

Investigating the Role of Creativity in the Design of Environmentally Sustainable Solutions

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RQ: Are creative solutions – i.e., unique and useful solutions – also environmentally sustainable?

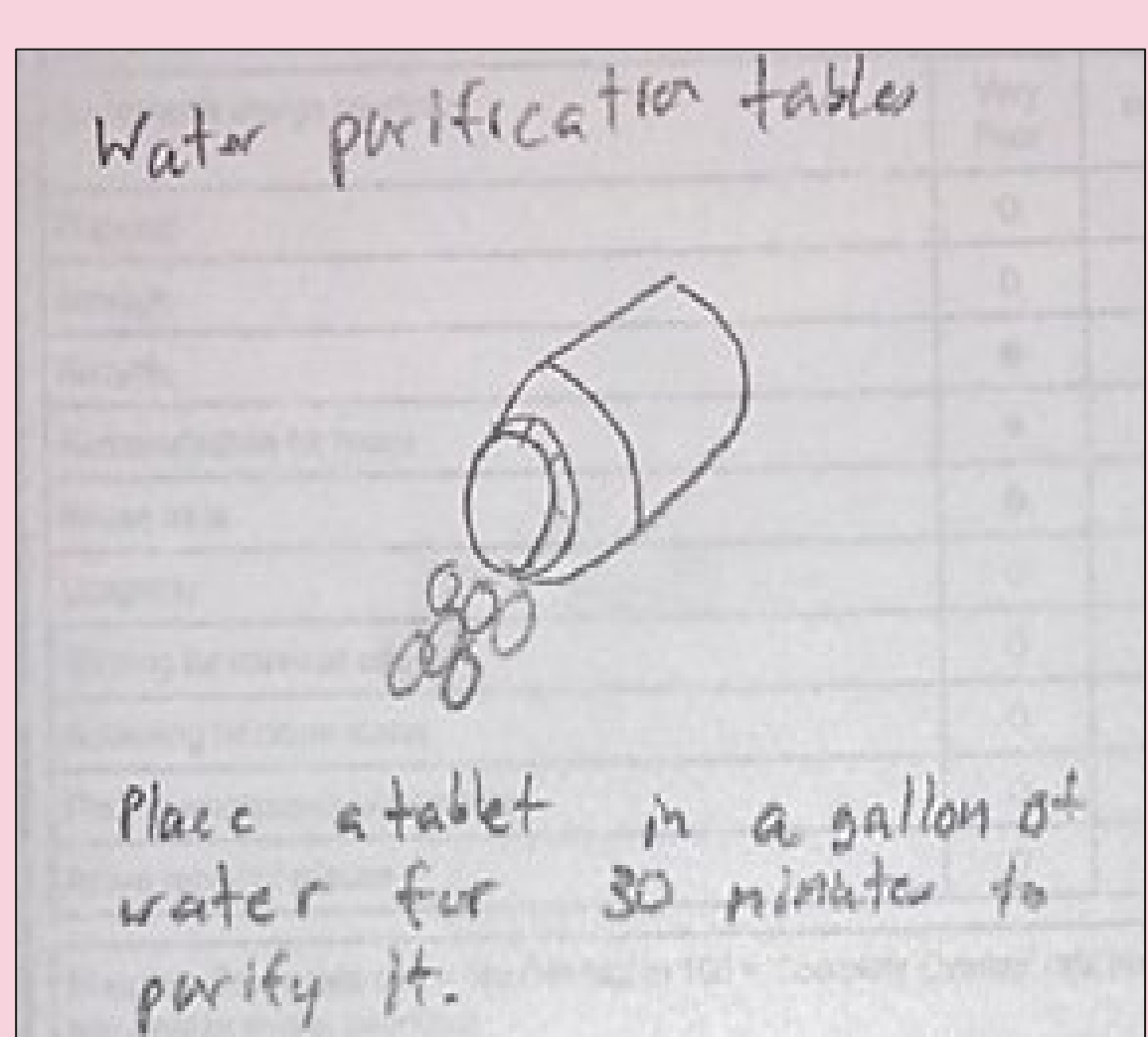
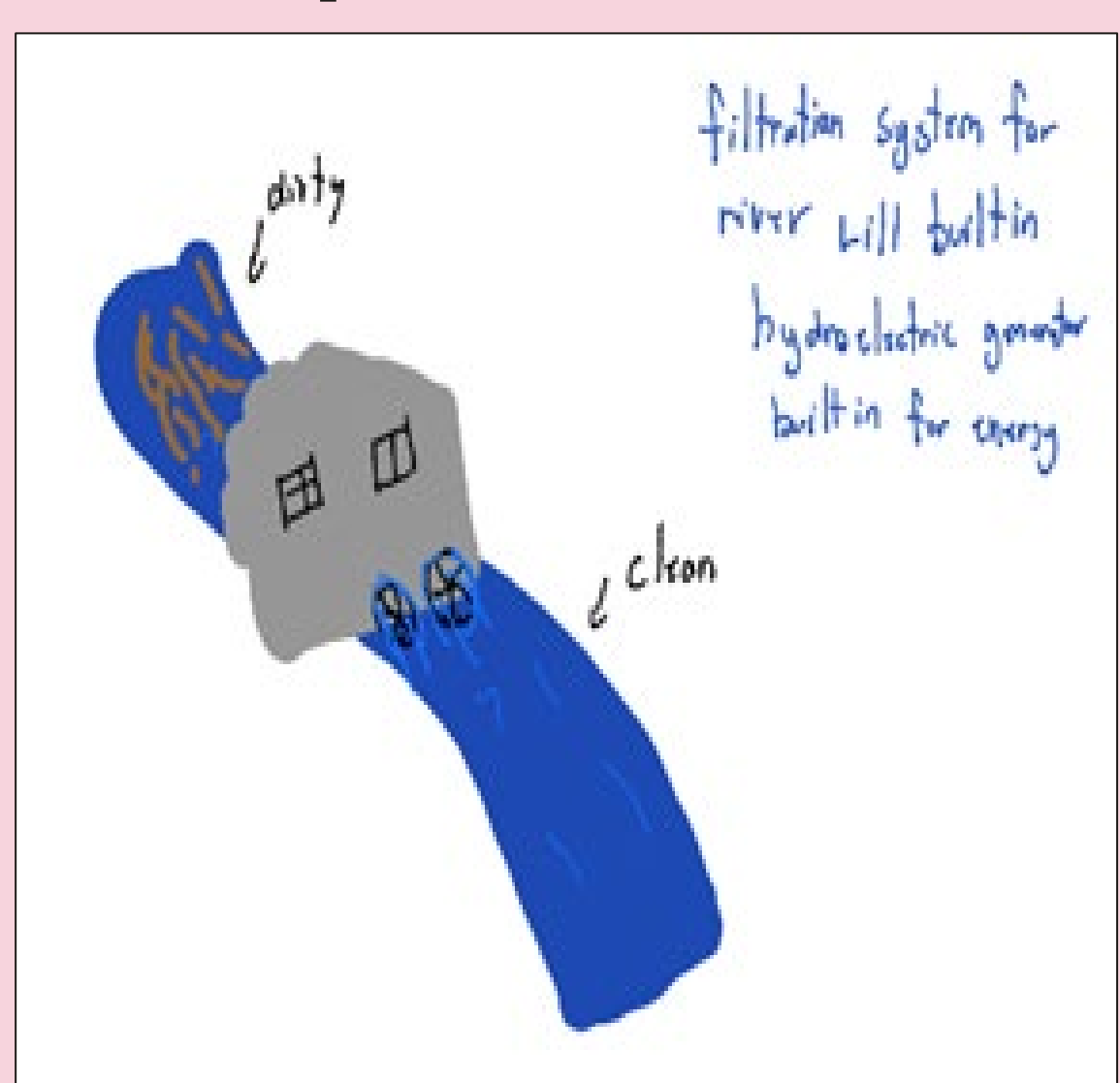
Hypotheses:

1. There is a relationship between uniqueness and environmental sustainability. Is this relationship positive or negative?
2. There is a relationship between usefulness and environmental sustainability.

Participants were given with the following design prompt:

“You are tasked with designing a solution to help improve access to clean water and sanitation for a farmer and his family in a remote village in Sub-Saharan Africa.”

Sample Solutions



Creativity can support the design of environmentally sustainable solutions, but only if designers appropriately emphasize uniqueness and usefulness.

Spearman Correlations between Components of Creativity and the Sustainability Latent Factors

Sustainability Latent Factor	Components of Creativity		
	Uniqueness	Usefulness	Overall Creativity
Material Reuse	0.30	<0.01	0.25
Maximizing Utility & Accessibility	-0.10	0.52	0.08
Corrective Measures for Use	0.33	0.17	0.37

Collaborators

Dr. Elizabeth Starkey and Dr. Sarah Ritter (Penn State University)

Dr. Mohammad Alsager Alzayed (Kuwait University)

Julia Greeley (Lafayette College)

References

Ruiz-Pastor, L., Chulvi, V., Mulet, E., & Royo, M. (2022). A Metric for Evaluating Novelty and Circularity as a Whole in Conceptual Design Proposals. *Journal of Cleaner Production*, 130495.



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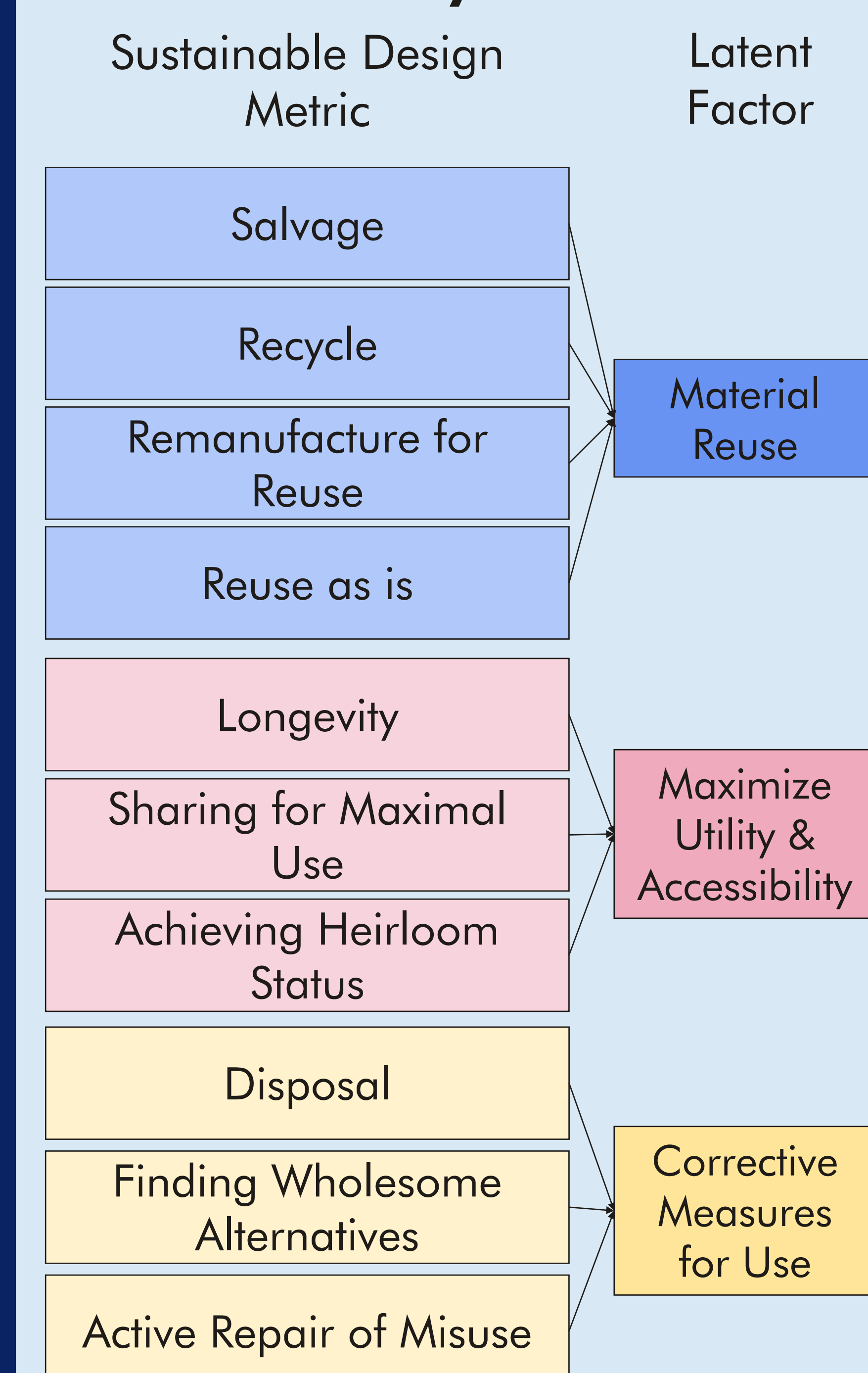


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Creativity Assessment

- Uniqueness: the degree to which the design is novel, surprising, or original
- Usefulness: the degree to which the design solves the problem
- Overall Creativity: a composite of uniqueness and usefulness

Sustainability Assessment



Key Results

- Maximize Utility & Accessibility and Usefulness (+)
- Material Reuse and Uniqueness (+)
- Corrective Measures for Use and Uniqueness (+)
- Maximize Utility & Accessibility and Uniqueness (-)