

Development and Validation of a Sustainability-Oriented Botanical Module for Prospective Science Teachers

K. F. ARDH, Hiroki FUJII, Okayama University, Japan

INTRODUCTION

Plant conservation is often overlooked in favor of animal conservation, despite the critical role plants play in supporting life. **Plant Blindness**, the tendency to undervalue the importance of plants in our environment, contributes to this disparity and hinders sustainability efforts. Therefore, it is crucial for teacher education programs to prioritize raising awareness of plant blindness.

AIMS AND METHODS

This study evaluated a botanical module's effectiveness in preventing plant blindness among undergraduate students (N=91) in a science teacher education program in Indonesia, using an embedded quasi-experimental sequential research design. The study used **reflective journals**, **pre- and post-surveys** and **focus group interview** to assess the module's impact on plant awareness.

MODULE DESIGN: "PLANTS, PEOPLE, AND PLANET" (ADOPTED FROM HICKSON, 2019; LEVINSON, 2014, GLASER, 2009)

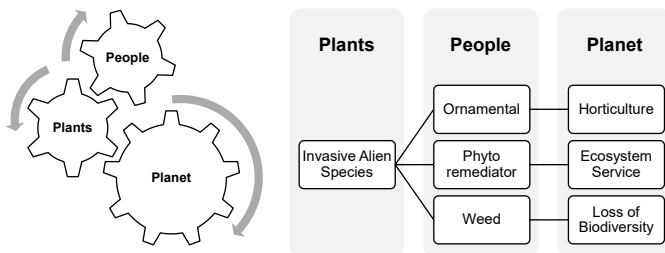


Figure 1. Conceptual framework of the botanical module

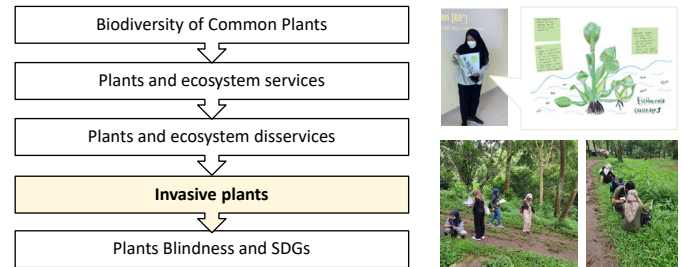


Figure 2. Module overview and exemplary activity

RESULT #1: PARTICIPANTS HAD ACTIVE ENGAGEMENT AND POSITIVE RESPONSE TO THE MODULE BUT TENDED TO BE LESS REFLECTIVE

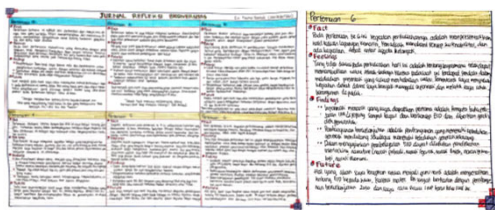


Figure 3. Example of the reflective journal

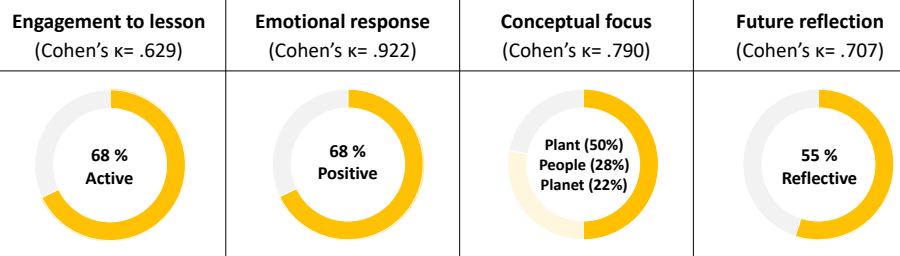


Figure 4. Content analysis results of the reflective journal entries (N=546)

RESULT#2: THE MODULE HAD A SMALL EFFECT ON ATTENTION AND ATTITUDE, BUT A LARGE EFFECT ON INTEREST AND SELF-EFFICACY

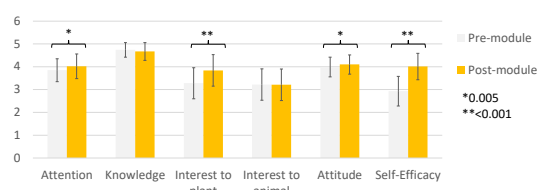


Figure 5. Result of paired samples t-test of the pre- and post-plant awareness questionnaire (adopted from Ladrera et. al., 2020, Parsley et. al., 2022)

Aspect	Mean (±SD)		** t	p	**** r	Cohen's d
	Pre	Post				
Attention	3.85 (±0.50)	4.02 (±0.54)	-2.64	0.00 ***	0.33	0.28
Knowledge	4.74 (±0.32)	4.67 (±0.39)	2.15	0.17	0.55	0.23
Interest in plants	3.28 (±0.68)	3.84 (±0.69)	-7.54	0.00 ***	0.48	0.70
Interest in animals	3.22 (±0.69)	3.21 (±0.69)	0.04	0.48	0.33	0.00
Attitude	3.99 (±0.43)	4.10 (±0.42)	-2.61	0.00 ***	0.56	0.27
Self-efficacy	2.93 (±0.65)	4.01 (±0.58)	-12.48	0.00 ***	0.14	1.3

RESULT #3: PARTICIPANTS FOUND NARRATIVE-BASED LEARNING AND REFLECTION JOURNALS TO BE USEFUL PEDAGOGICAL TOOLS

Table 1. Excerpt from focus group interviews (N=10) and the emerging theme

No	Demonym	Excerpt	Emerging Theme
1	Isaac	"The narrative-based learning activities , especially related to controversial issues were really captivating for me. They made me realize just how important plants are for our lives and how much we tend to take them for granted. It was a great way to learn and I found it really interesting to see different perspectives on these topics"	Narrative-based learning
2	Ashley	"As the lecturer sometimes randomly pick students to answer questions, it made me a bit nervous at first. But over time it helped me to build my confidence in participating in class and group discussions"	Socratic method
3	William	"The task of writing a reflection journal which was assigned as part of the coursework required me to take diligent notes. However, I found this to be a beneficial exercise as it helped me to retain and recall the key takeaways"	Reflection journal

LIMITATIONS AND FUTURE IMPLICATIONS

Despite the study's limitations in sample size and timeframe, the study highlights the effectiveness of the developed sustainability-oriented botanical module, in preventing plant blindness. This emphasizes the importance of incorporating similar approaches into teacher education programs, which could have far-reaching implications for plant conservation. Further research is needed to explore the generalizability of these findings to different contexts.

MAIN REFERENCES

- Glaser, M., Garsoffky, B., & Schwan, S. (2009). Narrative-based learning: Possible benefits and problems. *Communications-European Journal of Communication Research*, 34, 429-447.
- Hiscock, S. J., Wilkin, P., Lennon, S., & Bennett, Y. (2019). Plants matter: introducing plants, people, planet. *Plants, People, Planet*, 1(1), 2-4.
- Ladrera, R., Robredo, B., Ortega-Lasuen, U., Diez, J. R., & Ruiz-González, A. (2020). Unprepared to deal with invasion: Pre-service teachers' perception, knowledge and attitudes toward invasive species. *Sustainability*, 12(24), 10543.
- Levinson, R. (2014). Undermining neo-liberal orthodoxies in school science: telling the story of aluminium. *Activist science and technology education*, 381-397.
- Parsley, K. M., Daigle, B. J., & Sabel, J. L. (2022). Initial Development and Validation of the Plant Awareness Disparity Index. *CBE—Life Sciences Education*, 21(4), ar64.