World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:17, No:01, 2023

Enhancing Students' Academic Engagement in Mathematics through a "Concept+Language Mapping" Approach

Authors : Jodie Lee, Lorena Chan, Esther Tong

Abstract : Hong Kong students face a unique learning environment. Starting from the 2010/2011 school year, The Education Bureau (EDB) of the Government of the Hong Kong Special Administrative Region implemented the fine-tuned Medium of Instruction (MOI) arrangements for secondary schools. Since then, secondary schools in Hong Kong have been given the flexibility to decide the most appropriate MOI arrangements for their schools and under the new academic structure for senior secondary education, particularly on the compulsory part of the mathematics curriculum. In 2019, Hong Kong Diploma of Secondary Education Examination (HKDSE), over 40% of school day candidates attempted the Mathematics Compulsory Part examination in the Chinese version while the rest took the English version. Moreover, only 14.38% of candidates sat for one of the extended Mathematics modules. This results in a serious of intricate issues to students' learning in post-secondary education programmes. It is worth to note that when students further pursue to an higher education in Hong Kong or even oversea, they may facing substantial difficulties in transiting learning from learning mathematics in their mother tongue in Chinese-medium instruction (CMI) secondary schools to an English-medium learning environment. Some students understood the mathematics concepts were found to fail to fulfill the course requirements at college or university due to their learning experience in secondary study at CMI. They are particularly weak in comprehending the mathematics questions when they are doing their assessment or attempting the test/examination. A government funded project was conducted with the aims of providing integrated learning context and language support to students with a lower level of numeracy and/or with CMI learning experience. By introducing this "integrated concept + language mapping approach", students can cope with the learning challenges in the compulsory English-medium mathematics and statistics subjects in their tertiary education. Ultimately, in the hope that students can enhance their mathematical ability, analytical skills, and numerical sense for their lifelong learning. The "Concept + Language Mapping "(CLM) approach was adopted and tried out in the bridging courses for students with a lower level of numeracy and/or with CMI learning experiences. At the beginning of each class, a pre-test was conducted, and class time was then devoted to introducing the concepts by CLM approach. For each concept, the key thematic items and their different semantic relations are presented using graphics and animations via the CLM approach. At the end of each class, a post-test was conducted. Quantitative data analysis was performed to study the effect on students' learning via the CLM approach. Stakeholders' feedbacks were collected to estimate the effectiveness of the CLM approach in facilitating both content and language learning. The results based on both students' and lecturers' feedback indicated positive outcomes on adopting the CLM approach to enhance the mathematical ability and analytical skills of CMI students.

Keywords : mathematics, Concept+Language Mapping, level of numeracy, medium of instruction
Conference Title : ICIME 2023 : International Conference on Innovations in Mathematics Education
Conference Location : Tokyo, Japan
Conference Dates : January 09-10, 2023