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Supporting students to become agents of change: Introducing and evaluating the Transition Cycle approach to teaching transformative skills

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ABSTRACT

Human societies are dealing with urgent and daunting societal transition challenges, such as those posed by climate change, inequality, pandemics, and digitalization. In all these cases, we know that they must fundamentally change the way they do and think about things, and urgently so, but do not know how. Uncertainty about the direction of change and resistance to change are ubiquitous. Future generations must be equipped with capabilities for dealing with these challenges. However, there is an apparent mismatch between the skills currently taught and the skills needed to address complexity, uncertainty, and resistance. Using relevant existing frameworks and experiences we created and taught a course focusing on fostering these skills. For this purpose we developed the Transition Cycle, an original educational approach in which students work on a societal transition challenge in four distinct but related phases: *imagine*, *connect*, *act*, and *assess*. In this paper, we introduce and evaluate the Transition Cycle and its underlying concepts, basic components, implementation in the course, and learning outcomes. We conclude by reviewing lessons learned and raising questions for future research and experimentation.

1. Introduction

The world is ridden with complex challenges, such as climate change, deep-seated inequalities, undefined digital transformations, and public health emergencies. These so-called ‘wicked problems’ (Rittel & Webber, 1973) occur on different scales; involve a multiplicity of mutually interacting actors and factors; and function in ways that cannot be localized to any specific component (Meadows, 2008; Tromp, 2018). Because of their complexity, it is difficult to agree on how problems should be defined and the direction in which solutions should be sought. Uncertainty and resistance are pervasive, yet action is necessary.

Current and future generations must be equipped to instigate the societal transitions necessary to address these challenges. Students in higher education should therefore be taught the transformative skills required to facilitate change in the face of complexity (Wessels, 2022; Wessels et al., 2022; McCune et al., 2023). Scholars have discussed relevant initiatives in transformative skills education, helping to identify key efforts and challenges. For example, Tassone et al., (2018, p 349) conclude their assessment of a set of innovative educational practices by stating that in higher education professionals should foster forms of teaching and learning that are more

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responsible than those that prevail currently. According to them, higher education should focus on ‘being relevant’ (e.g., connecting to real-world issues through inquiry), responsive (e.g., keeping up with changes), and above all reflexive (e.g., considering and questioning normalized assumptions and values). Further, it should foster an ethics of care (e.g., considering others’ perspectives and needs, as well as the ethical implications of one’s endeavors). For Hoffman et al. (2021), an educational approach centered on nurturing “futuring” (the ability to critically and reflectively imagine the future) is especially crucial for enhancing students’ sense of agency when addressing wicked problems. For Wals (2010, p. 150), the defining challenge for future-oriented environmental and sustainability education is that of coming to terms with the tension between “a deep concern about the state of the planet and a sense of urgency that demands a break with existing un-sustainable systems, lifestyles and routines” and “a conviction that it is wrong to persuade, influence or even educate people towards pre- and expert-determined ways of thinking and acting.” Regenerative education is one approach specifically aiming to equip students and educators with the capabilities to navigate the crises humanity is facing and redirect existing systems towards ones that stay within the socio-ecological boundaries of the earth (Mang & Haggard, 2016). Regenerative education goes beyond traditional 21st-century skills, focusing on fostering inner sustainability, innovative teaching methods, and shifts in institutional cultures toward regeneration as the core of educational thinking (Mang & Haggard, 2016). Another such an approach is a ‘pedagogy of entanglement’ that acknowledges and addresses wicked problems and complex challenges and how education is part of and acts within this complexity (Wessels, 2022).

Next to broader perspectives there is an emerging literature on specific transformative education skills. Already in 2012, in a widely cited, seminal paper, Rieckmann (2012, p. 132) drew on a consultation with experts around the world to identify a range of key competencies on which future-oriented higher education should focus. “[T]he most important key competencies” he contends, are “systemic thinking and handling of complexity, anticipatory thinking, and critical thinking.” Further building on this work, and integrating other contributions, the United Nations Educational, Scientific and Cultural Organization (UNESCO) has identified key competencies in ‘Education for Sustainable Development’ (Rieckmann, 2018). More recently, the Organisation for Economic Co-operation and Development (OECD) developed a ‘Learning Compass 2030’ in which three transformative competencies are formulated: the ability to create new value, reconcile tensions and dilemmas, and take responsibility (OECD, 2019). Another example of a collection of such skills is the ‘Inner Development Goals’ (IDGs) based on the Sustainable Development Goals of the United Nations (Inner Development Goals, n.d.). The IDGs are divided into five categories: relationship to self, cognitive skills, caring for others and the world, social skills, and enabling change. They aim at inner development, stemming from the belief that people need to develop the inner capacity to deal with increasingly complex environments and challenges (Inner Development Goals, n.d.).

Despite there being useful frameworks and relevant experiences, universities are still struggling to integrate transformative skills in educational curricula in a systematic way (Woiwode, 2020; Libertson, 2023). Importantly, while relevant skills and ways to teach them have been identified, there are few examples of how to combine different skills in an effective learning process in practice. We aim to contribute to this challenge by introducing and evaluating a newly developed educational approach: the Transition Cycle. Using the case of the honors course “The Next Great/Small Transformation” at the University of Amsterdam, we show and assess how the Transition Cycle can be implemented and how it can help university students learn to combine essential skills in a process for dealing with complex challenges and enabling societal transitions. Finally, we discuss issues and new opportunities that were identified during the implementation of the approach and highlight future steps in the research and educational agendas.

2. The Transition Cycle

Our overarching aim was to set up a course in such a way that students could (1) develop and cultivate key transformative skills and (2) appreciate how these skills, if meaningfully interlocked, provide an actionable approach to cope with complex societal challenges.

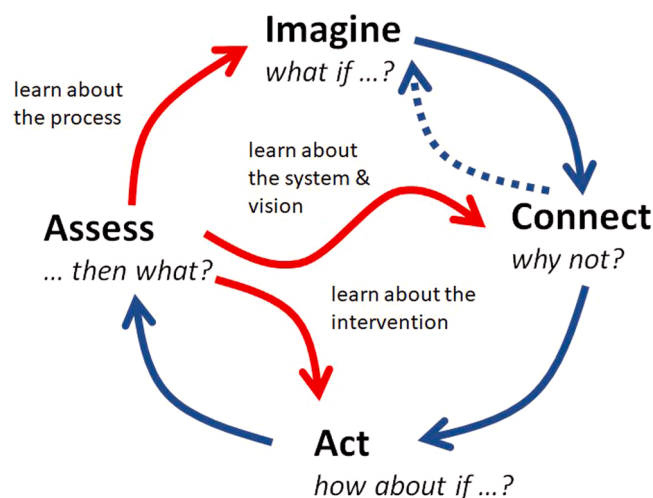


Fig. 1. The Transition Cycle.

The resulting setup took the form of a “Transition Cycle”, which builds on descriptions and discussions of key skills for future-oriented higher education (with reference to: [Rieckmann, 2012, 2018](#)) and transformative skills for sustainable development (with reference to: [Inner Development Goals, n.d.](#)).

The “Transition Cycle” iteratively connects four phases, each defined by an action (*imagine, connect, act, and assess*) and centered around a ‘generative question’ ([Fig. 1](#)). The cycle starts with participants imagining a societal transition (“What if...?”). They are then asked to articulate its systemic complexity (“Why not?”), identify and carry out an intervention to trigger change (“How about if ...?”), and learn from its implementation (“...then what?”). In this section, we introduce the Transition Cycle and embed it in relevant theories and practices. We will provide a more detailed description of how the Transition Cycle translates into educational activities in the next section.

2.1. Embedding in existing theories and practices

Although the Transition Cycle is original, it is inspired and related to existing concepts and experiences. Key, overarching frameworks of reference are transitions research ([Loorbach et al., 2017](#)), design thinking ([Luchs, 2015](#)), and experiential learning ([Kolb, 2014](#)).

In delivering the course, the core message we wished to convey to students was that a reflective, experimental attitude is key to developing the ability to cope with complex societal challenges and enable societal transitions. In this attitude, thinking and acting are continuously and iteratively connected. It prompts people to change the world while trying to understand it and understand it while trying to change it. This core message is also central to all three of our overarching frameworks of reference (i.e., transitions research, design thinking, and experiential learning).

There are also differences between the three frameworks and our approach. Importantly, transition management and other transition research approaches start the process of a transition with an analysis of the system (or our *connect* phase), not a vision for its future (our *imagine* phase). Similarly, design thinking asks participants to begin by “empathizing” with the issue (also much like our *connect* phase). Our decision to start instead from the student teams’ inner, unmediated drives (in the *imagine* phase) is more akin to experiential learning, in which the learner’s personal, intrinsic motivation to address a perceived problem or realize a perceived opportunity is the key trigger of the learning process ([Kolb, 2014](#)). This alternative starting point, we hypothesize, also provides a more focused approach to the mapping of systemic complexity in the *connect* phase. In our practice of the Transition Cycle, this *connect* phase is geared toward understanding those factors that variously enable or constrain change toward a vision that has already been identified (“Why not?”, that is, what stands in the way of realizing the vision?). Furthermore, although transition research highlights the cyclical and iterative character of transition processes, in which one learns by doing and does by learning, it articulates this poorly, especially where learning (our *assess* phase) is concerned ([Van Poeck et al., 2020](#)). Here too experiential learning helps, with its iterative cycles of concrete experience, reflective observation, abstract conceptualization, and active experimentation ([Kolb, 2014](#)).

Still, there are also ways in which our approach differs from experiential learning. One important difference, which was directly inspired by transition research, is that, in our approach interventions (our *act* phase) should be conceived as attempts to trigger change in the system at large, not just in a specific local context (this is akin to the notion of interventions as “transition experiments” in [Loorbach et al., 2017](#)). Finally, design thinking’s most distinctive contribution to the Transition Cycle is its approach to the step from analysis to intervention (in design thinking, this is a move from *definition* to *ideation/creation*; in the Transition Cycle it is that from *connect* to *act*). In both design thinking and in our approach, although the conception of an intervention is informed by an understanding of the challenge being confronted, it requires a creative leap, as well as an abductive rather than a deductive stance ([Luchs, 2015](#)).

Each phase of the cycle is described in more detail in the next section.

2.2. Phases and skills

2.2.1. Imagine

The ability to imagine the future is an essential precondition of being able to shape it ([Rieckmann, 2012](#)). This is because “the future does not yet exist, it can only be imagined” ([UNESCO, n.d.](#)). It is here, in an *imagine* phase, that the Transition Cycle and our engagement with students begins. In this phase, student teams are asked to envision a future world, where the societal challenge on which they have chosen to focus has been overcome. In so doing, they give their own answer to this phase’s generative question: “What if ...?”. Imagining a future that is fundamentally different from the present is vital but extremely difficult, given that the status quo strongly conditions not just contemporary reality, but also how people imagine the future ([Hajer & Versteeg, 2019](#)). In the face of these difficulties, aesthetic experiences are uniquely placed to open people’s imagination to the future ([van Lente & Peters, 2022](#)). Our hypothesis is therefore that art-based methods can be usefully employed to help students envision an alternative future ([Moon et al., 2013](#)) and should have a key role in the *imagine* phase. The key student product of this phase is a vision with which to address a challenge, expressed artistically as well as through other more conventional means.

In the *imagine* phase, students are enabled to develop and cultivate competence in “Anticipatory thinking” (as discussed in [Rieckmann, 2012](#)) and the skills of “Sense-making,” “Long-term Orientation and Visioning,” and “Creativity” (as discussed in [Inner Development Goals, n.d.](#)).

2.2.2. Connect

Second is a *connect* phase, in which the student teams are asked to develop a systemic understanding of their challenge. [Rieckmann](#)

(2012) has identified “Systemic thinking and [the] handling of complexity” as the most important competence for future-oriented higher education. In this phase, students mobilize and cultivate this competence by applying to their challenge conceptual tools associated with system thinking, including systems’ elements, interconnections, and purposes (Meadows, 2008). This is then supplemented by a stakeholder analysis. The leading, generative question for this phase builds directly on that of the previous one, asking “Why not?”. The question prompts students to consider why the world does not align with their vision (their “What if ...?”). They are encouraged to explore the factors hindering the realization of their vision, examine how these factors are interrelated, and identify the stakeholders associated with these factors. The key student products of this phase are a system map and stakeholder analysis.

In the *connect* phase, students are enabled to develop and cultivate competence in “Systemic thinking and [the] handling of

Table 1
Overview of competencies/skills developed and cultivated in the course.

Phase of the Transition Cycle	Competency/Skill	Full description	Source
Imagine	Anticipatory thinking	Ability to understand and evaluate multiple futures – possible, probable, and desirable – and to create one’s own visions for the future, to apply the precautionary principle, to assess the consequences of actions, and to deal with risks and changes	Rieckmann (2012, 2018)
Imagine	Sense-making	Skills in seeing patterns, structuring the unknown and being able to consciously create stories	Inner Development Goals, n.d..
Imagine	Long-term Orientation and Visioning	Long-term orientation and ability to formulate and sustain commitment to visions relating to the larger context	Inner Development Goals, n.d..
Imagine	Creativity	Ability to generate and develop original ideas, innovate and being willing to disrupt conventional patterns	Inner Development Goals, n.d..
Connect	Systemic thinking and handling of complexity	Ability to recognize and understand relationships, to analyse complex systems, to perceive the ways in which systems are embedded within different domains and different scales, and to deal with uncertainty	Rieckmann (2012, 2018)
Connect	Complexity awareness	Understanding of and skills in working with complex and systemic conditions and casualties	Inner Development Goals, n.d..
Act	Planning and realising innovative projects	Ability to collectively develop and implement innovative actions that further sustainability at the local level and further afield (NB: labeled ‘Strategic competency’ in Rieckmann, 2018)	Rieckmann (2012, 2018)
Act	Mobilization	Skills in inspiring and mobilizing others to engage in shared purposes	Inner Development Goals, n.d..
Act	Courage	Ability to stand up for values, make decisions, take decisive action and, if need be, challenge and disrupt existing structures and views	Inner Development Goals, n.d..
Assess	Critical thinking	Skills in critically reviewing the validity of views, evidence, and plans (Inner Development Goals, n.d.)	Inner Development Goals, n.d.; Rieckmann (2012, 2018).
Assess	Evaluation	Ability to question norms, practices, and opinions; reflect on own one’s values, perceptions, and actions; and take a position in the sustainability discourse (Rieckmann, 2018)	Rieckmann (2012, 2018)
Assess	Openness and Learning Mindset	Ability to understand and reflect on the norms and values that underlie one’s actions and to negotiate sustainability values, principles, goals and targets, in a context of conflicts of interests and trade-offs, uncertain knowledge and contradictions (NB: labeled ‘Normative competency’ in Rieckmann, 2018)	Inner Development Goals, n.d..
Assess	Self-awareness	Having a basic mindset of curiosity and a willingness to be vulnerable and embrace change and grow	Inner Development Goals, n.d..
Assess	Perspective	Ability to be in reflective contact with own thoughts, feelings and desires; having a realistic self-image and ability to regulate oneself	See also Rieckmann (2018)).
Assess	Perspective	Skills in seeking, understanding and actively making use of insights from contrasting perspectives	Inner Development Goals, n.d..
Whole cycle	Acting fairly and ecologically	Overarching ability to apply different problem-solving frameworks to complex sustainability problems and develop viable, inclusive, and equitable solution that promote sustainable development – integrating the above-mentioned competencies (NB: labeled ‘Integrated problem-solving competency’ in Rieckmann, 2018)	Rieckmann (2012, 2018)
Whole cycle	Cooperation in (heterogeneous) groups	Ability to learn from others; understand and respect the needs, perspectives, and actions of others (empathy); understand, relate to and be sensitive to others (empathic leadership), deal with conflicts in a group; and facilitate collaborative and participatory problem-solving	Rieckmann (2012, 2018)
Whole cycle	Interdisciplinary work	Ability to combine insights from different disciplines and different sources of knowledge in the definition of problems and the search for solutions (own definition)	Rieckmann (2012)
Whole cycle	Ambiguity and frustration tolerance	Ability to cope with ambiguity in the definition of problems and the impacts of potential solutions; ability to cope with the tensions between the urgency of challenges and the limitation of resources to address them (own definition)	Rieckmann (2012)
Whole cycle	Communication	Ability to really listen to others, to foster genuine dialogue, to advocate own views skillfully, to manage conflicts constructively and to adapt communication to diverse groups	Inner Development Goals, n.d..

complexity” (as discussed in [Rieckmann, 2012](#)) and the skill of “Complexity Awareness” (as discussed in [Inner Development Goals, n.d.](#)).

2.2.3. Act

In the next phase – *act* – the student teams are asked to conceive a real-world intervention to learn-by-doing about enablers of and barriers to systemic change in the direction of their vision ([Van Poeck et al., 2020](#)). The main body of scholarship and practice to which we refer in this phase is that of transitions research ([Loorbach et al., 2017](#)), particularly work on the concept of the multi-level perspective ([Geels, 2019](#)) and the practice of transition management ([Nevens et al., 2013](#)). Specifically, students are asked to conceive a “transition experiment,” that is, a “short-term action through which alternative structures, cultures, and practices are explored” ([Roorda et al., 2014, p. 32](#)). The leading question of this phase is “What about if...?”. The question prompts students to devise an intervention that could unlock the system and trigger change in the direction of their vision. It also incites them to build on their system and stakeholder analysis to reason how and why their intervention could trigger system change. Importantly, the transition experiment must be something that students can implement during the course, following the pragmatist notion that complexity can only be grasped by actually engaging with the real world ([Van Poeck et al., 2020](#)). The key student product of this phase is an intervention and monitoring plan, followed by the actual intervention and monitoring of it.

In the *act* phase, students are enabled to develop and cultivate competence in “Planning and realising innovative projects” (as discussed in [Rieckmann, 2012](#)) and the skills of “Mobilization” and “Courage” (as discussed in [Inner Development Goals, n.d.](#)).

2.2.4. Assess

In the fourth and final phase, the students are asked to assess the outcome of their transition experiment and draw lessons from it. This step builds on the idea that learning, not ‘success’, is the key aim of transition experiments ([Nevens et al., 2013](#)). They have already been asked to think about and prepare for this phase in the previous one (e.g., by setting up and applying a monitoring framework). Students are asked to learn on three levels (see the three ‘learning loops’ in [Fig. 1](#)): the experiment itself (asking, how could the intervention and the monitoring be adapted to increase their impact and insightfulness?); the vision as well as the system and stakeholder analysis (asking, should the vision be reframed? Did we underestimate or overestimate the role of some factors or actors?); and the whole process (asking, has this process helped us better understand the enablers of and barriers to change? How could the process be improved?).

This is an essential phase of the course, not least because cultivating reflexivity is a key aspect of all three of its overarching frameworks of reference (transitions research, design thinking, and experiential learning) and “Critical thinking” is a crucial competence for future-oriented education ([Rieckmann, 2012](#)). The phase also stretches beyond the course. A central characteristic of the Transition Cycle is that the four phases form part of an open-ended cycle ([Fig. 1](#)), of which the course is just a first iteration (we repeatedly stress this to students). The key product of this phase is an individual reflection, for we want each individual student to reflect and build on their personal learning process. Incidentally, this is the only individually realized product, given that we adhere to the notion that collaboration is a key skill for coping with complex challenges ([Rieckmann, 2012](#); [Inner Development Goals, n.d.](#)).

In the *assess* phase, students are enabled to develop and cultivate competence in “Critical thinking” and “Evaluation” (as discussed in [Rieckmann, 2012](#)) and the skills entailed in the notions of “Critical thinking”, “Openness and Learning Mindset”, “Self-awareness,” and “Perspective” (as discussed in [Inner Development Goals, n.d.](#)).

In addition to skills on which distinct phases focus, there are overarching skills that apply to the whole cycle. By going through the whole Transition Cycle, students are enabled to develop and cultivate the overarching competencies “Acting fairly and ecologically,” “Cooperation in (heterogeneous) groups,” “Interdisciplinary work,” and “Ambiguity and frustration tolerance” (as discussed in [Rieckmann, 2012](#)) and the skills of “Communication” (as discussed in [Inner Development Goals, n.d.](#)).

[Table 1](#) provides an overview of the competencies and skills developed and cultivated in the course.

There are also skills discussed in [Rieckmann \(2012, 2018\)](#) and [Inner Development Goals, n.d.](#) that the course in its present configuration does not seem to sufficiently enable. These include competencies in “Participation,” “Empathy and change of perspective,” “Communication and use of media” (as discussed in [Rieckmann, 2012](#)) and the skills entailed in the notions of “Inner Compass,” “Integrity and Authenticity,” “Presence,” “Appreciation,” “Connectedness,” “Humility,” “Empathy and Compassion,” “Co-creation,” “Inclusive Mindset and Intercultural Competence,” “Trust,” “Optimism,” and “Perseverance” (as discussed in [Inner Development Goals, n.d.](#)). As we point out in this paper’s conclusion, exploring ways of enabling students to develop and cultivate these other competencies and skills could be the focus of future research and educational experiments. Such experiments could both try and reach even more deeply into students’ inner selves and try and go even further in prompting them to engage with the outside world. A caveat is nevertheless also important in this respect. Many of this latter group of skills seem to point towards a fuller, more direct engagement of students with societal ‘challenge owners’, which is of course a key feature of ‘challenge-based learning’ ([Gallagher & Savage, 2023](#)). We however deliberately chose not to do this. Next to practical reasons (e.g., limited size and time of the course, range and scope of the themes addressed), there is also a key educational and ethical reason for this choice: we did not want the students to be too much influenced by the definitions of problems and potential solution directions of societal ‘challenge owners’. With this choice, we aimed to shape conditions for interpretations of the challenge by students beyond the status quo, and to enable their intrinsic motivation to be the main driving force of the learning process from the start. We will return to this important point in the discussion.

3. Research questions, approach, and case

3.1. Questions and approach

Our overarching research question is the following: How can transformative skills be combined in a learning process in such a way that students learn to cope with complex challenges and enable societal transitions? More specifically, how did the educational approach of the “Transition Cycle” contribute to this end? To answer these questions, we take the first three editions of the course as a case study for research. We have therefore employed the method of case-centred action research, a common method in educational research that involves integrating the roles of researcher and educator (Tran, 2009; Gibbs et al., 2017; for an application to research on future-oriented higher education see Hoffman et al., 2021). Action research enables educators and students to gather and develop knowledge collaboratively. In addition, this style of research fits the ‘learning by doing’ and ‘doing by learning’ nature of transition processes (Nevens et al., 2013; Van Poeck et al., 2020), including the transition towards a future-oriented higher education to which we aim to contribute. Both teacher and student experiences and student products and their assessment by teachers constitute valuable data for the action research process (Gibbs et al., 2017). By applying this method we generated a cycle of action and analysis (Tran, 2009), continuously testing and adjusting the educational activities mounted during the first three editions of the course in the light of emergent insights and producing relevant findings addressing our research questions in the process.

3.2. Case

Our case is the “Next Great/Small Transformation”, a 6 European Credit (EC) honors course.¹ There are 12 classes, which take place in a studio setting. There, around 20 students engage in various activities including seminars, (guest) lectures, presentations, an excursion involving a roundtable discussion, independent project work, and feedback moments. The target group of this research is that of honors students of the Free Universiteit (VU) and University of Amsterdam (UvA) who participated in the first three editions of the course. Those students who have an average grade of at least 7,5/10 can enter the honors program. The students involved in this research have a variety of disciplinary and cultural backgrounds (see Table 2 for an overview of their disciplinary backgrounds).

During the course, students form interdisciplinary teams of three to four members and choose a societal transition challenge that concerns health, digitalization, inequality, or environmental sustainability (these are key societal domains where transitions are needed as identified by the University of Amsterdam). In the first three weeks, students define a “What if...?” question and develop a common vision as part of the *imagine* phase (see our description above and Fig. 1). To fire their imaginations during this process, the course features a creative workshop offered by a creative professional. In each edition, we experimented with different kinds of creative workshops. One involved the spoken word, another theatre, and still another science fiction. Box 1 lists the “What if...?” questions developed by all the student teams involved in the course’s first three editions. In the three weeks following the *imagine* phase, students begin the *connect* phase. This entails learning about system thinking as well as developing a system map and stakeholder analysis, which will help them understand why their vision is not (yet) a reality. In the next five weeks, students work on the *act* and *assess* phases which are closely connected. The *act* phase starts with a roundtable discussion at a societal innovation hub named de Ceuveel, involving a panel of “changemakers” from the fields of art, science, activism, and/or entrepreneurship. In the subsequent sessions, students develop an action and monitoring plan for an intervention. Having then received feedback on their ideas, they proceed to execute that plan. Following a presentation of their interventions and initial findings, the last class is used to reflect on the Transition Cycle and the steps it involves. This provides input for the students’ individual reflections and evaluation of the course. At the end of each phase, students deliver draft products (described in the previous section), on which teachers and fellow students give feedback. At the end of the course, students deliver a final group portfolio that describes the outcome of the course’s first three phases, as well as an individual reflection addressing the *assess* phase.

3.3. Data sources

Our core research aim was to assess how our educational approach contributes to the learning of basic skills for dealing with complex challenges and enabling societal transitions. More specifically, we were interested in assessing the degree to which and how the educational approach enabled students to achieve the course’s learning outcomes, which are as follows:

- a. The student can use both imagination and creativity to define a challenge and develop a vision (*imagine* phase)
- b. The student can critically analyze a path toward realizing their vision by developing a system map and stakeholder analysis (*connect* phase)
- c. The student can develop a strategy to address a transition challenge, as well as prepare and execute a simple real-life intervention (*act* phase)
- d. The student can monitor the intervention and critically assess the outcome and transition methodology (*assess* phase)
- e. The student is able to apply scientific literature, coherent argumentation, and relevant methods and tools (all phases)

¹ One European Credit (EC) is equivalent to 28 h of work and includes lectures, tutorials, reading, preparing for tests, taking exams, writing papers, completing assignments, etc.

Table 2
number of students per cohort and disciplinary backgrounds.

	Number of students	Disciplinary backgrounds
Semester 1 (2021–22)	18	Economics/Business Administration, Law, Political Science, Sociology, History, European Studies, Psychology, Computer science, Artificial Intelligence, Media and Information
Semester 2 (2021–22)	22	Economics/Business Administration, Communication Science, Sociology, Political Science, European Studies, Psychology, Beta- Gamma (interdisciplinary program)
Semester 1 (2022–23)	21	Economics/Business Administration, Sociology, Medicine, English Literature, Political science, Media and Information, Media and Culture, Psychology, Cultural Sciences, Beta- Gamma

To fulfill our research aim, we analyzed several data sources, listed below.

1. Group portfolios and teachers' feedback

At the end of each phase, student teams hand in draft products, on which they receive feedback. They process the feedback and merge the different assignments into one group portfolio, which provides an overview of the outcomes of the first three steps of the Transition Cycle. The portfolios also include the monitoring results. The teachers give feedback to and assess this group product (which accounts for 70 % of each student's final mark) by means of a rubric (see Appendix). For this research, the portfolios, and specifically the feedback and rubrics were systematically analyzed to identify the teachers' perspective on the skills students learned to cope with transition challenges.

2. Individual reflections

Students are asked to reflect individually on their intervention and draw lessons for the subsequent continuation of their personal development process, beyond the course. Moreover, as part of their individual reflections, students are asked to draw lessons at three different levels: those of the intervention; system and vision; and process (see the three 'learning loops' in Fig. 1). In addition, they are asked to reflect on the extent to which they have achieved their individual learning goals, which they have determined at the start of the course. The individual reflection is assessed by the teachers (comprising 30 % of each student's final mark), again using a rubric (see Appendix). For this research, we analyzed the outcome of the individual reflections of the three editions of the course to identify patterns in student perceptions of the educational approach and the skills they perceive to have developed.

3. Interactive evaluations

In addition to the formal course evaluation (see below), an interactive evaluation takes place during the last class. For this, we used the "keep, kill, try, add" format. On post-its, students write what they valued about the course and what should be maintained ("keep"), what they didn't value, and think should be withdrawn ("kill"), what they think could be experimented with ("try"), and what they would like to add to the course ("add"). To know how the course could be improved in the next edition, the lecturers then cluster the post-its and facilitate a group conversation about the comments written on them. For this research, we analyzed the

Box 1

"What if...?" questions in the first three editions of the course.

What if ...

- ... housing was affordable and secure for all?
- ... we had ownership over the data we create?
- ... we stopped eating junk food?
- ... cities were run by AI?
- ... we did not crave meat?
- ... there were no filter bubbles on the internet?
- ... everyone had equal access to healthcare?
- ... the internet was a safe space for children?
- ... the street was enjoyable for everyone?
- ... we could eliminate all single-use plastics?
- ... the economy produced equitable outcomes?
- ... AI carried out all repetitive tasks for us?
- ... our buildings were completely smart?
- ... the elderly received the care they deserved?
- ... tertiary education was accessible to everyone?
- ... we consumed more local food?
- ... we could motivate tourists to clean up their trash?

outcome of the interactive evaluations of the first three editions of the course to identify patterns in student perceptions of the educational approach.

4. Formal course evaluations

All three cohorts finished the course by filling in a standardized UvA “UvA-Q” course evaluation, which includes generic questions about, for example, study load and assessment, as well as open questions about what students appreciated and what they think can be improved. For this research, we analyzed the answers to the open questions of the formal evaluations of the first three editions of the course to further identify patterns in student perceptions of the educational approach.

In total 61 individual student reflections and completed rubrics, 17 group portfolios and completed rubrics (for each phase), notes and outcomes of 3 interactive course evaluations, and 3 official course evaluations were analyzed.

Below we describe (Section 4) and discuss (Section 5) the findings of our analysis, complemented by the participant observations we conducted during class activities.

4. Findings

4.1. Student teams' achievements

Our discussion of the student teams' achievements during the four phases of the Transition Cycle is based on an analysis of the rubric guided assessment that the lecturers used to give feedback and grade the final group portfolios (see Appendix). During the course, we used these rubrics (which categorize work as being open for improvement, adequate, or excellent) to evaluate whether the student groups mastered the skills corresponding to each phase. More formative, explanatory comments are also included. We did this both to give students feedback during the course and mark the final products. Here we use these rubrics and comments as evidence of how the student teams were able to master the skills addressed by each phase of the course. Below, we present and discuss the results of this evaluation for each phase. For the *assess* phase, the rubric for evaluating the group portfolio only covers the monitoring of the intervention. The other components of the *assess* phase are evaluated in the individual reflection, which we discuss in the next Section (4.2).

4.1.1. Imagine

For this phase, the rubric entails an evaluation of the description and relevance of the challenge identified by each student group, the quality of their vision, and the extent to which the challenge and vision are connected. We assessed the student groups on their visioning and long-term orientation skills. Overall, we evaluated their work in this phase positively, which indicates that students were able to develop a vision (see also Box 1). However, students struggled to connect their vision with scientific literature on their chosen challenges (which we did not provide but asked them to find), as captured by feedback comments like this: “*Vision nicely explained in a day-in-the-life form (creative format) but lacks argumentation and references to scientific literature. Please try to connect the vision to the challenge – how does your vision relate to the problem of energy waste?*”. Some groups found it difficult to use art-based methods to develop their vision. Although the creativity of some students was activated during the workshops, some groups struggled to translate this creative thinking into the development of a vision.

4.1.2. Connect

The students found the *connect* phase to be the second most difficult of the phases (after *assess*). In this phase, students undertake a system and stakeholder analysis by making maps of the systems and stakeholders involved in their chosen challenges. In general, student groups seemed to be aware of the complexity of the systems they were investigating. Some groups found however it difficult to make that complexity more tangible by mapping it out. In assessing this phase, we found that system and stakeholder maps were often too detailed or too broad, and therefore not useful for the analysis and as a basis for further steps as the following feedback shows: “*Very detailed system- and stakeholders map. You might ask yourself if the system map is maybe too detailed. Would a focus area have been more useful for your intervention?*”. Moreover, some of the system and stakeholder maps contained redundancies (some variables were repeated in different parts of the maps). Lastly, stakeholders were not always included in the map or the connections among the stakeholders mentioned were unclear.

4.1.3. Act

In general, the student groups scored high on the rubric for the *act* phase. Most groups' work for this phase was assessed as adequate or even excellent. In some ways, this is remarkable because they often commented that they found this a very difficult step (see the students' assessment of the course below). Their interventions were well-defined, clear, and thoroughly executed. Students showed that they were more than capable of planning and realizing innovative interventions, demonstrating impressive mobilization skills (sometimes to even their own surprise). However, the student groups struggled to align their interventions with their system and stakeholder analyses. The portfolios did not always make clear how the interventions followed logically from them. Alternatively, this might be the result of poor argumentation in the portfolio. Students also found it hard to define in advance what they expected to learn from the intervention as showed in the following feedback: “*It is hard to predict if this intervention would have the expected results – this is something you could have taken into account (what was your goal and when would you know you made a difference?)*”. For some groups, the method of monitoring eventually proved unhelpful when it came to assessing the intervention (for example, some groups employed a quantitative survey when a qualitative approach would have been more suitable).

4.1.4. Assess (group component)

Of all the phases, the students found the *assess* phase (which for the group component essentially amounted to the monitoring of the intervention) the most difficult. The variables or concepts that some groups used to monitor the impact of their intervention did not correspond with their vision. In such cases, the students could not monitor whether the intervention contributed to realizing the visions they had formulated in the first phase of the cycle. In some cases, the monitoring was poorly structured and unclear. For example, the portfolios sometimes lacked a clear description of what had been learned during the monitoring process. Sometimes they described the monitoring process but neglected to include its results. Although it would therefore be too much to say that the students mastered evaluation skills, they developed these skills. By the end of the cycle, the students realized what had gone wrong or what they could have done differently, demonstrating a learning mindset. As one team for instance remarked: *“We failed to consider from our ivory tower of academia that the people actually experiencing these situations in their neighbourhoods did not have the same knowledge we did and did not view gentrification in the same manner”*. By reflecting on the Transition Cycle process and what they learned, they showed that they were able to learn from mistakes and had become aware of their own preconceptions. The students elaborated upon these developments in their individual reflections, which we discuss in the next section.

4.2. Student individual reflections

Here we summarize the findings from the students' individual reflections (see Appendix for the feedback and assessment rubric).

4.2.1. Did students think that during the *imagine* phase they learned basic skills for effecting transitions?

In assessing this phase, we encountered a mixed picture. Some students had found it useful to be creative and not restrict their ideas. Other students thought that their group's visions were too broad and/or too radical. They had learned to use their imaginations but struggled to think outside of the box and imagine a different world being realized over the long term. They also mentioned that the radicalness of the visions presented an obstacle later in the cycle when they had to think about translating their ideas into interventions. The students' main critique of their own practice during this phase was that their visions were not inclusive and jarred with some of the perspectives held by people in their target group. This is illustrated by a remark made by one of them: *“We over-estimated how many people would actually be on board with our vision.”* Very few students suggested that the creative workshop had enabled them to develop their visions, though some mentioned that they developed their creative skills.

4.2.2. Did students think that during the *connect* phase they learned basic skills for effecting transitions?

The students found making system maps very useful. At the same time, developing system maps made them realize the complexity of their challenges. They mentioned that this form of system thinking helped open their eyes to the bigger picture and think more critically. The students also noted that they had learned to analyze the system map to identify opportunities for change in the system.

4.2.3. Did students think that during the *act* phase they learned basic skills for effecting transitions?

In the beginning, students were somewhat skeptical about the prospect of developing and implementing an intervention, mainly because it was an entirely new kind of requirement, and they did not know what to expect. However, afterwards many felt that they had learned multiple things they would not have through less engaging activities, such as interviews or a survey. By realizing an innovative experiment, students learn by doing, that is, apply their knowledge in practice, connect with people, and improve their group-working skills. Moreover, the *act* phase helps foster an inclusive mindset: students felt that they gained a deeper understanding of how different groups of people thought about the subject matter that their projects addressed. The discussion with changemakers at the Ceuvél was crucial for several students, making them realize how 'dreaming big' can feed through into targeted, local, and contained actions ('acting small').

Other results were more mixed. One group of students felt empowered by performing their intervention. Financial or other resources are not necessary, they held, to start a transition process. *“I have become convinced”*, one student wrote, *“that there is more ground to be won and many people seem to be willing to change if they are provided with the right tools or circumstances.”* These students thought they could do something outside of the university and were motivated to realize the change they could make. They were proud and hopeful about their capacity to make a small difference. Another student wrote: *“it was really nice to see how the intervention also gave me, personally, a sense of self-efficacy when it comes to improving the life for the elderly.”* The students became aware of their agency. Another group of students were instead discouraged by the insight the course gave them into how difficult it is to make even a small change. They felt they had too little time and/or resources to carry out an intervention adequate to the challenge's complexity. They realized how hard it is to change something in a complex system.

4.2.4. Did students think that in the *assess* phase they learned basic skills for effecting transitions?

In this phase, students evaluated their intervention to establish whether it had brought about change. Most students indicated that the structure of the process (the Transition Cycle's different phases) was very helpful. Students thought that they had learned what it means to fail and that there is much to learn from failing. They realized the importance of a flexible mindset, which allows one to step back and adjust or revise earlier ideas or assumptions.

An important skill in this phase is the ability to reflect on one's learning process. Overall, the individual reflections prove that students can reflect on their work in a critical and open manner. Some students expressed increased self-awareness beyond the course, one writing that: *“this know-how can be used in not only academic and professional life but in personal development as well.”*

4.3. Students' assessment of the course

In addition to the course's outcomes, we were interested in students' assessment of the course. We wanted to know what they most appreciated, what they most struggled with, and their main suggestions for improving the course. We see this as evidence for what worked, what did not work, how and why, in the educational approach according to the students. We derived these perceptions from two sources. First were the formal, anonymous evaluations of the course (the UvAQ forms, compulsory for all UvA courses), specifically their answers to the open questions asking students what they especially appreciated about the course and for their suggestions for improvement. Second were the additional "keep, kill, try, add" evaluations that we held in class during the last session (see 3.3 Data sources).

The aspects of the course that students appreciated were consistent across its first three rounds. They appreciated its overall structure (captured by the Transition Cycle) and how it was organized around a clear process (the steps in the cycle). They valued the room for creativity and personal experience that the course offered within that framework ("*The freedom in thinking!*", one student remarked, "*It did not feel like a course!*"). Many appreciated how it combined the radical ('dreaming big') and the practical ('acting small'), one student describing the course as a "[g]reat imaginative opportunity to do something radical and practical for a change!". And most students (though not all, see below) appreciated that the course was challenging. "*I liked that the course was challenging*", one remarked, "*making us learn to be the change we want!*" As for specific activities, students particularly valued the workshops with external guests, especially those from professional practice (e.g., the changemakers panel at the Ceuvel). They also appreciated the opportunities for collaborating in student teams and debating issues with other students. Finally, they valued the overall approach of learning through feedback, both from the lecturers and their peers. Indeed, in each round they demanded that we strengthen this aspect of the course—see the suggestions below.

Students especially struggled with our expectations of them during the course, particularly regarding their intervention. How were they to juggle the requirements of feasibility and radicalness; combine learning with the imperative to effect change; and relate their interventions and visions? Some students also struggled with our overall expectations of them (did they need to be academic or practical in this course?). Students felt that they did not have enough time to conceive, plan, and carry out their interventions and that the deadlines were too tight. They also struggled with the role of theory. They thought they were offered too much transition theory but too little domain-specific theory. As for specific activities, some students struggled with the creative workshops, whose relatively open-ended, creative modes of learning they found difficult to reconcile with the more structured and analytical approaches to which other courses had familiarized them.

Students made several suggestions as to how the course could be improved, mostly in response to their appreciations and struggles. They recommended clarifying what was expected of students, especially when it came to the intervention. Some students suggested scaling down the course's overall ambition, others that we should provide (even) more feedback, guidance, and examples, particularly on the intervention and system map. They also asked that more time be allocated to the intervention. Students were divided as to how their difficulties with theory should be tackled. Some suggested that there should be less theory and more practical input, others that there should be more domain-specific theory (this divergence reflected an underlying division between the view that the course should become fully applied and another, for which it should be fully academic). Another recommendation in this respect was that theory and assignments could be more closely aligned. Finally, in terms of activities, students suggested (even) more field visits and/or classes at unusual locations. A few students also demanded more individual and fewer group assignments. Perhaps surprisingly, only once, in the third iteration of the course, was it suggested that we directly involve stakeholders in the course and engage real clients as part of their assignments (on this, see [Section 5.3](#) in discussion below).

5. Discussion

Overall, our findings indicate that the course's educational approach has by and large enabled students to achieve the learning outcomes. While there are differences between phases and students, student teams have produced meaningful products during all four phases of the Transition Cycle. Furthermore, students' individual reflections demonstrate that they have internalized the course's key messages; at the very least they have begun developing key skills. The findings also reveal some tensions, some of which seem inherent to the task of fostering change in the face of complexity. It seems possible to address others, though, by adapting the educational approach.

5.1. Insights about visioning

During the *imagine* phase, there appears to be a tension between the need to be visionary and the need to be inclusive. Originating a vision is beneficial for students because it gives them agency over the learning process. Starting with their own "What if ...?" question and projected solution, they note, has a positive effect on their efforts and motivation. However, students also seem to assume that their vision is consensual, something with which everybody or most people in society will agree. Unlike other approaches, such as design thinking (Luchs, 2015), this course puts students in touch with the 'real world' relatively late. During the *act* phase, they might find out that their vision is not shared by those involved in their intervention. It makes students question their vision's inclusiveness. To address this, an 'empathizing element' could be added to the *imagine* phase (e.g., an exchange with some from their target group). Nevertheless, we believe it important to continue granting students the freedom to develop their own vision, which boosts their motivation and stimulates their creativity (the alternative might be to adopt the vision of an external stakeholder or 'challenge owner' simply and uncritically, as in other, more conventional practice-oriented courses we teach). This catalyzing effect was key to our choice to start the

cycle with a relatively open *imagine* phase (see also [Section 5.3](#) below).

A second observation is that, although our intention in offering the students artistic workshops was to enrich their imaginations, students mentioned them relatively little in their individual reflections and course assessments. Furthermore, some artistic methods seem to work better than others when it comes to opening students' imaginations to possible futures in general terms (e.g., imagining a fantastic world through guided visualization and freehand drawing as opposed to expressing their vision through a spoken word creation). Even in these more successful cases, however, it proved difficult for students to translate this newfound openness to the future into their own, domain-specific visions (i.e., it seemed that the artistic exercise did not significantly affect their original "What if ...?" questions). This is therefore an area warranting further experimentation and research.

5.2. *Insights about acting in the face of complexity and uncertainty*

We live in an extraordinary time, marked by persistent problems and entrenched systems on one side, and transformative grassroots movements across many different domains on another. As lecturers, we feel that the first two steps of the Transition Cycle do justice to both realities. In the *act* phase, however, we observed that students tend to calibrate their interventions to impact individual behavior or awareness instead of challenging powerful stakeholders or institutions. This is understandable in terms of feasibility but might mean overlooking ways of changing a given system more profoundly ([Meadows, 2008](#)).

In our course, we aimed to motivate students to experiment with acting to shape the future while not losing sight of their challenges' complexity. This is naturally extremely difficult, but there were moments when it seemed at least possible. For instance, the panel with changemakers made many students realize that the apparently impossible combination of 'dreaming big and acting small' is possible and that agents of change operating in diverse fields adhere to this maxim. Obviously, students are not going to realize a complex transition challenge in a 6 EC course, but they can at least begin to understand and experience what that might entail. Importantly, during the course we continually stress that this is just a first iteration of the Transition Cycle and that further iterations should follow without end. The individual reflections show that at least some students have internalized the learning-by-doing and doing-by-learning attitude, which is both engaged and reflective, fostered in the course.

In our course, goals and products are not closely defined in advance. In the data, we found that one group of students feels somewhat discouraged by this open-endedness. Their longing for certainty leaves little room to attempt to influence change, a task that is deemed too complex. We feel that students who express hopefulness are better able to embrace uncertainty. They indicate that they can learn from failure and show vulnerability (by daring to admit they do not know everything, for example), as well as reflect critically on the cycle and their role in it. In this respect, students' personal attitudes seem more determinant than their (disciplinary) backgrounds (i.e., we could not trace these different attitudes back to the different programs in which the students were enrolled). An interesting question that follows from these reflections, of course, is that of how a personal ability to embrace uncertainty could be cultivated during and beyond a course, which identifies yet a key area of further experimentation and research.

5.3. *Insights about connecting the course with practice*

Although it was not highlighted by many students, one important issue emerging from the analysis relates to our choice not to involve societal stakeholders directly in the course (other than in most "challenge-based" teaching there are no 'clients' for student work). In part, this is a pragmatic choice, for it would be difficult to establish enough partnerships to cover the whole range of themes touched on in the course. However, the choice is also motivated by a desire to ensure that students feel free to identify their own challenge and vision. Involving stakeholders, we acknowledge, would have important benefits (e.g., increasing the societal relevance of student work and providing students with more insights from practice than the course currently does). However, we would not want these benefits to come at the cost of narrowing the range or scope of students' initial visions. The only way to resolve this dilemma, arguably, would be for also stakeholders to be open to the definition of both problems and solution directions, and effectively join the students as co-learners (see for a reference [Hoffman et al., 2021](#)). This seems a direction particularly worth experimenting with and researching in the future.

5.4. *Insights about connecting the course with theory*

A last apparent tension is that between the generic, process-focused theories of transition offered in the course, and the domain- and challenge-specific theories we ask students to identify. We believe that mobilizing students' own capacity to gather knowledge is important. More pragmatically, we are unable to cover the full range of domains and challenges that they choose to address. Nevertheless, some students demand more guidance while others do not fully appreciate transition theory's relevance to the course. This indicates a need to devote more attention to showing students how specific transition theories relate to specific assignments and why they should feel responsible for contributing other theories, a fourth and last area of experimentation and research.

6. Conclusions

In this paper, we sought to explore how to develop and cultivate transformative skills in an integrated learning process aimed at enabling university students to cope with complex challenges and foster societal transitions. For this, we developed a Transition Cycle, which we built into the design of an honor course. The paper assesses the student work produced from a teacher perspective in the first three editions of the course, as well as students' experience of the course in search for evidence of the workings of the educational

approach. Although our findings and discussion demonstrate that the approach succeeded in several respects, it also highlighted several core tensions, some of which seem inherent to its very aims. Others can be addressed by adapting the approach in the future. Most importantly, we found that the course’s overall structure, which centers on the Transition Cycle, is both robust and flexible, providing a framework that seems applicable for educators in other contexts. As for specific steps in the process, our findings indicate methods that work (e.g., learning by doing and learning through feedback) and others that need further experimentation and refinement (e.g., the application of art-based methods in the *imagine* phase and involvement of societal stakeholders, see Section 5). Particularly the latter identify key areas for further experimentation and research.

CRedit authorship contribution statement

Luca Bertolini: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Debby Gerritsen:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Katusha Sol:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

None.

Data Availability

Data will be made available on request.

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Appendix. : Assessment and feedback forms

Group portfolio (used to give feedback on draft versions of each component of the portfolio and assessing the final product).

Criteria	Open for improvement	Adequate	Excellent	Feedback
<u>Imagine:</u>				
Definition of the challenge				
<ul style="list-style-type: none"> • The challenge is well-defined and clear; • The definition of the challenge is supported by critically reviewed literature and comprehensive argumentation; • The (societal) relevance of this challenge being addressed is clear. 				
Vision quality				
<ul style="list-style-type: none"> • The vision is well-defined and clear; • The vision is supported by critically reviewed literature and comprehensive argumentation; • The vision is inspired by a creative process and product; • The vision is based on or connected to the described challenge. 				
<u>Connect:</u>				
<ul style="list-style-type: none"> • The system is well-defined and clear; • The system analysis establishes a complete overview of the relevant variables and stakeholders involved; • Connections between stakeholders and variables are clear. 				
<u>Act:</u>				
<ul style="list-style-type: none"> • The intervention is supported by critically reviewed literature and comprehensive argumentation; • The intervention adheres to the challenge definition, vision, and system analysis; • The intervention is clear and feasible; • Expected results (impact) are clear and likely to occur; • It is clear what can be learned from the intervention; • The evaluation method is suitable for assessing the intervention. 				
<u>Assess:</u>				
Outcome monitoring:				
<ul style="list-style-type: none"> • The collected data are useful in assessing the intervention; 				

(continued on next page)

(continued)

Criteria	Open for improvement	Adequate	Excellent	Feedback		
<ul style="list-style-type: none"> The assessment of the intervention is accurate. Final presentation: <ul style="list-style-type: none"> The presentation demonstrated a clear grasp of the problem; The presentation used evaluation outcomes to show clearly how the intervention has helped address the problem. 						
Individual reflection (used to assess the final product).						
Intervention	1	2	3	4	5	Remarks
What did you learn from the intervention?						
What worked and how can that be built upon in a follow-up intervention?						
How should the follow-up interview be similar and different? Why?						
Vision and system	1	2	3	4	5	
What did you learn about your vision and system analysis from the intervention?						
Does the vision need adjustment? How and why?						
Does the system analysis need adjustment? How and why?						
Process	1	2	3	4	5	
What did you learn about the process of developing a vision and strategy, analyzing a system, and devising and implementing an intervention?						
How could the process have been improved? What could you have done differently and why?						
What could the lecturers have done differently and why?						
Reflection	1	2	3	4	5	
To what degree have you achieved these goals? How have you achieved what you have?						
Following this experience and the insights that have emerged from it, on which learning goals do you want to focus on in the future?						
Why these goals and how will you go about achieving them?						
Other	1	2	3	4	5	
Deadlines were met (learning goals, reflection report), course literature was used, and the student's writing remained within word count.						

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