IO4 - Dual sustainability - within Transport and logistic in VET

Road map for teachers: How to organize a dual sustainability innovation course in VET-training in close cooperation with the professional sector.

Introduction:
The dual sustainability innovation course is a didactical solution to the challenge of how to integrate real world perspectives from the professional sector into the VET learning context, in ways that are dually meaningful for students and companies. Our roadmap can be used generically across VET-training programs and training levels. The innovation course can be organized across difference subjects within the same training program.

Learning outcomes: Innovation knowledge, -skills, and -competences:
1. The student is familiar with the concept of 'innovation', meaning a problem specific solution that is new, useful, and can be made available for further refinement towards realization/utilization.
2. The student can relate 'innovation' to the apprenticeship (on-going or forth coming), for instance to a specific system at the company (e.g., logistics management, quality, "Lean").
3. The student can actively contribute to assessing and applying creative methods for problem solving and the development of new activities, processes and/or business areas.
4. The student can use tools and methods that are part of, and promote, change process within their own branch of work, that feed into a specific company's strategy, policy and action plans, notably regarding sustainability and green transitioning.
5. The student can explain his or her own role in a change process and actively take part in the change of organization and structuring of workflows, problem-handling processes, and other dynamic processes relevant to the student's job function.

Student-description of the innovation course and learning objectives:
- During this course, you will work with an innovation process, and you will gain knowledge of the 17 Sustainable Development Goals.
- You will get to work with a self-chosen or company defined, real world sustainability challenge within your VET-branch, and you will develop an innovative solution to this challenge together with fellow students.
- You will work in a project-organized learning environment. You will develop and practice skills within collaboration, communication, creativity, and critical thinking. You will learn how to pitch your idea.
- The innovation process will take you through three phases conducted in three working spaces: The Creative Working Space, where you will brainstorm ideas; The Innovative Working Space, where you will critically assess your ideas, and pick and qualify the most relevant idea for a solution to the challenge; and The Entrepreneurial Working Space, where you and your group will prepare a visual presentation and an oral pitch of the solution for an innovation event on the last day of the course.
- Depending on the set-up at your school, either teachers, school management or company representatives will give the groups feedback on the solutions presented. A winning solution may be selected.
- We all learn in different ways. Throughout the innovation course, there will be apt opportunity for repetition and iteration. You and your group can choose to go back and forth between the ideation and qualifying phases and choose how fast/how deep you want to work in each 'working space'.

- As you go along, your teacher(s) will facilitate the groups' innovation process with critical and encouraging questions.

Pedagogical and didactical considerations:

- The sustainability challenge(s) must come from the professional sector. Ideally the challenge or case is set by a specific company or branch organization, but it can also derive from desktop-research of sector-specific issues regarding sustainability and green transitioning. This research can be carried out by the teacher or set as a group-assignment.
- The challenge must address one or several of the 17 Sustainable Development Goals.
- The didactic design of the Click on Climate innovation course is an adaption to vocational training of the Danish 'KIE-model', which is a structured innovation method developed for general high school programs by Ebbe Kromann-Andersen and Irmelin Funch Jensen. The KIE-model is aimed at triggering the students 'optimal frustration' – a working mode that balances between feelings of omnipotence and powerlessness, where the tasks alternatively match and challenge the skills of the group as they learn to master the principles of innovation.
- The KIE-model innovation process takes the students through three phases or working spaces: A creative working space (ideation); an innovative working space (selection and qualification) and finally an entrepreneurial working space (presentation). Variants of these basic phases of an innovation process - ideation, testing and adjusting, and presenting - can be found in 'Design Thinking' and many other entrepreneurial and innovation models. Each phase involves different working modes and mindsets. The facilitating role of the teacher(s) in each working space is mapped out in the check list below.
- Create clear, visual transitions between each working space. Remind the students what phase of the innovation process they are in, and which principles and goals apply to the specific working space.
- Additionally, the students can carry out analysis of target groups and their needs. Such analysis can be added to the innovation process prior to ideation or can be integrated into the phase of picking and qualifying ideas. If there are any pre-set solution requirements these should be communicated to the students as creative obstacles. Innovation differs from more open-ended invention in the sense that the solution is tailored to a specific challenge.
- The final presentation should display the solution's innovative aspects, expected impact and any possible potential for transferability to other challenges.
- Students will often find external feedback from companies and VET-committee members highly motivating. However, depending on how far the students are in their training, you may prefer to practice the feedback situation solely with teachers, and invite representatives from the school management to give the students feedback at the final presentation and contribute to selecting a winning solution. Feedback requires assessment criteria and a template.
- The innovation course can be organized in various time frames. However, time must be balanced with the complexity of the challenge, the degree of research, the scope of the solution, and the students' learning prerequisites.
- Make use of makerspace/workshop facilities at the school for mock-ups and prototypes to ensure tactical and practical learning methods throughout the innovation course.
- Allow for at broad variety of analogue and digital presentation modes.

Check list:

Communicate the purpose and the plan for the course to the students.
Go through the student description of the innovation course. Explain concepts that are specific for innovation. Allow for questions but also encourage the students to embark on 'learning by doing'.

Group formation principles
- Diversity of all kinds promotes ideation.
- Groups of 5-6 students depending on the size of the class.

Introducing the challenge.
- Present the company-defined sector challenge(s) or let the students investigate their own sector challenges.
- Present any pre-set solution requirements (or introduce these later in the innovation process)
- Select relevant SDG(s)

Facilitating The Creative Working Space.
Explain the following ideation principals to the students:
- Generating many ideas is better than few ideas. Prioritize quantity and impulsivity above quality and contemplation at this stage of the process.
- Wild ideas are welcome! They inspire the group to think 'outside the box' and look at the challenge from many sides.
- The students are allowed to research if existing technologies in and outside of their educational field can be used as a solution to the problem.
- Do not assess or judge each other's ideas when the group is in the creative mode.
- Dare to go along with other group members' ideas, build upon the ideas of others. Say 'yes, and' instead of 'no, but'. Good and safe collaboration strengthens the development of ideas.
- Be visual and articulate your idea to the group.
- Stay focused on the challenge.
- One conversation at a time
- One idea pr. post-it, describe idea with few words and write with a marker, so the rest of the group easily can read the idea.

Role of the teacher:
- Continuously encourage the students to say yes to the new and unexpected, be playful, spontaneous, and not be afraid to fail. Consider using pedagogical exercises like energizers and ice-breakers!
- Help keep the brainstorm going by asking the students to imagine themselves in other professions and situations: what ideas would an astronaut come up with to this challenge? A nurse? An elderly person? Etc.
- Provide post-its and markers.
- Provide boards for post-its or let the groups work at tables.

Facilitating the Innovative Working Space.
Explain the following principals for qualifying and selecting ideas to the students:

- In The Creative Working Space, we aimed at generating lots of *creative* ideas. Now it is time to assess critically, and constructively which ideas would make a good solution to the challenge.
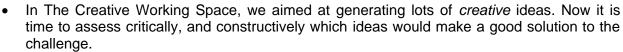- The task for the group is to select, prioritize, systematize, and value the ideas. Use masking tape to create scales or axes on the board or table, so post-its can be categorized, grouped, and assessed.
- To select an idea that can be developed into a final, innovative solution, the group needs one or several assessment criteria. These can be defined by the group, teacher, or the company that set the challenge. Criteria should be based on:
  - The chosen SDG
  - Costs and benefits regarding different aspects of sustainability
  - Any pre-defined, contextual demands to the solution
  - Knowledge about stakeholder perspectives (company, customers, users or other target groups/audiences). What would would create value (not only economic value) from a stakeholder's point of view?
  - Level of ambition: Is the group aiming at radical or incremental innovation? A long-term or short-term solution? Completely rethinking/transcending or simply improving an existing solution? Is the aim to create new demands, new behaviors or meet existing needs?
  - Is the idea realizable in terms of i.e., economics, legislation? Does the solution depend on future invention of new technologies? Etc.
- Use a point-system to select the best idea(s). If the group uses several criteria, they need to give each criterion different weight (in percentage)
- Refine and design the solution to the demands of the challenge.

Role of the teacher:
Continuously encourage the students to:
- Assess the ideas, not randomly choose, or jump to a solution. To present and discus pros and cons in the group.
- Be open-minded and challenge 'usual' assumptions.
- Be prepared to 'kill your darlings' if your idea does not adequately solve the challenge.
- Be realistic.

The Creative Working Space is playful, and ideation is stimulated by tempo. The Innovative Working Space involves many calculations and requires concentration, so allow the group to take short breaks. If the students are not satisfied with their pool of ideas, they may choose to return shortly to The Creative Working Space and research/brainstorm more ideas.

Facilitating The Entrepreneurial Working Space
Explain the following entrepreneurial principals to the students:
- Now it is time to present/pitch the solution set into practice to a third party. The task for the group is to convincingly show how the solution is useful, and to whom.
- the group needs to organize the preparation of a group presentation. Tasks need to be clarified, planned with deadlines, and delegated fairly.

Role of the teacher:
- Encourage the students to be extrovert, action-oriented, and to take responsibility and ownership for the output.
- The groups may need help with organizing their tasks.

- Remind the students to be loyal to the group's decisions made in The Innovative Working Space.
- If the groups are competing, ensure that they have the same conditions for presenting their solutions regarding access to materials and devises and time for presenting.

If it becomes apparent to the group that the solution needs further qualification before it is ready for presentation, the group can choose to return shortly to the Innovative Working Space.