Opportunities of digital environments for informal science education: A research project in science communication

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The Ocean Grazer Project (Ocean Grazer, 2022a)

- Dutch clean-technology start-up
- Aim: generate a genuine Ocean Battery
- Amount of energy generated offshore by 2050: >1150 gigawatts / 25% total power capacity of today

The Ocean Grazer Project (Ocean Grazer, 2022a)

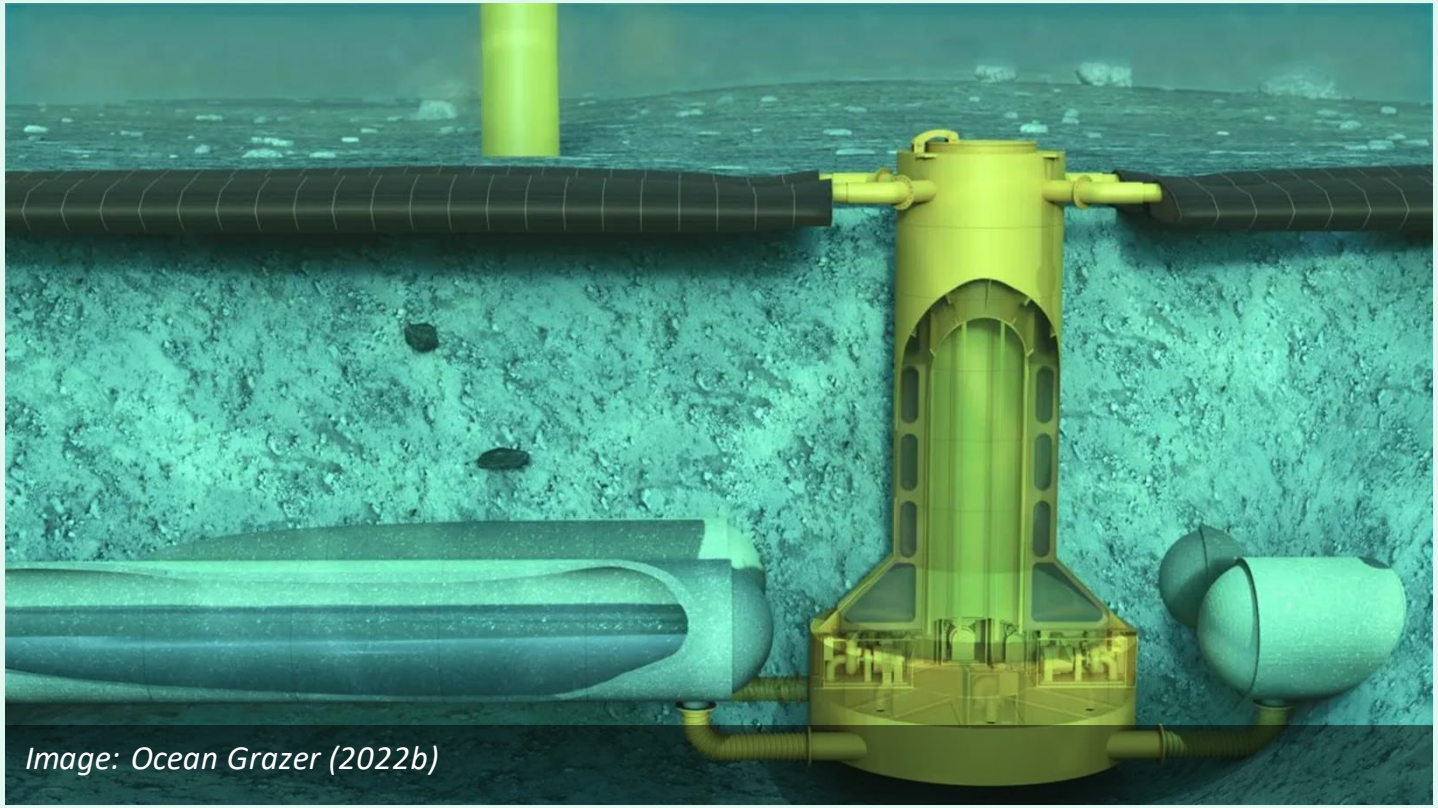


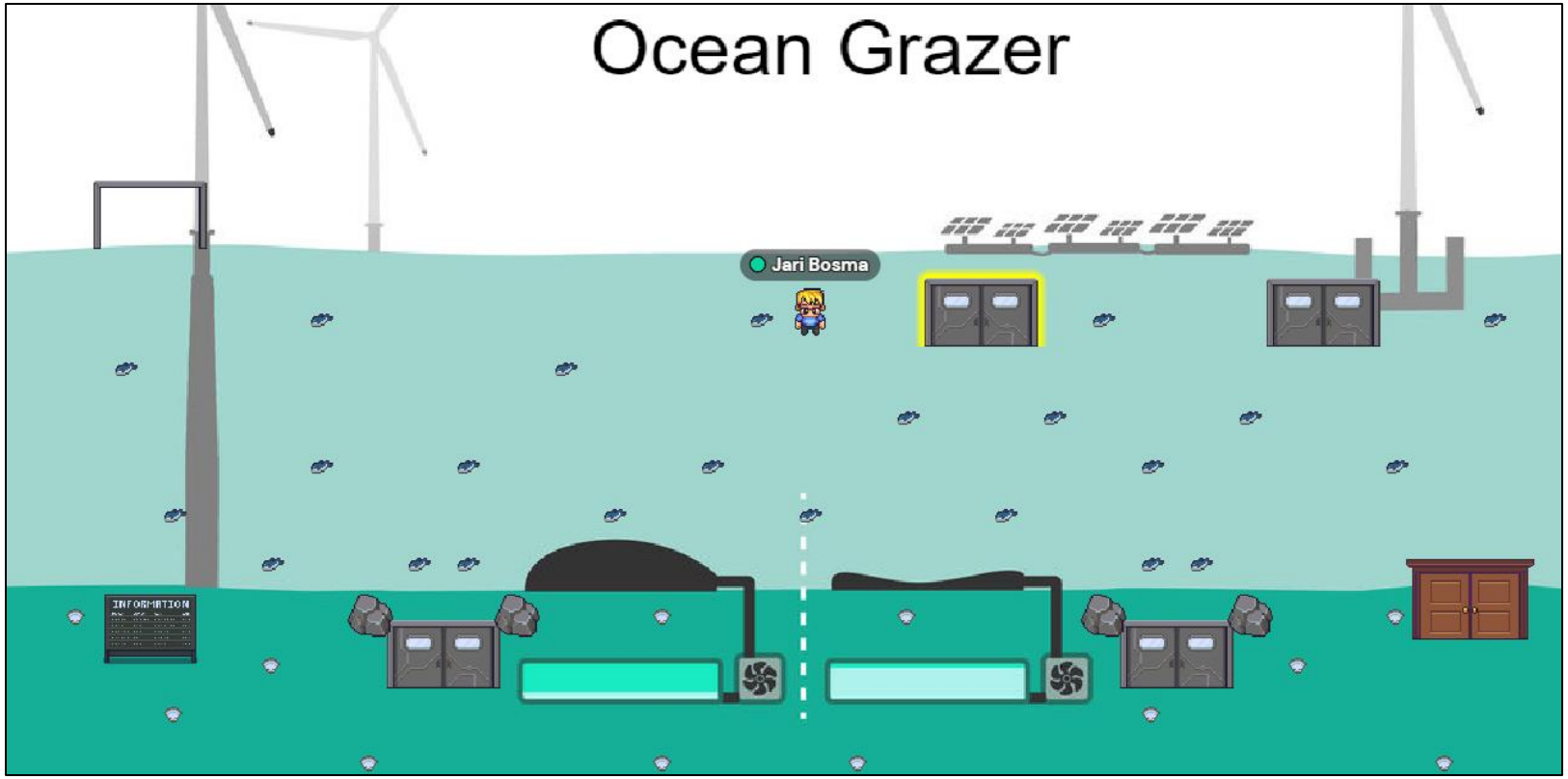
Image: Ocean Grazer (2022b)

- Pump, large flexible bags and reservoirs
- Water stored as potential energy
- Hydro turbines generate up to 10 MWh
- Efficiency of the Ocean Battery: 70-80%

Goal and relevance

- The goal: design, develop, test and evaluate a digital educational environment
- Blended learning (Margulieux et al., 2016)
- Environment got pilot tested
- What opportunities does a digital environment offer for informal science education about the Ocean Grazer project?

Materials and Methods: the design



- Gather
- Escape room gameplay
- https://app.gather.town/app/8ePVZlA0bZMvskCM/OG%20platform-test%201

Materials and Methods: the interview

- Pilot test through discussion based interview with three participants:

1. Designer of digital environment (myself)
2. STEM researcher
3. Teacher educator

- 2-3 minutes p.p. per question (~30 minutes total)
- Grounded theory approach
- Potentials, Deficiencies and Suggestions

Materials and Methods: the interview

1. Real-world relevance/problematization
2. Engagement in Engineering design cycle
3. Interdisciplinarity
4. Impact on Society
5. Epistemological reflection
6. Teamwork

Materials and Methods: the interview

1. To what extent do the activities relate to real-world contexts?
2. To what extent does the module engage participants in the engineering design practices, e.g., designing/testing/evaluating/revising (digital) artefacts/prototypes?
3. To what extent does the module include activities to explicitly emphasise interdisciplinarity?
4. To what extent does the module engage the participants in reflections and discussions about the impact of the relevant technologies on society?
5. To what extent does the module include reflexive discussion on conceptions of Engineering thinking and practices and/or S-T-E-M practices in general?
6. To what extent the module provides opportunities for collaboration and teamwork?

Results: Real-world relevance/problematization

- Potentials: highly related
- Deficiencies: little context and little information about the necessity
- Suggestions: extra context and introductory room

Results: Engagement in engineering design cycle

- Potentials: very engaging in general
- Deficiencies: no direct form of engagement in engineering design cycle
- Suggestions: more moment to brainstorm, more use of internet, use of an educator

Results: Interdisciplinarity

- Potentials: several disciplines are already implied
- Deficiencies: -
- Suggestions: let students come up with ideas, more explicit activities and questions, include more environmental details, make connections with social science

Results: impact on society

- Potentials: students come across several parameters, which are both positive and negative
- Deficiencies: -
- Suggestions: students should discuss more, arguments could be linked to a codeword

Results: Epistemological reflection

- Potentials: -
- Deficiencies: few opportunities for reflexive discussion
- Suggestions: allow students to think about engineering, have an in-game expert

Results: teamwork

- Potentials: multiple options foe collaboration were implemented
- Deficiencies: difficult to predict students behaviour
- Suggestions: -

Conclusion

- This digital environment is a good starting point
- Still a number of shortcomings
  - Little context
  - Lack of engagement in engineering design cycle
  - Few chances for reflexive discussions
- More necessity for intellectual processes

The end


Sources

- Ocean Grazer. (2022a). The Solution for the Global Energy Storage Problem: Eco-friendly Underwater Energy Storage [Brochure].
- Ocean Grazer. (2022b). Ocean Grazer - Ocean Battery – Utility-scale offshore energy storage [Video]. YouTube. https://www.youtube.com/watch?v=GbTsgWD_ZMU
- Margulieux, L. E., McCracken, W. M., & Catrambone, R. (2016). A taxonomy to define courses that mix face-to-face and online learning. *Educational Research Review*, *19*, 104–118. https://doi.org/10.1016/j.edurev.2016.07.001