

Do we teach what we preach?

Evaluating transdisciplinary, problem-based learning projects in sustainability programs

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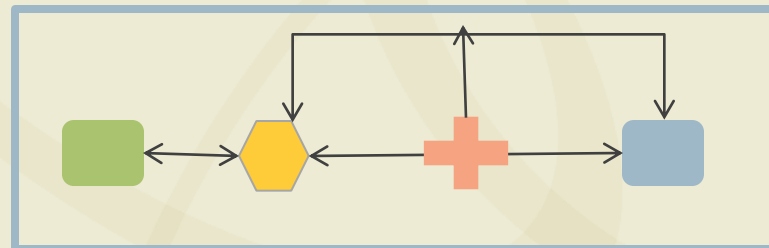
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Sustainability Research Education



Student(s)

Faculty



“Stakeholder”

Facilitator



- Real-world problems
- Transacademic settings

Background



Outcomes

Ideal educational situation for sustainability research education



Formats

Ways to teach and learn it across the curriculum



Alignment

Assessment

Evaluation of outcomes against learning formats

Competences

Competences for instructors facilitating such formats

Motivation for Pilot Study



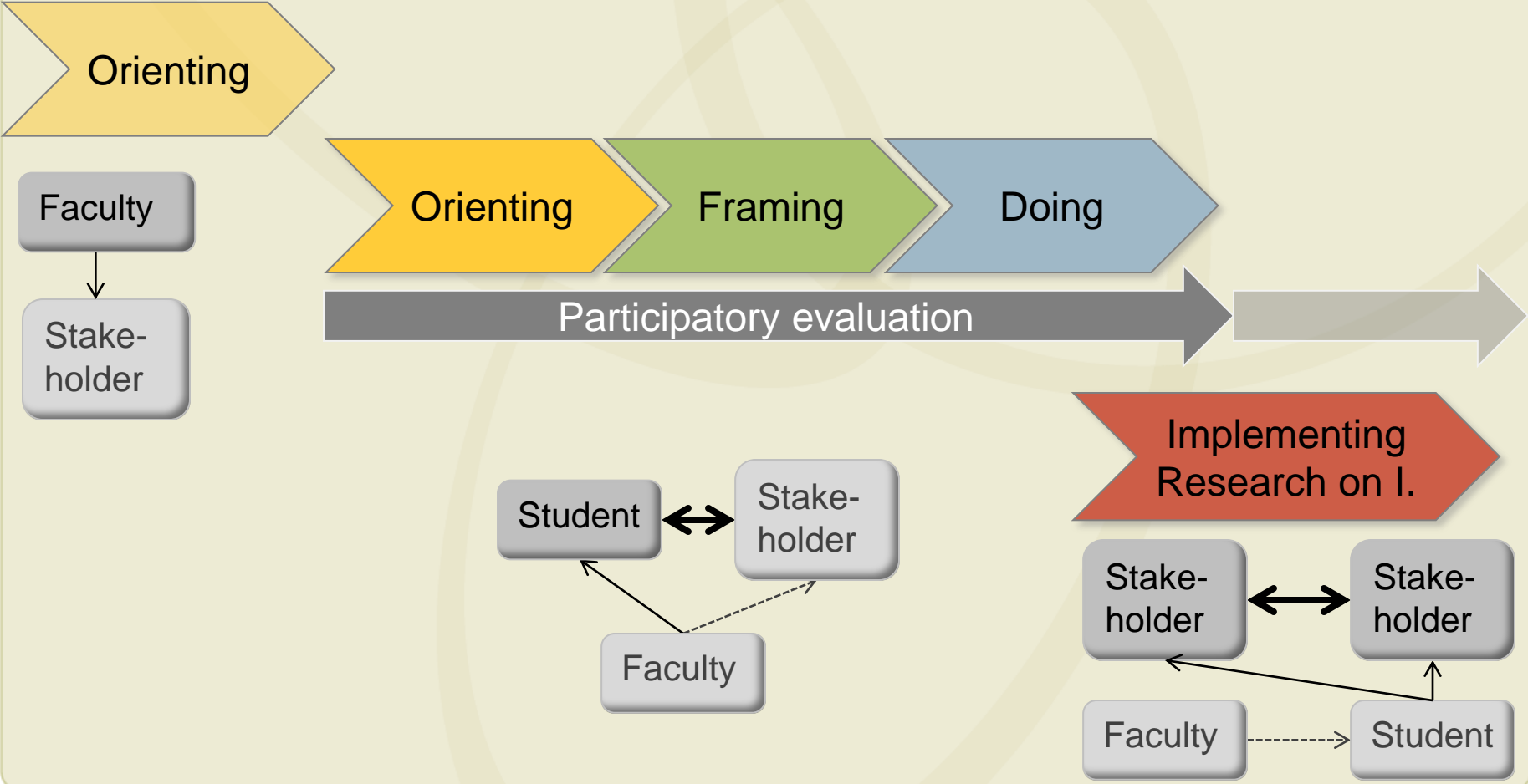
- Established practice
- Quality criteria
- Comparing projects against quality criteria
- Contribution to re-/design of projects



Profile of Six Cases (more forthcoming)

What	Canada (East)	Australia	Canada (West)	USA	Spain	Switzerland
Level	3 rd year UG	3 rd year UG	4 th year UG (G)	UG / G	1 st year MEng	1st year MSc
Formats	Course + project	Course + project	Directed study	Studio	Course + project	Studio
Lead	Fac & Admin	Fac (rotate)	Staff	Fac & Staff	Staff	Fac & Lecturer
Place	Campus* Community	Campus* Community	Campus* Community	Campus	Campus* Community	Communi- ty
# people (stu/sh/fac)	60 /12/4	30/6/1/	>90/45/1	16+6 /2/ 3/20	24/4/3	18/17/9/ 100
# projects	12	6	90	1 Split in 3	4	1 split in 3

Research Phases, Steps and Roles



Appraisal Criteria

Description

Evaluation

Orienting – Research Problem, Anticipated Goals, Research Question

- | | |
|--------------------------------------|--|
| 1. Who brought the problem? | 1. Equal agreement & commitment? |
| 2. <i>What was the problem?</i> | 2. <i>Was it a sustainability problem?</i> |
| 3. How was team-building organized? | 3. Based on problem? Facilitation? |
| 4. What was the goal of the project? | 4. To develop solution-options? |
| 5. Project description? | 5. Equal involvement of participants? |

Framing – selecting & combining methods to address problem in view of goal

- | | |
|---|---|
| 1. What methods were selected? | 1. Solution-oriented methodology? |
| 2. <i>Plan for integrating results?</i> | 2. <i>Integration-plan led to strategies?</i> |
| 3. Methods for evaluation of project? | 3. Participatory evaluation (cross-p)? |

Sources: among others: Brundiers & Wiek (2011); Morse & Bell (2011); O'Meara et al. (2011); Wiek et al (2011); Keil (2009); Stauffacher et al. (2008); Blackstock et al. (2007); Pohl & Hirsch Hadorn (2007); Moll & Zander (2006); Bergmann et al. (2005).

Appraisal Criteria

Description

Evaluation

Doing the research – applying identified methodology

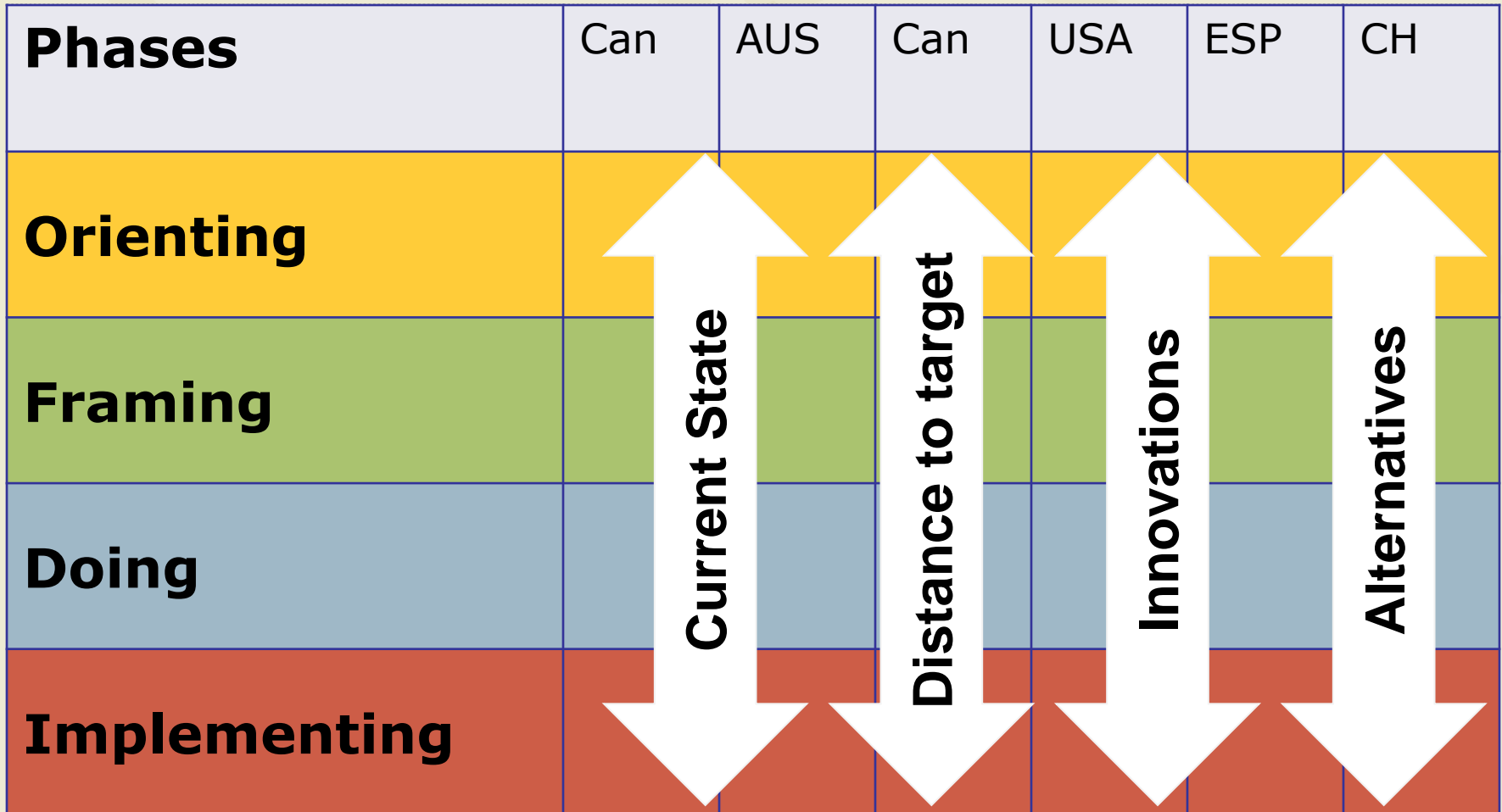
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|--|---|
| 1. <i>Research on problem analysis, solution options, and synthesis?</i> | 1. <i>Appropriate time for & rigor of method-application in all phases?</i> |
| 2. What learning outcomes; for whom? | 2. Sustainability competencies gained? |
| 3. Outputs of project? | 3. Extend peer-review of products? |
| 4. Solution-options developed? | 4. Solution-options built upon: current state analysis, vision, normative assessment, strategy? |

Implementation of solution-options by SH; *research* on their implementation

- | | |
|---|---------------------------------------|
| 1. How was the closure organized? | 1. Closure: planned as a transition? |
| 2. <i>Implementation of research results?</i> | 2. <i>Research on implementation?</i> |

Sources: among others: Brundiens & Wiek (2011); Morse & Bell (2011); O'Meara et al. (2011); Wiek et al (2011); Keil (2009); Stauffacher et al. (2008); Blackstock et al. (2007); Pohl & Hirsch Hadorn (2007); Moll & Zander (2006); Bergmann et al. (2005)

Synthesis of Results



Orienting: Selected Results



Team-building based on problem-definition and anticipated results?

- *Current state*: Self-select, informal activities for students, class discussion about it
- *Deficit*: Lack of skill-development for problem-solving
- *Innovation*: Explicit team-building activities for each group
- *Alternatives*: Combine problem-scan with team-building; model facilitator as epistemediator

Framing: Selected Results



Did project apply a participatory evaluation including cross-perception?

- *Current state*: For students, informal and formal, peer-assessments
- *Deficit*: Joint evaluation throughout, cross-perception, => lack of ownership for process and outcomes
- *Innovation*: Tiered appraisal with students & stakeholders
- *Alternatives*: Higher Ed is a “save environment”: design project as boundary organization & social learning process

Doing: Selected Results



Were outputs subject of “extended peer-review”?

- *Current state*: Range: optional to review influencing grade
- *Deficit*: “Order & pick-up”-model, lack of mutual learning
- *Innovations*: Peer-review of certain documents with grade
- *Alternatives*: Share rubric and invite professional criteria, share with class; engage stakeholders to convey skills

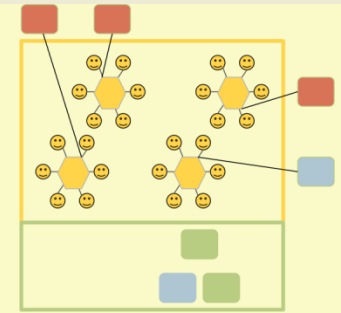
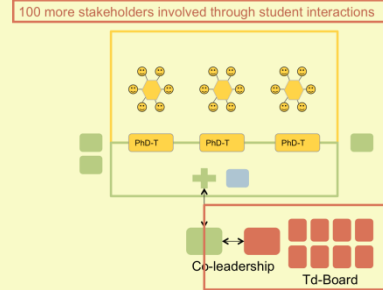
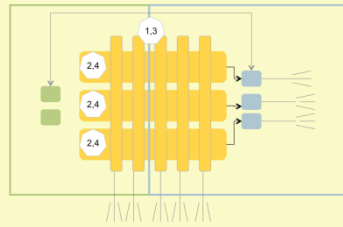
Implementation: Selected Results



Was closure organized as a transition to implementation?

- *Current state*: Often for students to present & learn in class
- *Deficit*: no discussion of results, lack of strategic planning
- *Innovations*: stakeholders co-leading final events to shape upcoming decision processes
- *Alternatives*: discuss anticipated results in orienting phase to inform transition to implementation from the outset & allow for possible student-research on implementation

Conclusion



- **Variety of good examples** – hard work, innovative approaches, deficits
- **Interrelated challenges**
 - Teach-learn-do overkill
 - Knowledge & experience relate to sustainability science
 - Institutional support of university & sustainability science community
- **Contribution to emerging field of sustainability science *education***
 - Learn from & with each other
 - Innovate institutional structures as learning platforms
 - Low-hanging fruits: make history and build community

Thank you

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References:

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