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**G1-OP-13****Infusion of elements of gifted education into a mathematics lesson with real-life examples for students' learning of similarity**

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**ABSTRACT:**

A three-tier implementation framework of gifted education with Levels 1 & 2 as school-based provisions has been put in place in Hong Kong since 2000 (Education Department, 2000), but studies purposed to examine its actual operation and practice have been very limited. The **Jockey Club "Giftedness Into Flourishing Talents" Project** (Project GIFT) organized by the **Program for the Gifted and Talented** at The Chinese University of Hong Kong and funded by The Hong Kong Jockey Club Charities Trust, has been launched to provide professional support for primary and secondary schools in Hong Kong to implement Levels 1 & 2 school-based gifted education provisions for students. Evidence-based evaluation research was also conducted to review the implementation process and to examine the effectiveness of school-based gifted education provisions.

In this paper, the implementation and evaluation results of school-based Level 1 gifted education in a secondary school, being one of the key project schools of Project GIFT, is reported. The Level 1 gifted education provision in the three-tier implementation framework adopted a school-based whole-class approach. It seeks to infuse elements of gifted education in the regular classroom for all students, and to adjust the subject contents to meet the learning needs of high ability and gifted students. This study focused on an enriched mathematics curriculum integrating well-thought-out teaching and learning activities, with an illustration of its development and examination of its effectiveness on students' learning.

A total of 144 Grade 7 students in four different classes were involved in learning the mathematical concept of Similarity. The learning contents and activities were re-structured and infused with the core elements of gifted education such as high-order thinking skills, creativity and personal-social competence. At the same time, enriched learning tasks were designed to meet the characteristics and learning needs of students with high ability in mathematics. Prior to the lesson, students were provided with a self-directed learning opportunity to gain some basic knowledge about the concept of Similarity. During the lesson, students first worked in groups to share their preparatory work and discussed the daily-life meaning and mathematical meaning of Similarity. Then, with the illustrations of real-life examples such as different sizes of A series paper, students were challenged to apply their knowledge about Similarity to determine whether the papers were similar or not. They were also asked to solve questions with various methods and to prove their answers with mathematical reasoning. Through the designed curriculum contents and learning activities, students gained a clear understanding of mathematical concept of Similarity and discovered that for any similar polygon, the corresponding angles and ratio of corresponding sides are equal. At the end of the lesson, all students were required to think further whether all squares, rectangles, and rhombus are similar. For students with higher ability in mathematics, an extended learning activity was provided. They were required to study whether the sleeve for disposal coffee cups of different sizes are similar or not.

Lesson observations were conducted during the learning and teaching process. Teachers in the school and school development officers of Project GIFT participated as observers. A check-list of "evidence of



learning” was developed for observers to record and evaluate the teaching and learning process, as well as students’ learning outcomes.

The results of lesson observation indicated that the designed curriculum contents and learning activities were effective in stimulating students’ learning motivation and enhancing their engagement in solving mathematics questions. The immediate responses of students and the completion of worksheets in class showed that they were able to identify and solve the questions logically and creatively. Through interaction and discussion among the groups, students also demonstrated their communication skills and collaborative problem-solving skills. A high level of engagement and enjoyment in the lesson were observed from students’ behaviors and body languages. Students’ feedback also confirmed that the task of applying the learned knowledge into daily-life examples is challenging enough for highly able students.

This paper provided a practical example of promoting self-directed learning among highly able/gifted students. Deeper engagement of students in learning mathematical concepts with real-life problems, enhanced students’ high-order thinking and problem-solving skills through challenging problems and enriched subject contents can be observed clearly. The active participation of students in the class, including the strong involvement of high ability students in sharing of their ideas with classmates, showed that Level 1 school-based whole-class approach with well-designed curriculum contents and learning activities can be effective in enhancing students’ learning interest, motivation and engagement in learning, and meeting the learning needs of highly able/gifted students.

**KEYWORDS:**

Hong Kong; Jockey Club “Giftedness Into Flourishing Talents” Project; mathematics education; school-based gifted education; secondary school



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