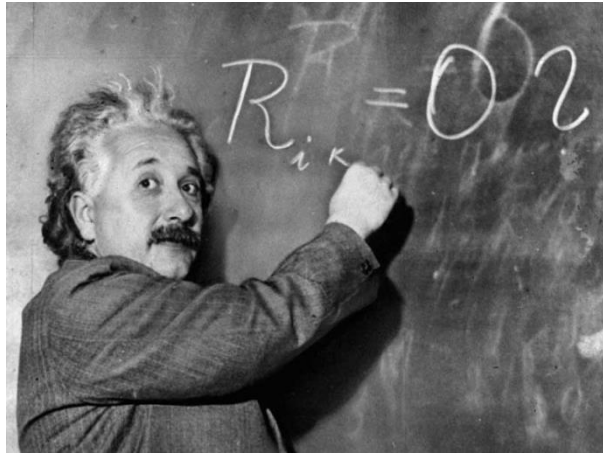




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Upscaling and Mainstreaming Sustainability Science in Higher Education

*Third Symposium on Sustainability Science: Towards Guidelines on Research and Education
31 May-1 June 2017, UNESCO Headquarters, Paris*

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Key issues in Sustainability Science

What are the underlying epistemological assumptions that sustainability research is based on?

How to identify intervention points and develop strategies to enable fundamental transformation processes in socio-environmental / socio-technical systems?

How can analytical-descriptive knowledge about global interrelations and context-specific, solution-oriented research to be made mutually utilisable?

How can mutual learning processes between science and other social groups of actors be realized to foster sustainable development?

How can central competencies for shaping a sustainable society be communicated and imparted effectively?

cf. Heinrichs et al. (2016);
Wiek and Lang (2016)

Table 4 Educational contributions in sustainability science: an overview Barth/Michelsen (2013)

	Individual action and behavior change	Organizational change and social learning	Inter- and transdisciplinary collaboration
Educational concept	Development of key competencies	Social learning, higher-order learning	Situated learning and communities of practice
Focus	Definition and operationalization of competencies Process of competence development Assessment of competencies	Collaborative aspects of learning Organizational learning	Focus on interactive construction of understanding
Major claims	Rationale for and description of key competencies Key competencies as the interplay of cognitive and non-cognitive components Competence development as increased 'mental complexity' and value interiorization	Learning is linked to social action Social learning is a process of iterative reflection Close links to communication Learning as a process of constant negotiation	Learning as a form of 'legitimate peripheral participation' Offers opportunity to consider inter- and transdisciplinary collaboration as an opportunity for learning rather than a problematic situation that has to be managed
Consequences	Supports the development of appropriate objectives Helps to design formal learning settings Offers a way to evaluate the successful change in the individual	Focus on learning rather than teaching Need for learning environments that support informal learning	Deconstruction of difficulties in communicating across disciplines and between researchers and practitioners Deconstruction of method-conflicts between different disciplines
Applications in sustainability science	Barth et al. (2007) Eggert and Bögeholz (2010) Wals (2010a) Wiek et al. (2011b)	Fernandez-Gimenez et al. (2008) Muro and Jeffrey (2008) Pahl-Wostl (2006) Wals (2007)	Haythornthwaite (2006a) Jones et al. (2010)

SHE delivery

Existing structures

New structures

SHE focus

Narrow
(discipline-specific)

Integrate into existing course(s)
minor(s), major(s),
or programs(s)

Create new, discipline-specific
sustainability course(s),
minor(s), major(s)
or programs(s)

Broad
(cross-disciplinary)

Integrate into common
core requirements

Create new, cross-disciplinary
sustainability course(s),
minor(s), major(s),
or programs(s)

Rusinko (2010)



Educating future change agents – Higher education as a motor of the sustainability transformation



Systems Thinking
Competence



Futures Thinking
Competence



Values Thinking
Competence



Strategic Thinking
Competence

- How effective are novel teaching and learning formats in conveying these key competencies?
- Which of such novel teaching and learning formats yield the most profound impact?
- What types of integrating sustainability into curricula are best suited to educate competent and passionate change agents?
- What institutional factors are conducive to adopting such types of sustainability curricula?
- If and how real contributions to the sustainability transformation can get attributed to the acquisition of key competencies during higher education?

Problem-Solving Competence

<http://www.leuphana.de/en/research-centers/cgsc/research-projects/educating-future-change-agents.html>



Outcomes of discussion on higher education in sustainability science

Guidelines can give guidance for decision makers to broaden the approach of Sustainability Science and inter- and transdisciplinarity in education.

- **Higher education institutions**, due to academic autonomy in many countries, are key stakeholders to advance the crucial role of Sustainability Science
- **Individual researchers and teachers** can have a substantial contribution to make for fostering sustainability in higher education
- **Governments** could ensure enabling environments for institutions of higher education to promote Sustainability Science
- **Society and community** play an important role, since they are both relevant co-producers of knowledge and the target group of Sustainability Science results.



Mainstreaming sustainability science in higher education

- Sustainability Science also **requires additional approaches** within higher education and even a fundamental **reconceptualization of teaching and learning**.
- The goal is to academically **educate sustainability experts** (young students as well as professionals in continuing education) to develop the power of critical thinking and relevant competences to being able to tackle the challenges facing the society from local to global levels.
- Based on the principles of academic freedom, **higher education provides a protected space** for independent and historically informed reflections, which is both, oriented towards the generation of new knowledge and contributing to meeting societal challenges.
- **Progress** has been made over the past two decades towards establishment of Sustainability Science in higher education. There is **still a lack** of bundling together academic expertise in higher education, particularly an insufficient learning from good practice.



UE4SD: University Educators for Sustainable Development

- Frame:
 - duration: 2014-2016
 - Supports teaching colleagues at universities in the development of competencies for ESD
 - 53 partner universities in 33 European countries

- Outcomes:
 - Mapping State of the Art of ESD training programmes
 - publications
 - ESD academy
 - Online platform – <http://platform.ue4sd.eu>

- Continuation:
 - Operated by COPERNICUS Alliance



UNIVERSITY EDUCATORS
FOR SUSTAINABLE DEVELOPMENT



Staged social and educational responses to sustainability

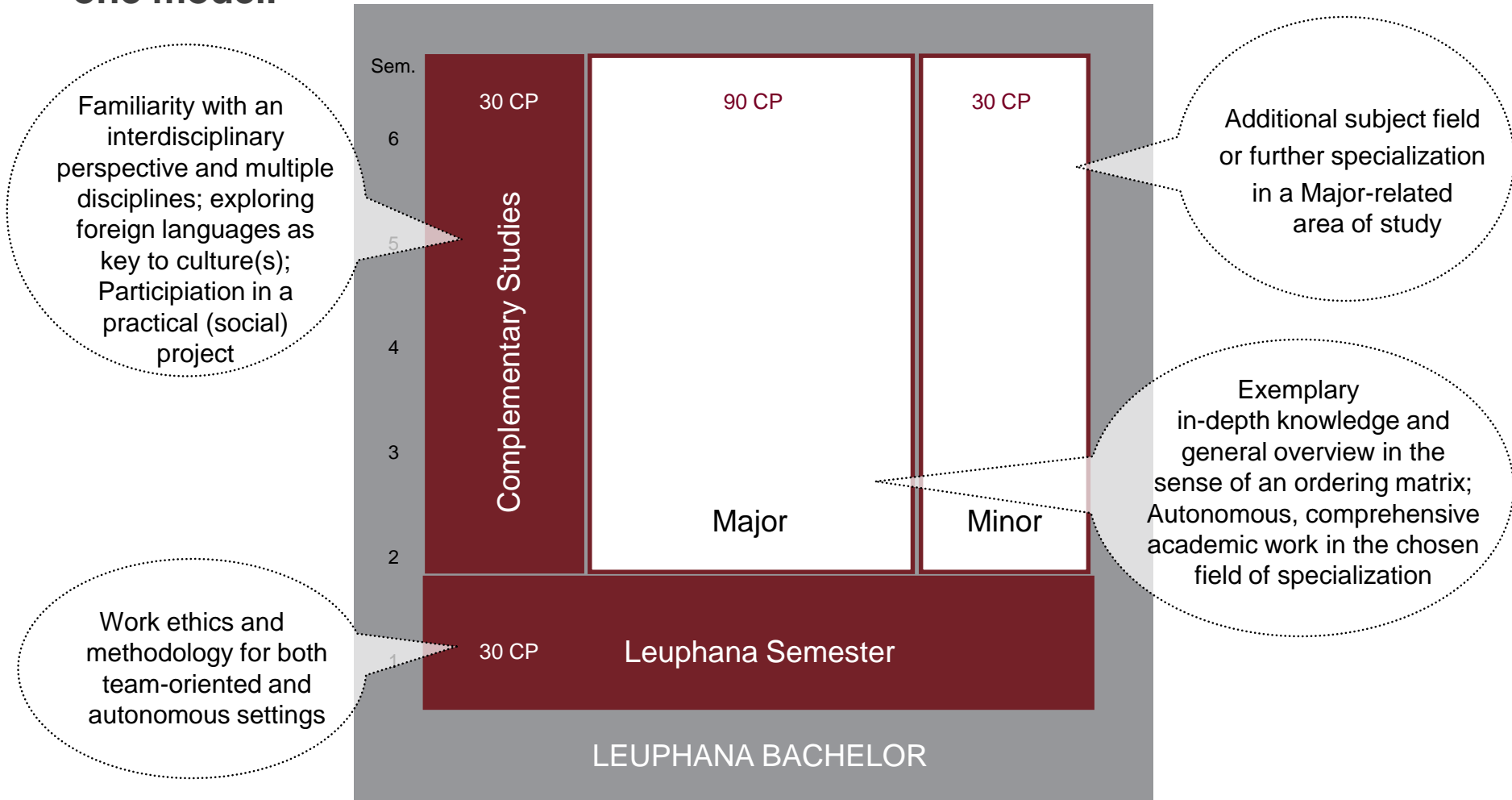
<i>Sustainability transition</i>	<i>Response</i>	<i>State of sustainability</i>	<i>State of education</i>
1 Very weak	Denial, rejection or minimum	No change (or token)	No change (or token)
2 Weak	‚Bolt-on‘	Cosmetic reform	Education <i>about</i> sustainability
3 Strong	‚Build-in‘	Serious greening	Education <i>for</i> sustainability
4 very strong	Rebuild or redesign	Wholly integrative	Sustainable education



Sterling (2004)



Leuphana College offers a unified model of study for all subjects. The various preceding undergraduate programs are completely replaced by one model.



CP = Credit Points



The first Semester: Helping lone warriors to become a durable community of learners. Teamwork and peer learning create transdisciplinary learning successes.

- Emotional identification with degree program and university
- Acceptance into the scientific community of learning
- Creating a welcoming social atmosphere on campus
- Mentoring to ensure productivity and success from the start

Conference Week

“Science imparts understanding”
for perspective and reflexion

“Responsibility and Sustainability”
with Conference Study

“Science knows disciplinary boundaries”
specialization/
Major

“Science uses Methods”
qualitative & quantitative

Freshman Week with Case Study

LEUPHANA SEMESTER

<http://www.leuphana.de/en/study/bachelor/leuphana-semester.html>



The module „Responsibility and Sustainability“ asks:

Which questions arise from the problems of tomorrow?

Interdisciplinary introduction to science

Change of roles and perspectives

University for the Civil Society

Challenges of sustainable development

Learning by research

Participation in science as an open process

Learning objectives: scientific inquiry, arguing, cooperative research, target group-oriented presentation

Focus: Opportunities and limits of societal shaping of the future

→ **How does change work?**

Project groups present their first ‘research results’ at the conference week

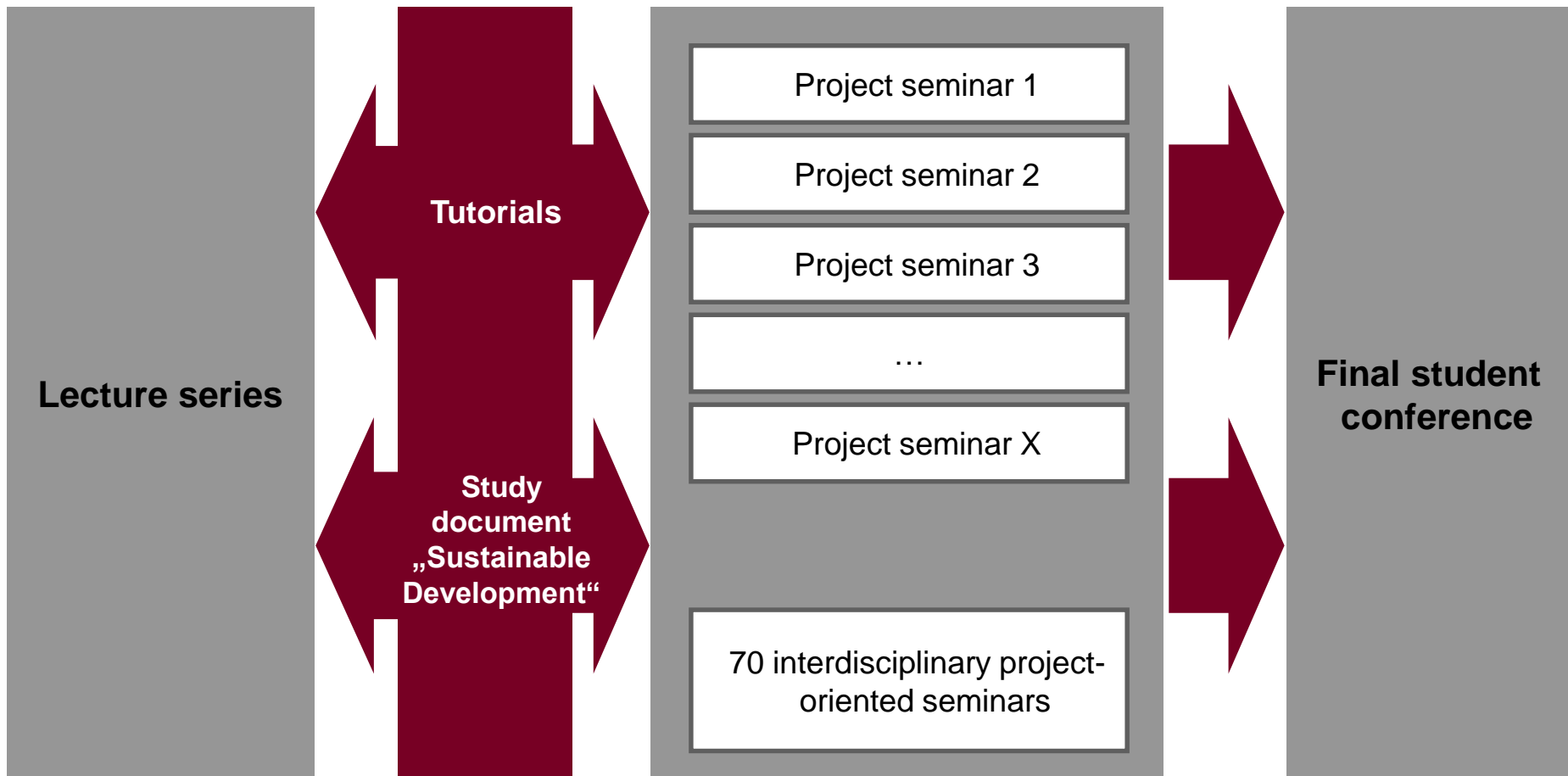


Structure of the Module “Responsibility in Science“: Forms of learning and teaching

(1) Knowledge transfer

(2) Knowledge generation

(3) Knowledge presentation



CULTURE OF TEACHING AND LEARNING IN THE RESPONSIBILITY AND SUSTAINABILITY MODULE

Curriculum

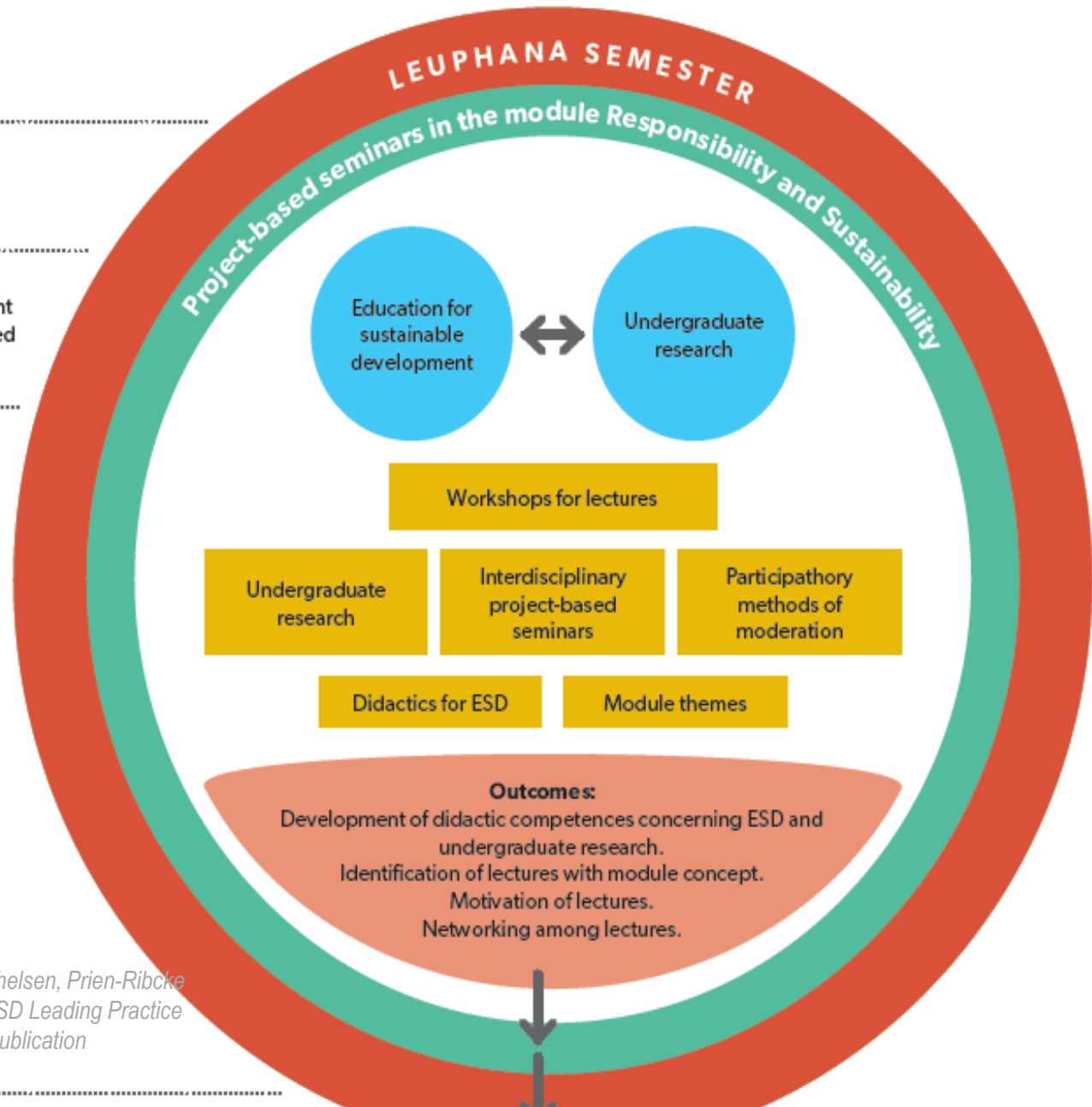
Seminar

Conceptual content of the project-based seminars

Professional development

Main focus of workshops

Outcomes



Source: Michelsen, Prien-Ribcke (2015) UE4SD Leading Practice Publication



F t re.

**Without u there's no sustainability.
Ohne Dich keine Nachhaltigkeit.**

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Scientific Sustainability Science Community



Higher Education for Sustainable Development

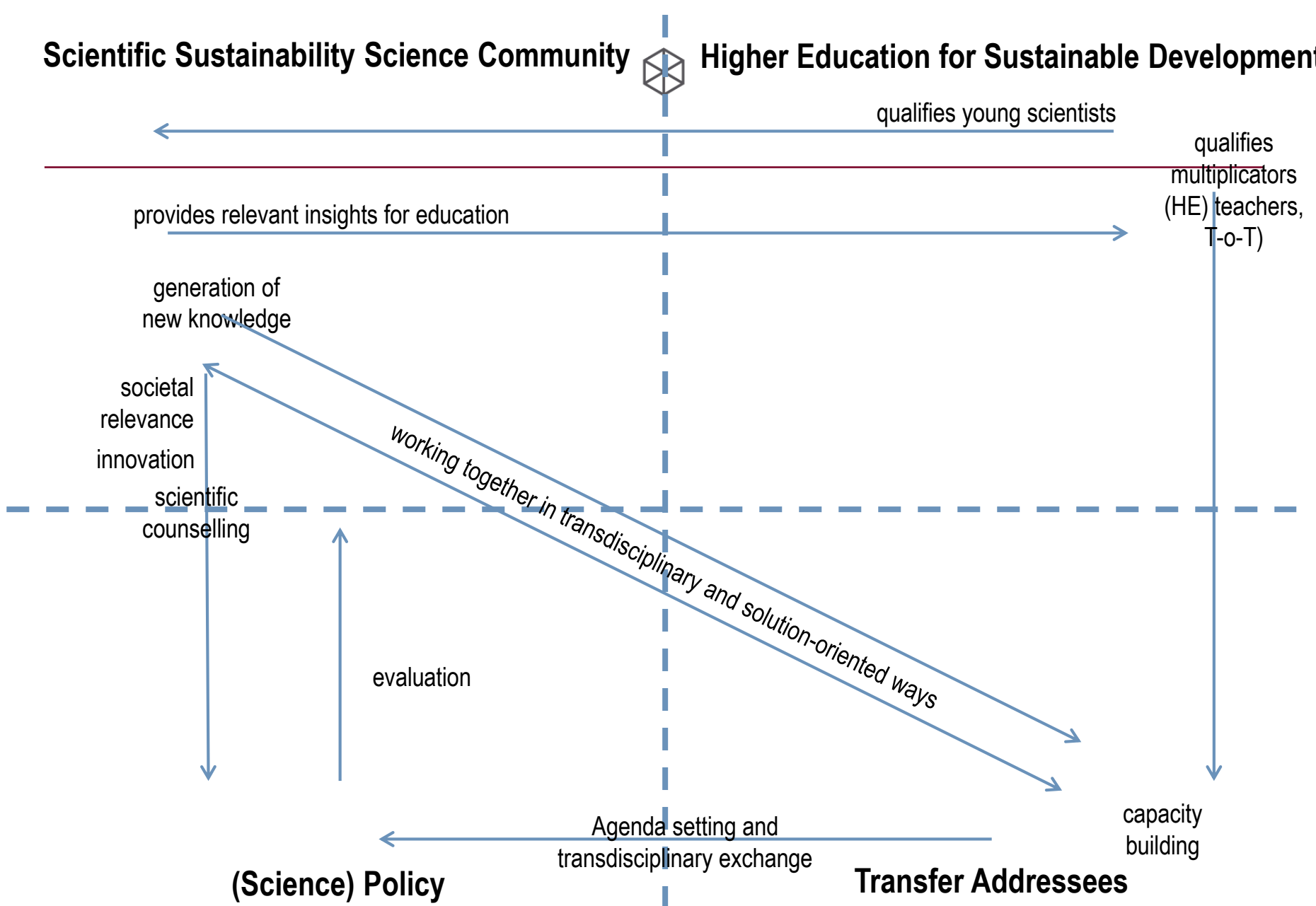


Figure modified according to Mevissen & Simon (2013)



Recommendations

- cultural dimension of sustainability is conceptually and strategically indispensable, both for research and education
- valuing and deliberately addressing the regulative core of sustainable development and its implications for education are an asset for (science) education
- interrelatedness of science and sustainable development deserves educational attentiveness by every professor and lecturer and his/her students
- To this end, it is essential to make (sustainability) science a tangible experience for students (to familiarise with and practice value-laden conflicts, tensions and incompatibilities of knowledge etc.)



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