

Teaching Web Sustainability Best Practices Through a Board Game: Impact on Engagement and Learning

Exploratory work



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More about the project and different board games on sustainable IT

Context & Motivation

There are growing concerns about the environmental impact of digital activities, stemming from the high energy demands of infrastructure and the embodied carbon costs of equipment manufacturing. The development of digital services can play a major role in worsening the situation or, conversely, in reducing its impact by following web sustainability guidelines.

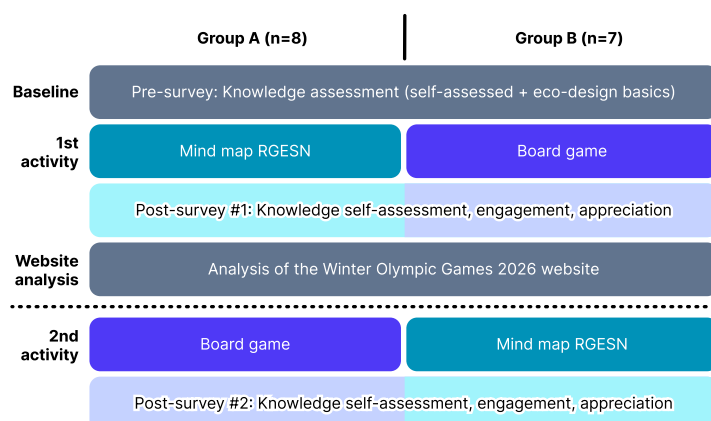
Teaching students sustainable web design practices remains a pedagogical challenge. **Can game-based learning increase engagement and knowledge acquisition compared to traditional study methods?**



We designed **Ecodesign Journey**, a board game in which players make web design decisions that stack CO₂ "clouds"—physically visualizing the cumulative environmental cost of bad practices. We compare it to a **mind map activity** based on a reference document on best practices in eco-design (French RGENS – General Reference Framework for the Ecodesign of Digital Services).

Methodology

We conducted a **crossover study comparing two teaching approaches** for web sustainability.

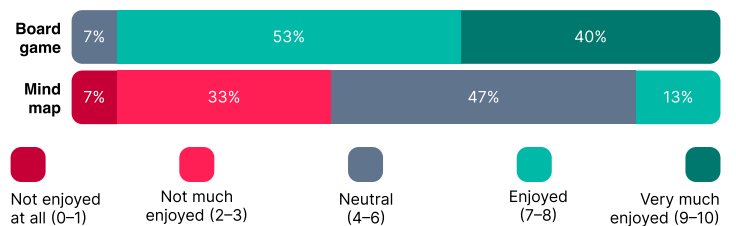


Flow of the crossover study: two groups complete the board game and mind map activities in alternate order, with surveys and a website analysis between them.

Key Results

Regarding involvement and perceived appreciation of activities:

- All participants reported **greater engagement in the board game activity**.
- Participants **appreciated the game activity much more**.



Answers to the question:

"How much did you enjoy the activity?"

- Analysis of the answers shows a **significant improvement in the board game group's knowledge** of best practices.

	Board game group (n=7)			Mind map group (n=8)		
	Pre	Post	Δ	Pre	Post	Δ
Mean	3.71	5.00	+1.29	3.67	4.13	+0.46
Median	4.00	5.00	+1.00	4.17	4.50	+0.50
Stdev	0.76	1.00	0.76	1.72	1.73	2.01
Improved	6/7 (86%)			4/8 (50%)		
Regressed	0/7 (0%)			3/8 (38%)		

Analysis of the survey question:

"List 5 best practices for eco-designing digital services"

Conclusion

- Game-based approaches generate significantly higher engagement and appreciation**, consistent with prior literature.
- Session results indicate measurable and **significant knowledge gains for the board game group** after the first activity, compared with the mind map group.

Limitations & Future Work

- Motivation investigation.** Enjoyment may not fully reflect motivation to learn and should be further investigated.
- Small sample size.** Results remain exploratory and are not statistically significant across all aspects studied.
- Reproducibility in other sessions.** Future studies should replicate the experiment in additional courses while strengthening and standardizing the protocol.
- Longitudinal follow-up.** Future work should assess long-term knowledge retention and the integration of eco-design practices in student projects.
- Open research materials.** The board game, experimental protocol, and datasets will be shared on Zenodo to support transparency and replication.