

The active creation and enaction quadrant can be applied to many areas of knowledge creation and learning. It is particularly needed in five areas where knowledge advances and capacities are currently very limited and which are needed in most professional settings or environmental studies:

* Creative development of solutions and approaches (e.g. learning from trying to bring about change, creative development of designs and possible solutions and the complex human social challenges involved);
* Working with uncertain and desired futures (e. g. learning how to apply futures methods and supporting actions to bring desired futures into being, which requires very different kinds of orientations and considerations of what constitutes evidence or truth, and developing futures consciousness and new practices around different orientations to time);
* Working with complex interrelated challenges (e.g. developing know-how to engage with and intervene in complex systemic challenges);
* Working with highly contested issues (e.g. developing know-how by actively applying dilemma resolution, mediation practices or deliberative democracy processes such as citizen assemblies);
* Stewarding systemic and transformational kinds of change (e.g. developing know-how from actively working to try and instigate transformative outcomes or stewarding system transition in the real world).

**Box 1: Active creation and enaction forms of learning.**

Rapidly advancing capacities for working with 21st century challenges needs extensive focus on action-oriented forms of learning that develop know-how for working with change in practice. Learning from abstract information about what exists in the world (e.g. papers or lectures on the nature of social and bio-physical phenomena) currently dominates most teaching in universities. Considerable learning also occurs from students actively developing practical skills in analysis allowing them to develop new information about the world (e.g. learning practical skills in analysis from doing lab experiments or conducting fieldwork, writing dissertations). Some learning also occurs from analysing attempts to create solutions and enact change. Rarely, however, does learning occur in the active creation and enaction quadrant, such as by learning to actively create and test solutions or through trying to enact change. This is needed to develop embodied know-how for working with climate change (e.g. to help create change and rapid carbon reduction). Much greater attention is then needed on active creation and enaction.