Green chemistry education for a sustainable future

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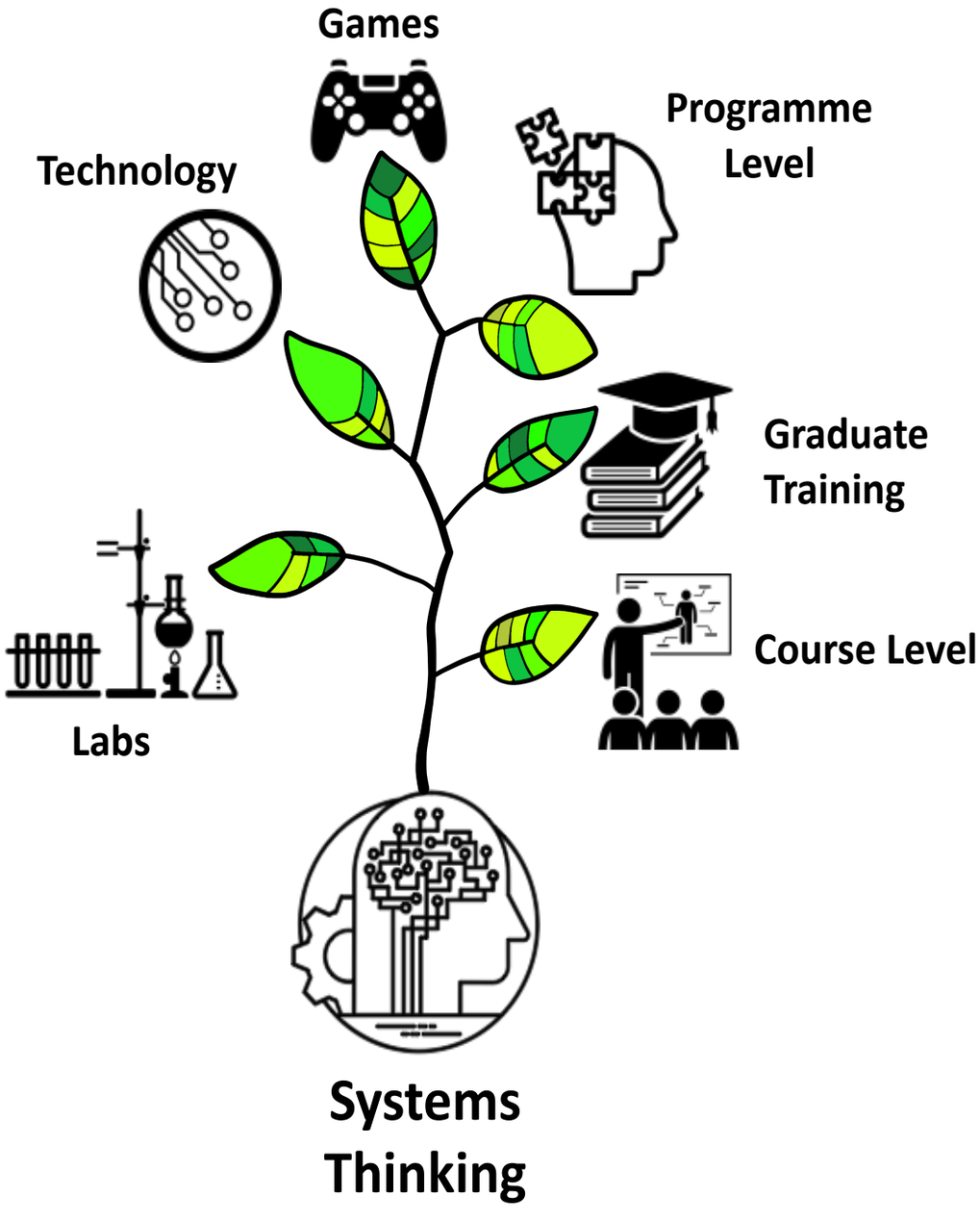

UN Sustainable Development Goals

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- These objectives seek to address global challenges relating to poverty, inequity, climate, environmental degradation, prosperity and peace and justice

- **Interconnected, interdisciplinary, team-based, consideration of entire systems...**

What could the future look like?

The future is going to look like what we design it to look like

Green chemistry: ‘The **design** of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.’

Design is a statement of human intention.

And **design** will be critical to help us change our current unsustainable trajectory.

How do we equip the future scientists, engineers, policymakers with the necessary skills?

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Systems Thinking

- Uses cognitive frameworks, strategies and tools to:

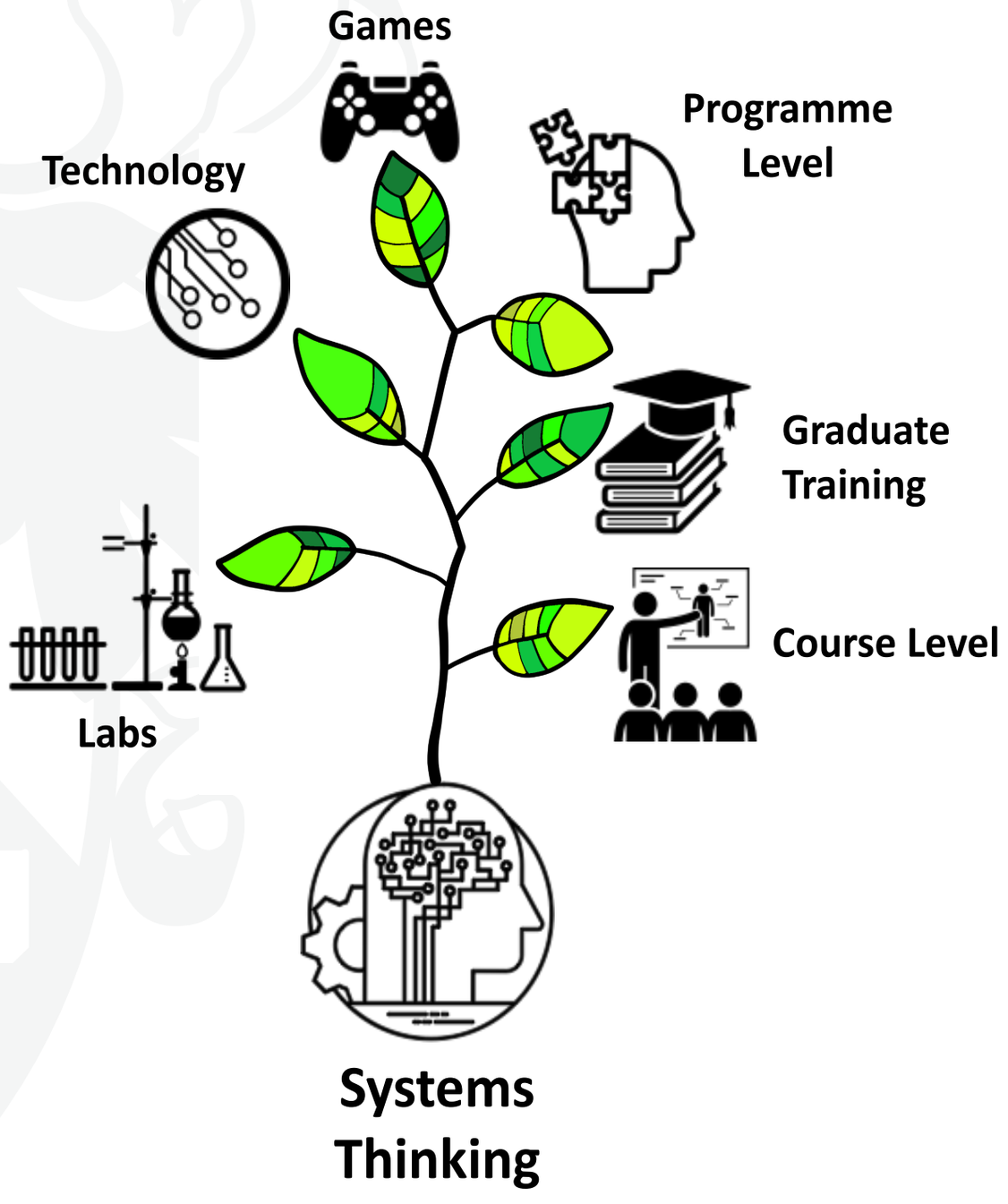
1. visualise interconnections and relationships
2. examine how the system(s) may change over time
3. see how system-level phenomena emerge from system parts interacting

- By studying the interdependence of components in dynamic systems, students can transition from a **fragmented** and **reductionist** knowledge of subject matter to a more **integrated** and **lateral** understanding of concepts

- Green chemistry is well suited as the 12 principles, LCA and process designs all depend on reliance of reactions and processes on each other with local and global systems.

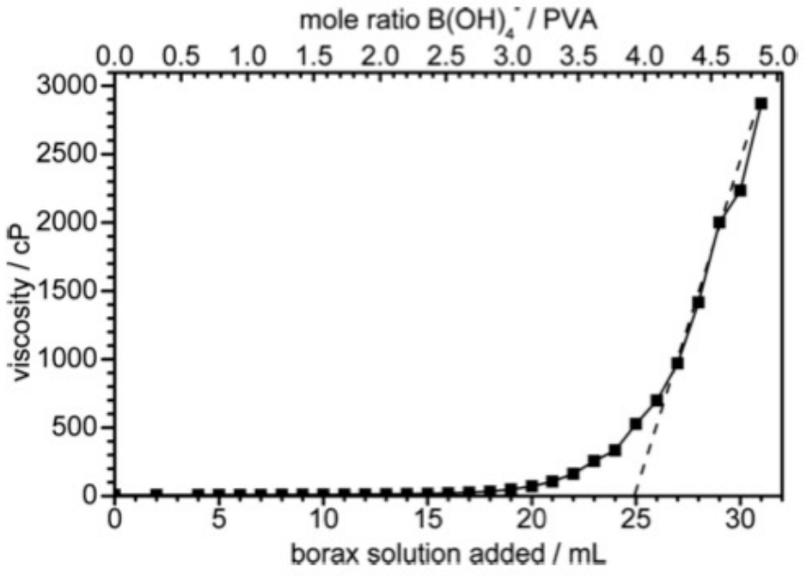
Mahaffy, P. G.; Krief, A.; Hopf, H.; Mehta, G.; Matlin, S. Reorienting chemistry education through systems thinking. *Nat. Rev. Chem.* **2018**
Orgill, MK.; York, S.; MacKellar, J. Introduction to systems thinking for the chemistry education community, J. Chem. Educ. **2019**

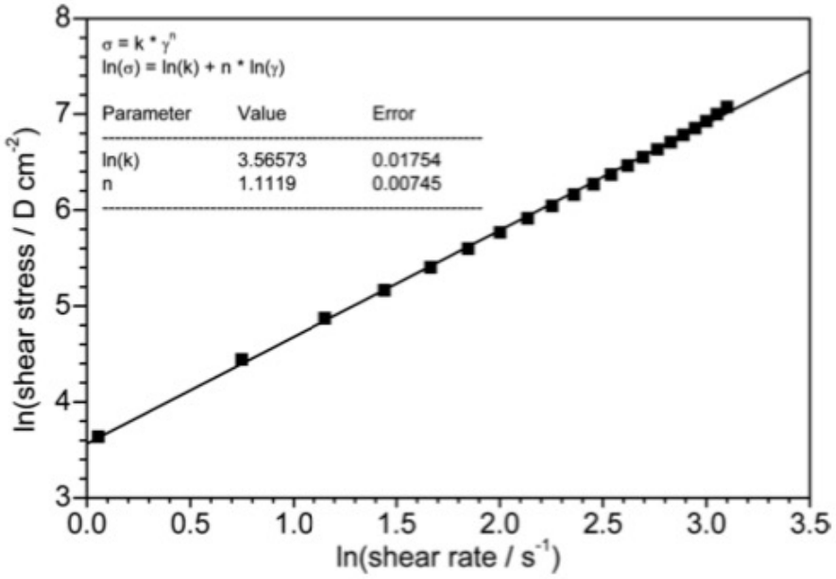
Our approach

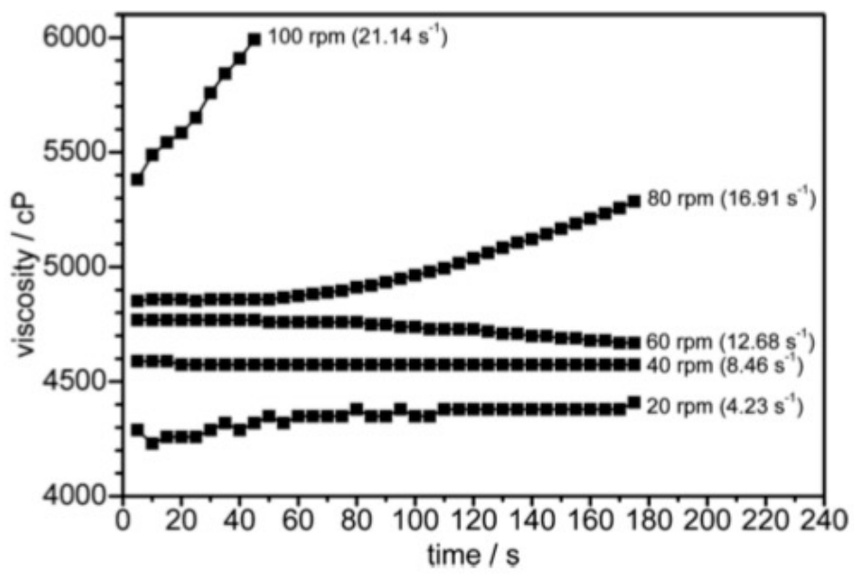


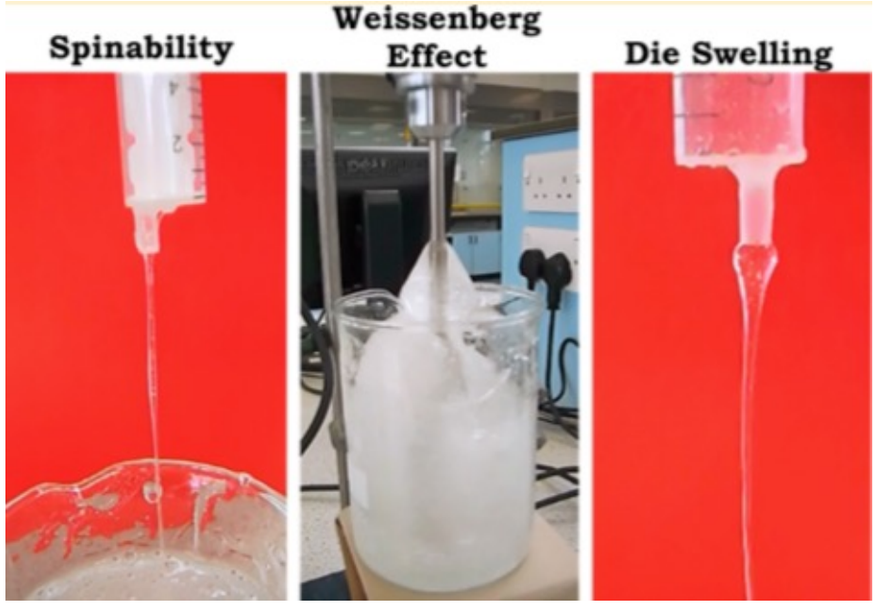
Hurst, G.A. Systems thinking approaches for international green chemistry education. Curr. Opin. in Green and Sust. Chem., **2020**

How did I get started?









Hurst, G.A.; Bella, M; Salzmann, C.G. The rheological properties of poly(vinyl alcohol) gels from rotational viscometry . J. Chem. Educ., **2015.**

Students as partners

My takeaways

- Experience
- Teamwork
- Having a positive impact on the learning experience of peers
- Fuelling a passion for learning and teaching
- Opening doors and networking -> ViCEPHEC 2014
- Publication
- Enhanced employability prospects

Learning from around the world

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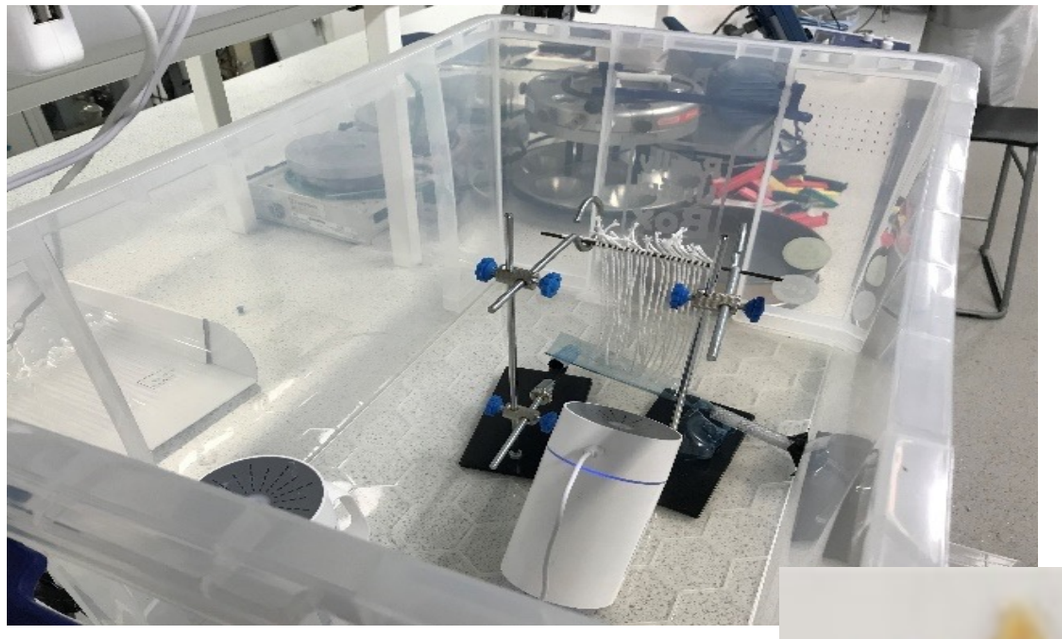
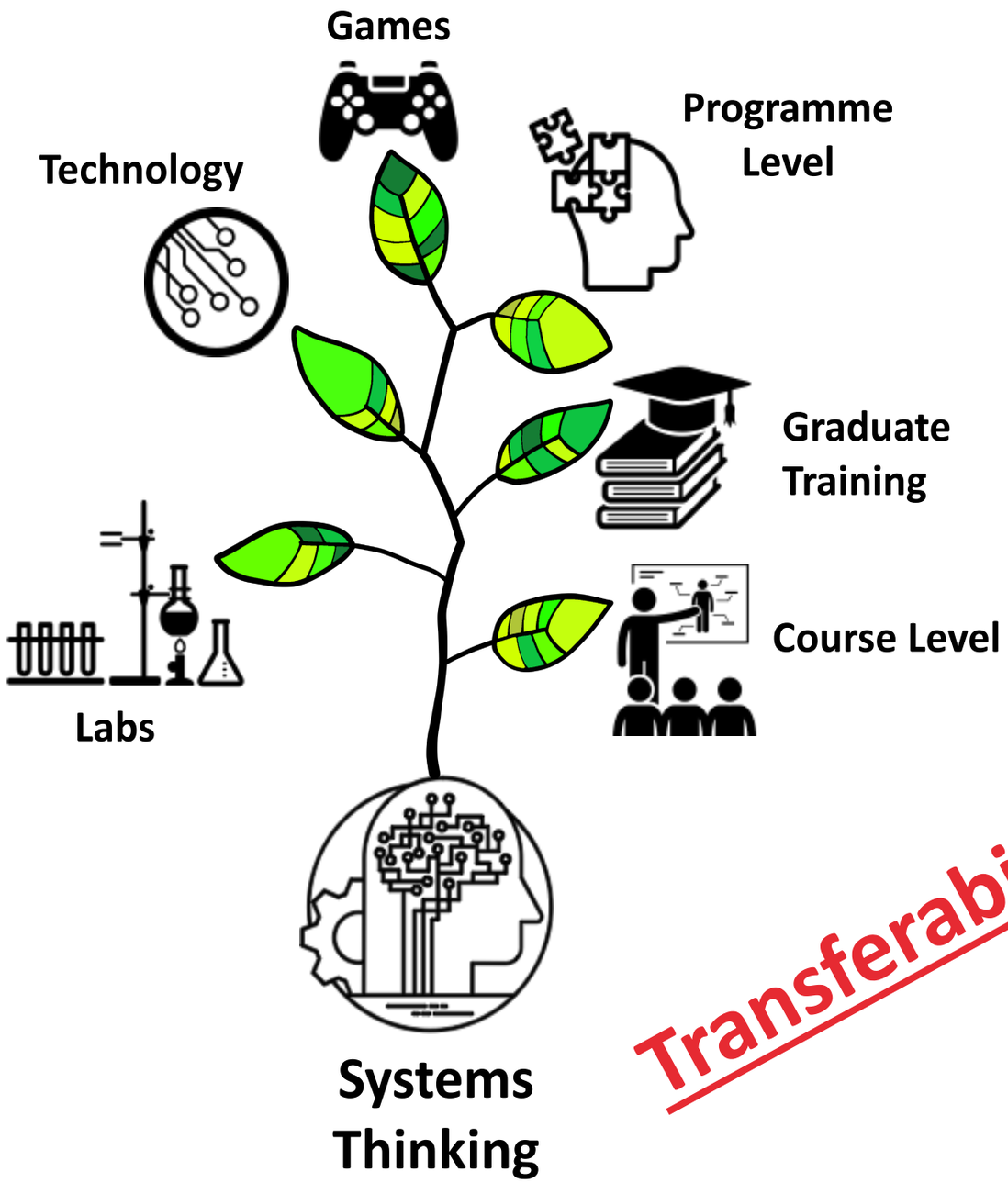
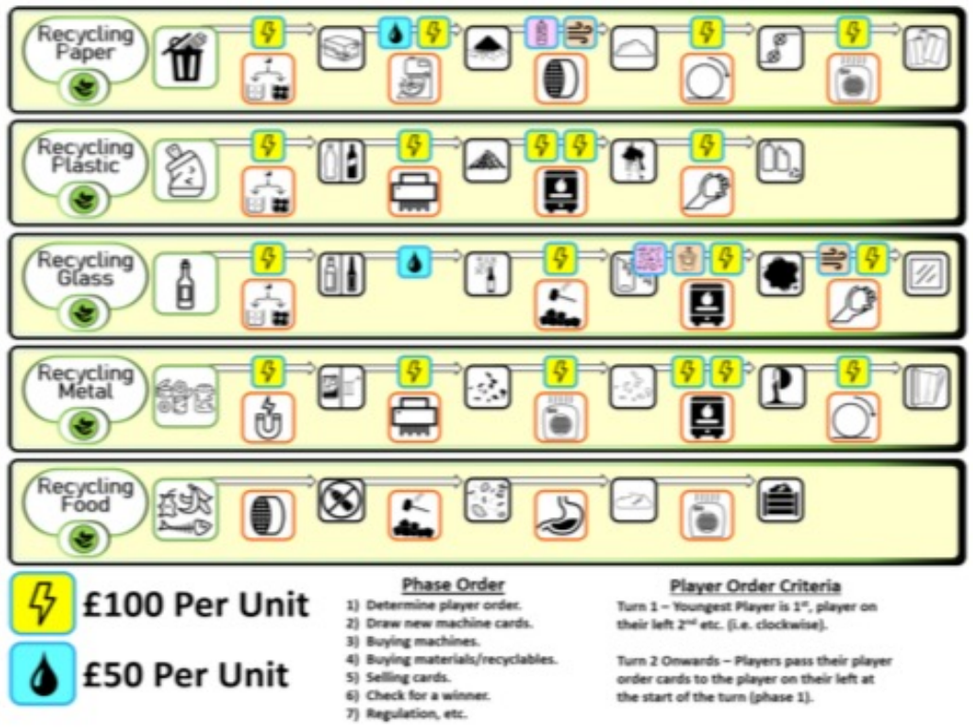
Paying back through working with students as partners and growing confidence



Mackenzie, L S.; Tyrrell, H.; Thomas, R.; Matharu, A.S.; Clark, J.H.; Hurst, G.A. Valorization of waste orange peel to produce shear thinning gels. J. Chem. Educ., **2020**

With confidence and collaboration, moving into unchartered waters with students as partners





To international projects for global systemic change

GCTLC: $250,000 project via Argosy Foundation

- ‘Develop, distribute and share, high quality green chemistry education resources with educators, students and stakeholders’ to shift from a community of practice to one of transformation

United Nations

- Development of a specialised manual on global green and sustainable chemistry education as part of the United Nations Environment Programme.
- Out soon!

Why?

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Why?