Raising Students' Awareness and Actions through a Sustainability Project

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Sustainability has been increasingly included in school curricula of some countries, including Australia and Indonesia. Teachers attend to sustainability through learning areas in Australia, and through co-curricular projects in Indonesia. Little is known about how teachers use mathematics as they aim to raise students' sustainability awareness and actions. We explored how one Indonesian high school teacher designed and implemented a sustainability project, in which Year 10 students (aged 15-16) investigated waste management around their school, then proposed and took actions in addressing the problem. We used the *Green Mathematics Framework* (Salim, 2023) to analyse the project design and implementation.

The students first investigated various types of waste (e.g., plastic and food waste) and observed how the waste was managed by being burnt in the neighbourhood or sent to a local landfill. We show that the *observation* (of how the waste was managed) was important as it peaked students' interest in the problem and their sense of urgency to address it. This then led to students' *data collection and analysis*. For example, a group of students, found that, on average, each student in the school used 1-2 single-use plastic bottles a day. The students were then encouraged to make a *projection*, that is, estimate how much waste the school would have produced in the next 10 years, if nothing were to change. When making projections, they were surprised and concerned by the amounts of waste the school would have produced in the future.

Among key contributions to the success of the project, and to students' meaningful uses of mathematics within it, it was key that through initial observations students had developed a purpose for investigating the waste problem, because of the authenticity and relevance of the problem to their lives. They came to view mathematics (e.g., estimation and statistics) as a tool for better understanding and quantification of the current situation of the school waste production. They also learned that they could envisage future situations based on projecting or extrapolating from their findings. Since the students perceived the findings and context as being authentic, they tended to believe that their projections were likely to eventuate if they did not change their waste production. As such, to prevent undesirable outcomes from happening, the students were highly motivated to seek and propose solutions, including urging the school to provide water dispensers around their classrooms and compost organic waste.

References

Salim, S. (2023, July 2-6). *A Framework for Designing Green Mathematics Tasks* [Paper presentation]. The 45th annual conference of MERGA, Newcastle. https://files.eric.ed.gov/fulltext/ED631512.pdf

For more information, please refer to the following paper presented at the 46th Annual Conference of MERGA in July 2024.
Salim, S, Makar, K, and Višňovská, J. (2024). Raising students' awareness and actions through a sustainability project. In J. Višňovská, E. Ross, & S. Getenet (Eds.), Surfing the waves of mathematics education. Proceedings of the 46th annual conference of the Mathematics Education Research Group of Australasia (pp. 479-486). Mathematics Education Research Group of Australasia.