CASE STUDY: PHYSICS GIFTED STUDENTS' USE OF MULTIPLE REPRESENTATION IN PROBLEM SOLVING

Sayyai Chaiwan[a] and Pornrat Wattanakasiwich[b]

Presenting Author: Sayyai Chaiwan (sayyai.ch@yupparaj.ac.th)
[a]Yupparaj Wittayalai School, Chiang Mai, Thailand, 50200
[b]Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand, 50200

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Gagné (2010) defines the Differentiated Model of Giftedness and Talent (DMGT) as the process of transforming exceptional innate qualities (sometimes known as gifts) into exceptional knowledge and skills (called talents). Physics gifted students are students with outstanding capabilities resulting from being well-trained and having systematically developed their competencies in physics. These students will become high-skill workforces and central to developing responses to societal challenges (Makkonen, Lavonen, & Tirri, 2022). In this presentation, we report on a qualitative study aimed to investigate gifted physics students' capabilities of using multiple representations during problem solving in mechanics. Multiple representations include words, diagrams, equations, graphs, and drawings. Previous physics education research (Chi et al., 1981) indicated that students who were able to use multiple representations often had better physics conceptual understanding. As gifted physics students, three students were chosen from the first camps of the Thailand Physics Olympiad (TPhO). Data were collected during a semi-structured interview. Each student was asked to solve a problem and then explain their thought processes and their choice of representations. Different, often multiple, representations were used depending on the physics topics related to the problem. The main representations selected were equations and diagrams, which relate to analytical thinking. This case study helps us understand how gifted students' use, or lack of use, of representations relates to their abilities to solve problems. These results are helpful for improving physics teaching. The findings can be used by physics teachers to identify which representations in physics, gifted students need help on. The teachers can then design effective teaching materials to best support the talent development of gifted physics students.

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