|  |  |
| --- | --- |
| Core competency | Explanation |
| Creative development of solutions and new approaches | Strengths in universities tend towards critical analysis of problems and less on creative development of solutions or enacting them. This applies to both research and teaching. universities will need to foreground learning (teaching and research) that leads to design or creation of new ideas or solutions, such as new policies, ways of working or approaches and how to bring about change through collaborative action. Stewarding change cannot be learned just from books or lectures and requires learning by experience. Creating new ideas or solutions also often comes from trial and error, and is thus often not separate from implementation. Shifts towards more engaged action-oriented research and teaching is needed to help develop such capacity. |
| Working with uncertain and desired futures | Rapid development of futures consciousness is needed to work with 21st century challenges. Most universities focus on knowledge creation methods that rely on an evidence base from the past or present. This is important, but can be akin to driving forwards while looking through the rearview mirror. Relying on evidence alone limits understanding of, or actions for, bringing about change and how the complexity, rapidity, extent and uncertainty associated with the environmental changes hurtling towards us is navigated. Research and teaching needs to rapidly enhance development of competencies for working with the future in co-creative ways. This can include futures tools (e.g. scenario planning, visioning, stretch goals), creative and active learning processes, and working with deeply held assumptions about how change occurs. |
| Working with complex, interrelated challenges | Urgent development of new approaches is needed to work with ill-defined problems, complexity and inter-related issues. Very few environmental challenges are easily defined, and most are complex, dynamic and cross many disciplinary fields. Developing ability to understand, surface and make sense of complexity and inter-relations is important, as are understanding underlying dynamics and how subjective experience of those dynamics shape the way people respond. ‘Interdisciplinary’ approaches, problem-based learning or systems thinking are often suggested as a solution. But these approaches are rarely given serious attention. New integrative approaches are also needed to transcend the kinds of thinking that have led to 21st century challenges like climate change, including through new fundamental research to develop the kinds of knowledge creation and teaching that can help societies work across interconnected challenges. |
| Navigating highly contested issues | New competencies are needed to work with diverse subjective, normative, contested and ethical or moral aspects of change. Most change is contested, but there is still insufficient emphasis on how to work with, for example, conflict, negotiation, mediation or dilemma resolution or how to surface and work with different values. Most students who leave university face such issues, especially when engaged in environmental sustainability related work but usually have not received any training in these areas. Developing such competencies takes time and requires personal work on ‘the inside’ to enable more effective working with ‘the outside’. Culture shifts and new competencies in staff will be needed to support the development of more nuanced change or solution-oriented research and teaching that are underpinned by greater attention to the personal transformations that are needed to enhance one’s effectiveness in working with change. |
| Stewarding transformational change | Effective societal change in relation to issues like climate change cannot be achieved without addressing systems and structures, cultures, values and mindsets that underpin them. Realising the Sustainable Development Goals, for example, needs systemic change. New research and training to develop competencies for bringing about transformational change as a distinct form of change is essential. |

Table 2. Examples of some of the core competencies needed for societies if they are to successfully navigate 21st century challenges. These competencies are needed to support: (a) knowledge creation about how to navigate 21st century challenges; (b) capacity development for navigating change; and (c) transitions within universities (based on [Wiek et al. 2011](#_ENREF_91), [Hodgson 2013](#_ENREF_41), [Leicester et al. 2013](#_ENREF_53), [Beynaghi et al. 2016](#_ENREF_6), [Fazey et al. 2018](#_ENREF_31), [Bina and Pereira 2020](#_ENREF_7), [O’Riordan et al. 2020](#_ENREF_70), [Brundiers et al. 2021](#_ENREF_13)).