Taiwan (2014). To fulfill the spirit of “Educational Fundamental Act” which encourages government and non-government groups to establish experimental education, the population of establishing experimental education in Taiwan is on the increase (Taiwan Homeschool Advocates, 2021; Wu, 2020). As the revision of “Three-type acts of experimental education” was further amended in 2018, the development of experimental education has become more diverse. Among them, gifted and talented students, as well as students with disabilities, apply for non-school-type experimental education. These students are seeking out alternative educational opportunities.

Apart from serving on the Committee Responsible for Identification and Placement of Gifted and Disabled Students, the first author also leads Taoyuan Autodidactic 3.0 Lab. Taoyuan Autodidactic 3.0 Lab is a project launched by Taoyuan City Government Department of Education in 2018 to foster the values of “Three-type acts of experimental education” including the promotion of educational innovation. This project aims at unlocking students’ learning potentials through a variety of programs, including classic keynote speeches, inquiry-oriented learning courses, curriculum-matching services, as well as field trips and off-campus learning activities. Our program is focused on providing high-quality educational resources for non-school-type individual and group experimenters. Among them, there is a 2E student who has applied for non-school-type experimental education and is participating in the Autodidactic 3.0 Lab course.

In the homeschooling literature, a wide range of studies have been conducted to investigate homeschooling in the United States; however, only a few studies found are related to homeschooling in the East Asian contexts (as cited in Tung, 2010).

Tung (2010) describes the homeschooling (now included in non-school-type experimental education) experiences of four Taiwanese Christian families, who seek to provide a more religiously-infused learning experience. These families value the flexibility that homeschooling provides both in terms of curricular content and increased family time, but they worry that Taiwanese society’s ignorance toward homeschooling and strong emphasis on conventional academic credentials will limit their children’s future educational and career options.

Huang (2022) analyzes the influences of family socioeconomic status, social capital, cultural capital on learning performance and educational aspiration. Data from Taiwanese students in PISA 2018 was analyzed using structural equation modeling to examine the proposed model and the invariance of the model. He found that family socioeconomic status positively affected social capital and cultural capital. Family socioeconomic status, social capital and cultural capital positively affected learning performance and educational aspiration.

How can family, schools and the society provide resources to boost 2E homeschooling students’ talents? The purpose of this research is to gain insight into how 2E homeschooling students build a repertoire of highly effective actions within stimulating environment to make adaptations to the environmental conditions and achieve excellence.

Methodology of Research

I. Participants

The participants of this study involved homeschooling elementary school student with twice-exceptionality, parents, a gifted class teacher, a professor of information and computer engineering department from tutor-matching program and peers.

1. Introduction of the 2E homeschooling student (S)

Due to premature birth and brain injury, after a long rehabilitation period, S can live independently, but his sensory integration ability is poor, and his physical movement is slow. He had applied for homeschooling since he was in second grade of elementary school. He also took three classes (Data structure and algorithm, Database management, Object-oriented program) at Chung Yuan Christian University.

2. Introduction of the parents

S's farther was financially secure and retired from his job early in order to homeschool his child.

3. Introduction of the teachers

A. Gifted class teacher (GT): The resource room teacher of the gifted and talented students has rich experience in teaching gifted classes. According to the regulations of the Special Education Act in Taiwan, S's school developed and implemented an Individualized Education Program (IEP) for him. The GT serves as the main coordinator in gifted curriculum and assists parents in communication.

B. Professor of information and computer engineering (Prof. W): Collaborative programs offer students ranging from grade 5 to senior high school and vocational high school opportunities to enroll in elective courses in universities, which aims to achieve the idea of breaking the frameworks of education system and age. In this way, children can have greater learning opportunities, while sparking new creativity in class. Autodidactic 3.0 Lab signs MOU with National Chiao Tung University, Chung Yuan Christian University, and Ming Chuan University, marking a new milestone for experimental education (Wu, 2020). Prof. W teaches Data structure and algorithm at Chung Yuan Christian University.

II. Research Method

This study follows qualitative approach, in which semi-structured interviews were conducted and then analyzed. The semi-structured interview outline was used to serve as a reminder or guide to the researcher during the interview.

The interview questions included:

1. At what age did you start homeschooling your child?
2. Why did you select non-school-based experimental education (homeschooling)?
3. What supplemental materials (e.g., manipulatives, technology) do you use when teaching English/Computer and why?
4. How do you adjust the English/Computer curriculum to meet your child's individual learning needs?
5. Please describe instructional strategies that you used in the past to help your child learn English/Computer.
6. Please describe resources that you used in the past to help your child.
7. What made you feel the need to get your child identified? Was it due to certain behavior or personal traits observed?
8. Has your child received early childhood intervention to develop fine motor skills

- or sensory integration?
9. Was it a concern for you that he wrote slowly?
 10. Did poor performance in sport affect his peer relationship in elementary school?
 11. Please share your experience about matching curriculum with the university.
 12. How did you get ready for it? What kind of support have you offered your child concerning studying?

In addition to interviews, researchers also reviewed a collection of related documents (e.g., IGP, videos, photographs) and works to acquire rich data.

III. Data analysis

A recorder was used to record contents of the interview. Each interview was transcribed verbatim, including descriptions of nonverbal factors where appropriate. The researcher kept a log and diary to jot down pieces of thoughts and opinions about the participants and/or the research itself. The transcript was mailed/lined to participants for confirmation, and then the researchers used the continuous comparison method to analyze the data. The steps are as follows:

1. Forming the meaningful unit: First sort out the interview content, and through multiple readings, understand the structure of the interview content and determine the smallest meaningful unit.
2. Forming sub-themes: Read repeatedly, classify similar minimal meanings into sub-themes, and name the sub-themes.
3. Form the core theme: Classify the sub-themes in a series to form the core theme.

The student's achievement is analyzed by his performance at school, productions, academic records using the Environmental Boosters of Talent Development model of exogenous and endogenous learning resources. How family, schools and the society can provide resources to boost 2E students' talents is further discussed.

IV. Research Reliability

To achieve credibility and rigor in information analysis, researchers repeatedly consulted and compared the data, and looked for the connection and context in the data, then invited the interviewees to check. After constant emendation, a structure corresponding to the research purpose is constructed.

Results and Discussion

The findings in this study are as follows:

1. Professionals from Committee Responsible for Identification and Placement of Gifted and Disabled Students play a significant role in identifying 2E students.

Take S's IQ test for example. According to the Special Education Act of Taiwan (2009), to be identified as gifted, students with superior intelligence must score above 97 percentile rank (PR) on individualized intelligence tests. S's Full-Scale IQ (FSIQ) did not reach above PR97. S's Processing Speed Index (PSI) was only PR5, however in contrast, S's Verbal Comprehension Index (VCI) was above PR99+. Considering his physiological state and remarkable intra-individual differences, it was apparent that FSIQ failed to reflect S's real ability. 2E students may score higher in cognitive domains related to abstract thinking (Verbal Comprehension, Visual Spatial, and Fluid Reasoning) and lower in processing skills (Working Memory and especially Processing Speed), their disabilities prevent them to reach the standard of giftedness.

Professionals from Committee Responsible for Identification and Placement of

Gifted and Disabled Students should identify 2E students' advantages through comprehensive assessment and label homeschooling 2E students as gifted to secure them match-needed gifted services and enrichment programs at school.

2. Comprehensive Summary of S's Current Abilities

The researchers analyzed the strengths and weaknesses of S based on information provided by the father, gifted class teacher, university instructor, and S himself. The parents began applying for homeschool in the second semester of second grade in elementary school.

Resulting from preterm birth, he's sensory integration was inferior to those of other children. Thus, he felt frustrated in classes related to physical activity such as PE class. What's more, he was bored in most lessons since his academic ability was superior to those of other peers. As a result, he was unhappy in school. After careful consideration, we decided to homeschool. (P1, video)

I started self-studying in the second semester of Grade2 in elementary school. (S1, video)

A. The strengths

A strong focus while reading: S is passionate about reading.

He is a fast reader. For the past one year, he had finished reading almost one thousand Mandarin/English books. Although he is not particularly talented in math, through hard work, S still achieved excellence in math. He won the third place in International Mathematical Olympiad when he was a second grader. (P)

I really like to read, so my mother borrowed 300-400 books every year. My parents encouraged me to write and let me participate in comic dialog/crosstalk training for three years in order to let me practice expressing my thoughts clearly. (S4, video)

B. The Weakness

Due to premature birth and brain damage, S is poor at sensory integration development and his learning speed is thus slowed down. S is adept at programming but poor at circuit assembly which requires fine motor skills. S was interested in exploring scientific phenomena but has weaker hands-on skills when it comes to performing experiments. Similarly, in architectural design and creation courses, S's level of completion for hands-on projects is slightly weaker. (photo)

Resulting from preterm birth, he's sensory integration was inferior to those of other children. Thus, he felt frustrated in classes related to physical activity such as PE class. (P)

C. Parents' expectations/needs

Because of homeschooling, S lacks practice and training in relationship skills. However, S holds a different view.

The parents expected that with the help of gifted education, S would be able to make friends who share similar interests. (IGP)

Many people are worried that I would become withdrawn and loathe making friends. In fact, I frequently took part in extracurricular activities or overnight camps to get acquainted with friends of different ages. Besides, I made many friends who were almost ten years senior to me as I joined a course offered by Department of Information and Computer Engineering at Chung Yuan Christian University. (S6, video)

D. Education and Training Needs Assessment

Offer S computer lessons aimed for Grade 6 so that S could study with students elder than him. If possible, it is suggested that S joins art and craft class designed for Grade 1-2 to enhance his fine motor skill development. (IGP)

Before choosing/taking a course in university, we distinctly researched what he would learn from that class, what kind of skills he lacked and needed to improve, and what he should do to acquire these skills as soon as possible. (P6, video)

After gaining a clearer insight, we discussed with his professor about his capability. The professor had him take a basic competence test. We had prepared well in advance and let the professor assess whether he had the ability to take this course. (P7, video)

3. In terms of exogenous learning resources, Taoyuan Autodidactic 3.0 Lab played a crucial role as social educational capital.

The programs of Taoyuan Autodidactic 3.0 Lab provided curriculum for 3rd graders in elementary schools to university elective courses. In this way, 2E student can learn outside the box and focus on developing superior ability (in this case study, programming).

Department of Education, Taoyuan, provides a course matching program to connect homeschoolers with universities. (P5, video)

How fortunately he is to be homeschooled in Taoyuan. Taoyuan's Homeschooling project 3.0 provides many resources to homeschoolers. He uses these resources to make his homeschooling life more enjoyable and colorful. This project allows children to have various possibilities and more chances to try and explore. (P9, video)

Owing to the course matching provided by Homeschooling project 3.0, I took three classes (Data structure and algorithm, Data-base management, Object-oriented program) at university to advance my programming ability. (S7, video)

I am grateful to my professor for requesting me to do all the assignments, prepare for the group presentations, and take the same exam as other peers did instead of giving alternative tasks just because I am younger. (S8, video)

4. As to endogenous learning resources, parents' positive upbringing attitudes and company will support homeschooling 2E student to flex their courage muscles and try something new.

I think English is a useful tool. We hired for an English tutor who could not speak Chinese at all. Meanwhile, we always searched for intriguing learning materials such as English fairy tales. After reading, we encouraged him to narrate the story in English and record the narration by himself. The duration of his narration gradually increased from 2 minutes, 3 minutes and then to 5 minutes. Whenever, we found interesting articles, we asked him to try writing English summary for it, either through drawing or jotting down sentences. We didn't correct his writing before 4th grade in primary school lest he feel frustrated and withdrawn from learning English. (P, line20221108)

The thirst to be able to read English articles or news that interested him urged S to continuously improve his English language ability. On the contrary, many Taiwanese people only see English as an exam subject. They care more on the correct use of English grammar instead of enjoying the process of learning English. (P, line20221108)

He enjoyed watching English learning videos through a free online learning service—Khan Academy. After a few months, he'd completed most of math courses tailored for elementary school students. (P)

As soon as the semester started, we tried to look for friendly classmates and guided him how to make friends with college students. We encouraged him to exchange Line ID with classmates so that if he has problems, he can ask for help from them. (P8, video)

I scheduled my time to study Mandarin, English, math, social study, and science efficiently. After finishing studying those basic subjects, I devoted lots of time to my favorite subject such as computer programming. (S2, video)

With a view to deepening my study, I sought help from online courses, such as MIT Open Course Ware, to assist me in clarifying complex concepts in Data structure and algorithm. Nonetheless, I couldn't fully understand some concepts sometimes. (S9, video)

English is significantly important. It connects us with the whole world. I study computer programming, science, or math through watching online lessons from YouTube. (S3, video)

I really like to read, so my mother borrows 300-400 books every year. My parents encouraged me to write and let me participate in comic dialog/crosstalk training for three years to let me practice expressing my thoughts clearly. (S4, video)

His performance is better than other college students. He has such a positive attitude towards learning that he would spend a good deal of time on one assignment and do his best. Being a homeschooler, he was able to focus on what he is interested in, even if it's just an assignment or a question in an online quiz. Whenever I offered him an answer, he became even more inquisitive. It's really impressive. (Prof. W1, video)

His English ability is exceptional. When I introduced him to supplementary learning materials such as online English learning forum, he could rapidly tell me what he found or the difference between how he thought and the information he saw. His response to knowledge and information was exceptionally fast. It was a great stimulus for me to work harder in teaching. (Prof. W2, video)

I think it's necessary that the environment responds to his needs. Family's support especially makes a great difference in making homeschooling project succeed. (Prof. W3, video)

Lin et al. interviewed two homeschooling gifted elementary school students and their significant others. They found that homeschooling gifted students are able to master their own advantages, think positively, and focus on developing their superior abilities. Parents' positive upbringing attitudes and company provide homeschooling gifted students support in bravely trying new things (Lin, et al., 2021). Family socioeconomic status, social capital and cultural capital largely affected learning performance (Huang, 2022). The achievement of excellence is interpreted as building a repertoire of highly effective actions. This study showed a domain-specific adaptation to the environmental conditions in the individual actiotope that is increasingly developed.

Conclusion

According to the Actiotope model of giftedness, exogenous and endogenous resources are essential in developing excellence. A supportive and encouraging system allows 2E student to complete missions and solve problems with the aid of diversified learning resources. Even more, 2E students benefit from positive thinking and high self-esteem, which empowers him to embrace weaknesses, and believe in his own capability and autonomy to learn.

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