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G1-OP-10**Implementing a whole-class enriched mathematics curriculum with differentiated self-learning activities, class tiered assignments and technology**

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ABSTRACT:

Over the past decade, the use of various digital devices in learning has been increasingly popular, which brings both opportunities and challenges for schools. In order to embrace such change and provide quality education, teaching pedagogies and learning strategies should be refined to enhance students' learning and academic achievements. Yan Chai Hospital Choi Hin To Primary School is one of the schools in Hong Kong attempting to bring out the best in every student and unleash their potential through implementing school-based talent development and gifted education, with the aim of catering for students' diverse abilities, talents and learning needs. Such effort was bolstered by joining the **Jockey Club "Giftedness Into Flourishing Talents" Project** (Project GIFT) which is 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. Project GIFT collaborates with 20 primary and secondary schools and provides them with professional support to implement Levels 1 & 2 school-based gifted enrichment for students. This paper aims to report how the school utilized technology and differentiated education to enrich students' learning of mathematics in a regular classroom with professional support provided by Project GIFT on the curriculum design and evidence-based evaluation. The advantages of iclass platform were also explored.

About 60 students at Grade 4 in two classes participated in the study. Students were required to bring their own iPads to attend the mathematics lesson. Before the lesson, students had learnt the concept of fraction in an iclass platform and were asked to finish a pre-lesson, self-learning task. The task was designed for students to build up the ideas of expanding fraction, and for teachers to assess students' knowledge of this concept. Students were required to show their thinking and reasoning on the relationship between $\frac{1}{2}$, $\frac{2}{4}$ and $\frac{4}{8}$ through any one of the following ways: using the GeoGebra software, folding papers, drawing grids, or making a video clip. Students were encouraged to choose their preferred activity and complete the task based on their own interests and readiness. During the lesson, students were divided into homogenous ability groups (each group had 4 to 5 students) to work on a class assignment on fraction and fraction expanding with their iPads. Considering the differences in students' mathematics ability and comprehension, teacher employed the strategy of differentiation to design a tiered assignment in three difficulty levels. Students who were comparatively weak in mathematics were shown in their iPads the grids and the multiplication relationship of the numerators and denominators, and were guided by the teacher to observe the grids change in unit fraction and the consequence in the change of numerator with the iclass app. They then completed the questions in the assignment. For the medium ability groups, students were given the same sets of questions with the iclass app showing the grids only. They needed to find out the multiplier and draw the lines in the grids to show the relationship by themselves. Students who are proficient in mathematics were not given any hints. They had to work out the relationship between the fractions by themselves and showed their presentation in any ways they considered appropriate.

The assessment of students' individual performance in the self-learning activities, their group work in the class, and teacher's observation, as a whole, supported the multiple benefits of providing choices of activities for students' self-learning, the use of homogeneous grouping, and differentiated learning with tiered assignments in an e-learning class. It was observed that students were actively engaged in learning and more willing to share their own ideas and work with their classmates. Such positive change was manifested among students who were relatively slow in learning mathematics. Highly-able/gifted students' needs for intellectual stimulation were also satisfied with sufficient challenges in the enriched activities and assignments. Different improvements in the learning processes were also observed among specific ability groups. Students with lower proficiency in mathematics could understand the related knowledge more quickly with the interactive demonstration of multiplication, owing to the help of technology and teacher's guidance. Students with medium mathematics ability level grasped the knowledge well through group discussion, observation and exploration by drawing lines on the grids. High ability students mastered the knowledge on multiplication fast and well, could further their understanding of the underlying rules, and were able to demonstrate different patterns using electronic devices with the discovered rules. All students benefited from the application of digital devices and e-platform such as GeoGebra, iPad and iclass app. With such technological support, teaching and learning were facilitated with immediate exchanges of ideas and thinking among students, as well as instantaneous comments of teachers.

KEYWORDS:

Differentiation; Jockey Club "Giftedness Into Flourishing Talents" Project; mathematics education; school-based talent development and gifted education; technology; whole-class enrichment



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