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Towards a Creative and Authentic Learning Environment Through Creative Steps 2.0

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In universities in the Northern and Arctic regions, overcoming physical distance is one of the key challenges to developing and providing a high-quality education. The coronavirus 2019 pandemic created an urgent need to develop online and blended learning environments to support higher education (HE) at the present time and during possible future pandemics. Over the past two decades, the need for models and principles for creative and authentic online learning environments has been acknowledged (e.g., Reeves et al., 2004). This chapter reports on design research in which *Creative Steps 2.0 (CS2.0)* was developed to overcome the challenge of distance by modelling creative and authentic learning in blended environments in HE. CS2.0 is a response to the need to develop models and practices that meet the challenges of modern globalized working life and business, which require a creative and innovation mindset and the ability to work across distances (Arkko-Saukkonen et al, 2020; Arkko-Saukkonen & Krastina, 2016).

The promotion of student creativity has long been a pedagogical priority. For example, Ausubel et al. (1978) described “teaching for creativity” as a “flourishing trend” in education (p. 584). Approximately 40 years later, the need for the promotion of creativity in education policy (e.g., Tarjanne, 2020) and research, especially to support future working life (Shaheen, 2010), has been highlighted. Universities of applied sciences have identified innovation competence as a basic working life skill. Creative work, which includes brainstorming and product development in multidisciplinary teams, is considered crucial for promoting innovation competence and entrepreneurial thinking (Hero & Lindfors, 2019; Keinänen & Kairisto-Mertanen, 2019; Poutanen & Stähle, 2014; Zhou & Luo, 2012).

University–business collaboration has been identified as a strategy to enhance innovation (Hero & Lindfors, 2019) and innovation competence (Hero, 2019; Keinänen & Butter, 2018; Keinänen & Oksanen 2017). Collaboration often culminates in the integration of teaching and research, development and innovation. Various factors such as “the right people, the right supporting, motivational and task contexts, and effective

social and cognitive processes” in team collaboration can increase innovation (Paulus et al., 2012, pp. 348). Collaboration, especially in innovation and development activities, is a key competency for a working life (Arkko-Saukkonen et al 2020). Online tools and environments enable international collaboration across geographical borders. They play a key role in the Arctic (Lipatov, 2014).

This chapter discusses the second iteration of CS2.0, a model for creative and authentic learning in blended environments in HE. CS2.0 was designed, implemented, and refined as part of a larger research project (see Arkko-Saukkonen, 2017; Arkko-Saukkonen et al., 2020). The focus of this chapter is the *student experience* and the implications for the refinement of the model. At the core of CS2.0 is the pursuit of creative and authentic learning activities in online university–business collaborations.

Previous Research

Previous research on *university–business collaboration* has focused on settings in which “working and learning are integrated as students work on assignments from clients or other stakeholders in the community” (Cremers et al., 2016, p. 310). Cremers et al. (2016, p. 310) designed, implemented, and evaluated a “hybrid learning configuration” for senior secondary vocational institutions and universities of applied sciences in collaboration with companies. On the basis of the students’ learning experiences, seven principles were developed to guide the design and development of such learning settings: (1) foster authenticity, (2) create a learning community, (3) use diversity, (4) interlink working and learning, (5) facilitate reflexivity, (6) enable organisation, and (7) enable ecology. Hero and Lindfors (2019) studied the learning experience in a multidisciplinary innovation project at a Finnish university of applied sciences. With the help of faculty, the students were expected to create novel solutions, products, services or processes to resolve challenges submitted by companies. This provided opportunities for personal development and participation in multidisciplinary collaborations to solve problems. The students’ negative experiences were related primarily to unevenly distributed workloads, task-related uncertainty, and inadequate input from the companies.

Recent studies in Finland have focused on *innovative learning* and *creative development* at universities of applied sciences (Hero, 2019; Kairisto-Mertanen et al., 2012; Keinänen, 2019). Keinänen et al. (2018) developed a self-assessment tool for measuring university students’ innovation competence in an authentic learning environment (see also Keinänen, 2019; Keinänen & Kairisto-Mertanen, 2019). The tool measured the

following competencies: creative problem solving, systemic thinking, goal orientation, teamwork and networking.

Keinänen and Butter (2018) tested a novel tool to assess the role of authentic learning environments in the development of innovation competence through university–business cooperation. Students identified university–business cooperation as contributing to the development of innovation competence and working life skills. The application of a self-assessment tool in business collaborations taught students to reflect on and evaluate what they had learned, to practice collaboration skills, and to discover the role of learning in creative and innovative work through trial and error. In a systematic literature review, Hero et al. (2017) studied individual innovation competence. The results suggest that innovation and collaboration require flexibility, an achievement orientation, adequate content knowledge, motivation and engagement, self-esteem and self-management, and a future orientation, as well as creative thinking, social interaction, and project management skills.

Hero (2019) developed an innovative pedagogical approach that was applied to the study of students' development of innovation competence in a multidisciplinary innovation project. She suggested the following steps, each involving assessment, for promoting the development of innovation competence: orientation and theory, the development of creative ideas, future orientation, concepting, prototyping and testing, implementation, and entrepreneurship planning. In a study of students' development of innovation competence, Keinänen and Oksanen (2017) concluded that attention should be paid to creating a psychologically safe and encouraging atmosphere (see also Paulus & Dzindolet, 2008).

Authentic learning in online environments has received a great deal of attention. Teräs and Herrington (2014) applied the elements of authentic e-learning identified by Herrington et al. (2010) to educational design research focused on an online professional development program. They concluded that the elements of authentic e-learning are very useful for both design and evaluation. Especially at the beginning of the learning process, students may experience difficulties with some of the elements. Therefore, guidelines were developed to enhance scaffolding during the learning process. Lepisaari et al. (2013) applied the elements of authentic learning identified by Herrington and Oliver (2000) to the evaluation of online courses. They found that the “multiple roles and perspectives” and “scaffolding” elements were achieved; however, the “collaborative construction of knowledge” and “authentic assessment” elements posed challenges (Herrington & Oliver 2000, pp. 16–17, 19–20).

LaBeouf et al. (2016) found that international online collaboration in HE can be problematic because of time zone differences. Thus, planning, scheduling, and the establishment of clear guidelines for collaboration can support group activities (see also Arkko-Saukkonen, 2017). Studies on international university–business collaboration have highlighted the importance of face-to-face communication in addition to online collaboration (Arkko-Saukkonen, 2017). Paulus et al. (2012) argued that some creative development can occur online; however, decision-making is more effective when done face-to-face.

Design Framework

Creative and authentic learning environments

In the conceptualization of a *creative and authentic learning environment*, the present study relied on (1) the design principles, elements, and factors in creative learning (Philip, 2015; Poutanen & Stähle, 2014) and (2) the nine elements of authentic learning and learning environments (Herrington & Herrington, 2006; Herrington et al., 2003, 2010). In the present study, a learning environment refers to curriculum design and the organization of material, geographical, social, and virtual resources for teaching and learning (Cleveland & Fisher, 2014; Vuojärvi, 2013). The role of the teacher is to coach, support and encourage students during the creative work process (see Arkko-Saukkonen, 2017; Herrington et al., 2010).

Poutanen and Stähle's (2014) focused on creativity in short-term, self-directed student groups tasked with real-life societal challenges. They identified the following seven factors as important for achieving creativity in teamwork: (1) information and knowledge about the case, (2) frequent feedback, (3) organization of work, (4) communication skills, (5) group mentality, (6) use of internal and external assistance, and (7) deadlines and time limits. The focus is similar to that of the present study, in which a 10-day workshop was conducted. These factors can also be applied to authentic learning to support creative activity because the foundation is collaboration.

Philip (2015, pp. 257–259) identified the following approaches to fostering creativity:

1. framing the vocabulary around concepts such as “explore”, “experiment” or “play”;
2. realizing that instead of “teaching creativity”, the aim is to “set up the conditions for creativity”;

3. fostering habits of creativity, e.g. developing domain specific knowledge, tools and techniques, and appreciating the creative process;
4. finding generative spaces for play, which can be virtual, physical, affective or cognitive, individual or team-based;
5. creating pathways for creativity, e.g. through using constraints such as time, place and task to frame creativity and setting “parameters within which students have broad freedoms, but are not overwhelmed by choice”;
6. using holistic assessment strategies of creativity;
7. empowering students to develop “a sense of agency about their capacity to be creative thinkers, learners, makers and researchers”;
8. using a whole person approach, e.g. through developing students’ and tutors’ awareness of the emotional dimensions and phases of the creative process;
9. providing leadership and guidelines for creative groups;
10. teaching and leading by example, and by adopting a facilitative teaching style;
11. using analogue and digital technologies that best meet creative needs; and
12. strengthening creative leadership and supporting a climate of creativity.

Table 1 presents the conceptualisation of the creative and authentic learning environment to design and evaluate CS2.0. The conceptualization is based on the following nine elements of authentic learning suggested by Herrington et al. (2010): (1) authentic context, (2) authentic tasks, (3) access to expert performances and the modelling of process, (4) multiple roles and perspectives, (5) collaborative construction of knowledge, (6) reflection, (7) articulation, (8) coaching and scaffolding, and (9) authentic assessment. Additional elements of creative learning environments have been integrated into the conceptualisation.

CS2.0 provides a model for creative and authentic online and blended learning environments in HE. The model is informed by the previously discussed theories of creative and authentic learning. CS2.0 describes the coaching, learning, and co-creation processes and resources needed for a creative and authentic learning environment that fosters the development of innovation competence in online and blended environments in HE (Figure 1). The model was iteratively designed, implemented, and refined in previous studies by Arkko-Saukkonen (2017) and Arkko-Saukkonen et al. (2020).

1) Authentic context: The authentic context is built on real-life tasks or assignments from work environments to enable students to practice working life skills. Professional practices guide the curriculum, and the learning environment preserves the complexity of the real-life setting (Herrington & Herrington, 2006).

2) Authentic and creative activities: Complex, ill-defined activities provide opportunities for professional growth, as well as engagement in complex communication and the acquisition of higher-level skills (Herrington & Herrington, 2006; Keinänen & Butter 2018; Kivunja 2014; Lombard, 2007). Fostering creative habits involves developing students' domain-specific knowledge, tools and techniques, as well as appreciating the creative process and finding generative spaces for play (Philip, 2015).

3) Access to expert performances and the modelling of processes: The learning environment should make real-life situations accessible by providing students a "model of how a real practitioner behaves in a real situation" (Herrington & Herrington, 2006, p. 5). In addition, students should have the opportunity to see experts' strategies for solving similar problems and to compare them to their own.

4) Multiple roles and perspectives: Working with more than one person creates opportunities to work on a task from different perspectives and starting points. In addition, the exchange of ideas generates common thinking and solutions to current challenges (Herrington et al. 2010). It is important to enable students to examine problems from the stakeholders' perspectives (Herrington & Herrington, 2006). The variety of roles in group work has been acknowledged as having a positive effect on innovation activities (Hero & Lindfors, 2019). Diversity refers to not only multiple professional roles and perspectives but also multiculturalism and a shared learning culture and understanding of the needs of others from different cultural backgrounds (Leppisaari et al., 2013; Teräs et al., 2014).

5) Collaborative and creative knowledge construction: Collaborative knowledge construction can be encouraged through appropriate incentives, tasks, and information and communication technologies (Herrington & Herrington, 2006; Herrington et al., 2010). For online collaboration, the digital tools that most effectively support creativity need to be selected (Philip, 2015). Thus, the sharing of ideas and knowledge through collaboration is crucial (Amabile, 1998). Collaborative knowledge construction is supported by a creative climate and psychological safety for creative activities (Paulus & Dzindolet, 2008; Paulus et al., 2012; Philip, 2015; Poutanen & Ståle, 2014). Risk is inherent in creativity, and mistakes have been found to activate creativity and development (Paulus & al., 2012).

6) Reflection: The processes and outcomes of learning through authentic tasks and activities are reflected in relation to the work of the individuals, group members, and experts (Herrington & Herrington, 2006). Decision-making is an aspect of reflection, the evaluation of the materials used, and the selection of important content and practices (Herrington et al., 2010).

7) Articulation: Learning is facilitated by opportunities to share and present knowledge; to reflect, defend, and justify ideas; to create conflict; and to build a common understanding (Herrington & Herrington, 2006; Herrington et al., 2010). Innovation activities enable students to brainstorm, to communicate with one another, and to present content to experts, instructors, and/or the wider public (Hero & Lindfors, 2019; Keinänen & Kairisto-Mertanen, 2019). In creative collaboration, the group is provided opportunities to discuss the content to develop a common understanding (Poutanen & Ståle, 2014).

8) Coaching and scaffolding: In an authentic learning environment, coaching and scaffolding are provided by more able partners, such as teachers or student peers, at critical times (Herrington & Herrington, 2006). The teacher's task is to "empower students to develop self-efficacy" and, at the same time, to "strengthen creative leadership and support a climate of creativity" (Philip, 2015, pp. 257-259). Therefore, pedagogical solutions are designed to support creative activity (Cochrane & Antonczak, 2015). The key is to "provide leadership and guidance to creative groups" to foster self-direction and trust in the availability of support (Philip, 2015, p. 257-259). Deadlines and time limits are important for achieving creativity in teamwork (Poutanen & Ståle, 2014). From the perspective of creative leadership, the effects of digital technology and social media on creative activity must be carefully considered (Philip, 2015).

9) Authentic assessment: Authentic learning can be assessed on several criteria, such as knowledge acquisition and polished performances or products, as well as the time and effort invested in the collaboration (Herrington & Herrington, 2006; Herrington et al., 2010).

Table 1. Elements of creative and authentic learning environments.

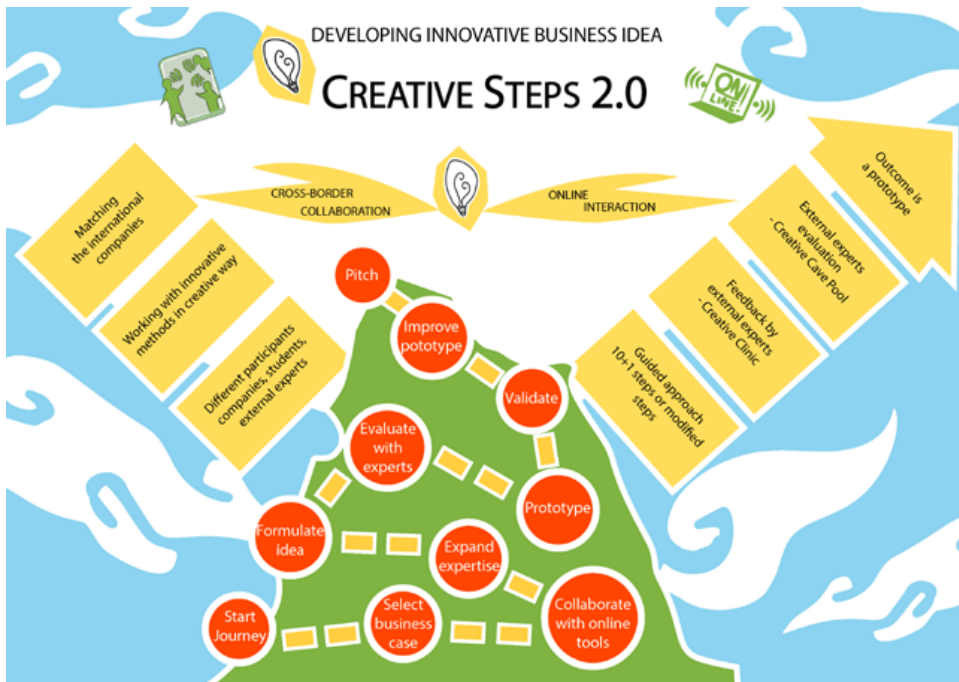


Figure 1. Creative Steps 2.0 (Arkko-Saukkonen et al., 2020).

The centre of the “mountain,” the visual representation of the model, depicts the progressive approach, the 10 + 1 steps, to developing innovation competence in online and blended environments in HE. The steps are as follows (Figure 2): (0) developing a framework for the business case, (1) identifying and creating the business case, (2) enabling the use of online tools, (3) understanding the business case, (4) formulating a potential business idea, (5) creating a checkpoint for evaluating the idea, (6) enhancing business expertise, (7) sparring with experts in the creative clinic, (8) prototyping the business idea, (9) proving market demand, and (10) pitching.



The central elements of the model are depicted on each side of the mountain (see Figure 1). First, international companies are paired to facilitate the development of a common new product or service. This complex task challenges each creative student team to consider the companies' needs and perspectives. Second, ideation tools and innovative methods are used creatively (see Arkko-Saukkonen & Krastina, 2018). Third, the participants, including the companies and multidisciplinary student groups and external experts, were involved in the CS2.0 process. The students act as aids to the business partners. The shared goal is to collaboratively learn creative ideation and development methods, to engage in innovation activities, and to develop entrepreneurial thinking.

Figure 2. The step-by-step approach of the Creative Steps 2.0 (Arkko-Saukkonen et al., 2020).

The right side of the “mountain” contains three additional key elements. First, the model is based on the step-by-step approach that structures and guides the creative activities. Each step includes tasks and creative methods to advance authentic and creative learning. They include energizers to keep the mind and body active during the creative process (Arkko-Saukkonen & Krastina, 2018; Arkko-Saukkonen et al., 2020). Second, external experts provide teams with feedback and assistance in the Creative Clinic. Third, the creative innovative project is completed when the student teams develop a prototype and present a finalized product or service concept to an international team of experts in the Creative Cave Pool. The external experts’ evaluation includes feedback on the marketability of and opportunities for the final product or service concept. In addition, the companies evaluate its usability and value from their perspectives.

Course Design and Implementation

Design research

The principles of the present study are in accordance with those of design research. They are typically used in the design of the product, operating model, curriculum, pedagogical model, or learning environment (Brown, 1992; Collins et al., 2004; Edelson, 2002; McKenney & Reeves, 2019; Nieveen, 2010; Plomp, 2010; Ruhalahti et al., 2017). In design research, theory and practice are tested through iterative rounds in real-life educational situations instead of controlled test environments (Collins et al., 2004). Successes and challenges are identified, and the results of each iteration are used to develop a deeper understanding of the objects of learning (The Design-Based Research Collective, 2003).

Creative Steps 2.0 workshop and participants

In the present study, CS2.0 was applied in the design and implementation of a 10-day workshop at the Lapland University of Applied Sciences in Finland in Spring 2016. The participants were visual arts, international business and business information technology students ($n = 15$) and creative sector entrepreneurs ($n = 8$) from Finnish Lapland, western Ireland, Northern Ireland, and mid-Sweden. The students represented six nationalities. Visual arts and business faculty members ($n = 2$) facilitated co-creation and learning. In addition, external experts ($n = 4$) brought their idea sparring expertise to

the Creative Clinic, and an international jury ($n = 5$) provided feedback on the finished products and services. The workshop was organised as a Creative Momentum¹ project activity.

The aim of the co-creation and learning activity was to develop students' creative, innovative, and entrepreneurial skills through an authentic industry-based task. During the workshop, the students were expected to co-create novel product and service ideas with and for the entrepreneurs. Four creative teams, each comprising three or four students and two company representatives, were formed. The entrepreneurs participated online, and the students worked in a hybrid environment. Some shared the same physical space, and others worked online only. The students were involved in the selection of the online tools for communication (Skype, iLinc), collaboration and presentations (Padlet), ideation (mind maps, Scamper), and content sharing (Facebook, Eliademy). The creative teams were allowed to choose the online tools for their internal communication. Support and coaching for online collaboration were provided throughout the process.

The creative teams started the process by getting to know the companies' operating principles, products, services, and challenges. They then created frameworks that included key information about the businesses: operations, products or services, challenges, expectations, and potential development and innovation opportunities (Arkko-Saukkonen & Krastina, 2018). Finally, as is typically the case in authentic learning, a complex real-life task was developed.

The teachers coached by supporting, encouraging, and guiding the students (see also Arkko-Saukkonen, 2017; Herrington et al., 2010). In the Creative Clinic, the creative teams engaged in sparring with experts from different creative fields. To develop and to present their product or service prototypes, the students obtained feedback from a target group of their choosing. The prototypes were presented to the international jury of career professionals, who provided feedback and assessed their marketability.

1 Creative Momentum (2015–2018), a transnational project to support the creative industries in Europe's Northern Edge, was co-funded by the European Union's Northern Periphery & Arctic Programme (MyCreativeEdge, 2021). It supported networking opportunities, the acquisition of creative and business skills, and the development of new products and services. Internationalization was promoted through various creative spaces, events, mentoring, and gatherings.

Research Questions, Data Collection and Analysis

The study sought to answer the following research questions pertaining to students' experiences of the workshop:

1. What were the successes and challenges regarding the learning process and outcomes?
2. What implications does the student experience have for the refinement of CS2.0?

Data collection and analysis

At the end of the workshop, the students ($n = 13/15$) responded to a 42-item online evaluation survey (Google Forms; see also Arkko-Saukkonen, 2017). The close-ended questions allowed for responses on a scale of 0 (*poor/not important at all*) to 5 (*excellent/extremely important*). The focus of the closed-ended ($n = 22$) and open-ended ($n = 20$) questions was the implementation of the workshop. Thus, the questions were related to the tasks and creative methods, online work, teamwork, and coaching. The students ($n = 11/15$) also maintained reflection diaries about the creative teamwork experience. They were instructed to make daily entries. The diaries varied from 1,038 to 5,943 words. The total amount of data collected was 25,622 words.

First, qualitative content analysis was performed to identify the successes and challenges regarding the learning process and outcomes related to the elements of creative and authentic learning environments. The results were re-examined, and the problem areas were clustered into four main implications for the refinement of CS2.0.

Results

Successes and challenges

Table 2 shows the successes and challenges regarding the learning process and outcomes with respect to the theoretical framework, i.e., the elements of creative and authentic learning environments.

Elements of creative and authentic LEs	Identified successes	Identified challenges	Examples from the data s=student, rd=reflection diary and q=questionnaire
Authentic context	<ul style="list-style-type: none"> • Step-by-step approach • Use of diverse creative methods 	<ul style="list-style-type: none"> • The authentic context's complexity 	<p>Working with real companies is my first experience and working with them online is even more new for me. From that collaboration I have learnt many new things about business, business relationships, management and teamwork- it is an invaluable experience. S5, RD</p> <p>Generally, I found the workshop really good experience. It was nice to work in environment combined of students of many programs and countries, bringing more variety in thinking and innovative process. Online tools chosen for this workshop work well, so thinking about future I think these elements are good to keep as it is now. S2, RD</p>
Authentic and creative activities	<ul style="list-style-type: none"> • Creating a business case • Creative Clinic • Prototyping • Checkpoint (pitching business ideas) • Use of Scamper for ideation 	<ul style="list-style-type: none"> • The ill-defined task • Time constraints 	<p>We were required to work with our 10Q [the questioning procedure used in the workshop] results combining companies' answers on one mind map. Such practice has trained us how to apply innovation way of thinking and to have a professional approach to the working process. In addition to this all, we also were trying to create an added value for an existing or future customer pain. In this case we were using only existing resources of two companies, these resources could be combined into producing one new innovative product. S6, RD</p> <p>We needed to do marketing research in order to find out whether there is actually a demand for our product This information indeed turned out to be extremely valuable when trying to find out whether our product is going to be successful or not. S7, RD</p>
Access to expert performances and the modelling of process	<ul style="list-style-type: none"> • Sparring by the experts during the Creative Clinic 	<ul style="list-style-type: none"> • "Go around" method in the Creative Clinic • Lack of prior knowledge about the experts attending the Creative Clinic • Students' insecurities • Time constraints 	<p>Working with real companies is my first experience and working with them online is even more new for me. From that collaboration I have learnt many new things about business, business relationships, management and teamwork- it is an invaluable experience S5, RD</p>
Multiple roles and perspectives	<ul style="list-style-type: none"> • Students' diversity • Collaborative development of the main task with the companies 	<ul style="list-style-type: none"> • Students' experienced lack of expertise in the field of the company involved • Homogeneity of the Creative Teams 	<p>All of the results of brainstorm were gained because of unique set of team members' background knowledge. S4, RD</p> <p>We had a great teamleader who had a clear vision of things. We were actively asked about our opinion so our voices weren't muted and we worked a lot in the background. I could help with the practical things in artistic perspective, for example: our companies were strongly visual art based companies, so it was easy for me to bring up ideas from my own perspective. The other students understood more about economics and marketing I didn't know much about. S7, RD</p>

Elements of authentic and creative LEs	Identified successes	Identified challenges	Examples from the data s=student, rd=reflection diary and q=questionnaire
Collaborative and creative knowledge construction	<ul style="list-style-type: none"> • Use of online tools • Collaboration with companies • Support from the Creative Team 	<ul style="list-style-type: none"> • Company members' delayed responses • Lack of necessary ICT skills in students • The atmosphere in the Creative Teams • Scheduling the collaboration 	<p>It was nice to work in environment combined of students of many programs and countries, bringing more variety in thinking and innovative process. S2, RD</p> <p>We also had a team meeting on Skype to catch up what happened and to what direction we should go. During our meeting this was the first time when I felt being discouraged from being creative. I still would like to have something really creative as end-result as well as fulfil the needs or expectations of the companies. S8, RD</p> <p>People can disappear and be unreachable without saying a word. S8, RD</p>
Reflection	<ul style="list-style-type: none"> • Multiple arenas for reflection with companies, coaches, experts and student peers 	<ul style="list-style-type: none"> • Get companies participation in joint action and feedback 	<p>The aim of this day was to have short presentations from each creative team. By this way we all could see the progress on other team and also give comments to each other. S2, Q</p> <p>This day was reserved for us students to have time to gather more ideas and dig deeper into our cases. As we were creating the mindmap we saw that there is lot of things we need to take into consideration but at the same time narrow down the things so that we would have one clear executable business case at our hands. S7, RD</p>
Articulation	<ul style="list-style-type: none"> • Discussing, justifying and presenting arguments for peers, companies, teachers, and external experts 		<p>We had 4 entrepreneurs and experts, who could give us feedback and ask tricky questions in order to test out our ideas. We had 2 steps we need to make before the last one – Idea Prototyping and Market research. Taking into consideration our idea developed beforehand, we wanted to ask our companies' ideas regarding joint prototype, and based on that develop the essential prototype, matching our brainstorming results, and companies' needs S7, RD</p>
Coaching and scaffolding	<ul style="list-style-type: none"> • Coaching, support and encouragement provided by teachers • Availability of the teachers 	<ul style="list-style-type: none"> • Students' inadequate ICT skills and knowledge about creative process and online collaboration 	<p>We were coached about basics of innovation to understand the importance of it and everything it includes: instrument, resource, value, commercialization etc. S2, RD</p> <p>I am that kind of person who likes to plan in advance, for which it was a bit bothering that I did not always knew in advance what was next, but looking back it was perfect like that. We had many new information anyway and we did not have any disadvantage or rush because we did not no what exactly will be the next 2-3 steps. So it was just perfect really. It was also very important that everyone was available all the time pretty much, which even if we did not need the help, created a kind of safety-net feeling. I knew that I can contact someone any time if I need, which one was really important. S7, Q</p>
Authentic assessment	<ul style="list-style-type: none"> • Assessment provided by several stakeholders: teachers, experts, an international jury, and companies 	<ul style="list-style-type: none"> • Lack of interaction with companies during the process 	<p>Creative Clinic which let us to think critically. There were four coaches and they directed us to make our outcome better. We were impressed with their ideas and skill of narrowing down. With their feedbacks we could definitely understand where we are heading for. S3, RD</p>

Table 2. Successes and challenges.

1) Authentic context

In CS2.0, the authentic context was realised through the complex and ill-defined real-life task, which was based on working life. As their main task, the students, in collaboration with the companies, developed a product or service for the companies. For students, authentic contexts can be very demanding and even overwhelming. Therefore, the CS2.0 model is based on a step-by-step approach to provide a structure for co-creation and learning (see also Philip, 2015). In the questionnaires and reflection diaries, the students indicated that the subtasks provided an effective and easy-to-follow structure that supported the participation of first-timers. One student indicated that the clear structure and daily deadlines facilitated the completion of the development tasks and the achievement of the final goal (see also Philip, 2015). Some students reported that some of the subtasks were very challenging; however, peer collaboration and instructor support were helpful.

2) Authentic and creative activities

The online questionnaire asked the students how the step-by-step approach, which included tools and methods, enhanced learning. Most students (85–100%) rated all 10 + 1 steps in the CS2.0 model as either “extremely important” or “very important.” The model begins with Step 0, the *development of a framework for the business case*, and Step 1, the *identification and creation of a business case*. This required creating a background for the authentic task in collaboration with the entrepreneurs and the students. In their diaries, the students wrote that Steps 0 and 1 were essential for producing the actual assignment and the main aim of the creative process collaboratively with the entrepreneurs.

Step 2, *enabling online collaboration and the use of online tools*, was important to ensure that guidance was provided for international cross-border collaboration. The creative teams chose the online platforms for accomplishing the tasks. They indicated that Facebook, Skype, and Padlet were very important for collaboration and task completion. Step 3, *understanding a business case*, required information acquisition. Thus, the students assigned themselves an information retrieval task. Some of the diary entries indicated that they gained a deeper understanding of the topics related to the business case and shared their knowledge of various topics with team members.

The creative teams brainstormed, and in Step 4, they *developed* and presented a *potential business idea*. This led to Step 5, the *idea evaluation checkpoint*. Most (85%) of the students perceived the feedback from the entrepreneurs and teachers and the cross-evaluations from the other groups as important. The creative process continued.

The Scamper method was used to develop out-of-the-box ideas and to find new solutions. Most students (85%) also rated this method as important. In Step 6, incubation time was added to the creative process to allow the students to *enhance of business expertise*. This allowed them to expand their knowledge of the business and to participate in a business event. Many students were inspired by the business event and wrote in their diaries that it improved their understanding of entrepreneurship and business thinking.

In Step 7, the creative teams engaged in *sparring and* received *feedback* in the Creative Clinic about their business ideas from the experts. In Step 8, they developed a *prototype*, a more specific concept of the product or service. In Step 9, they *identified and proved the market demand for the new business idea* by testing prototypes and obtaining feedback from potential customers. The diary entries revealed that this step was important to several students. One student registered surprise at discovering that their idea was not as innovative as had initially been thought. At the final step, 10, the polished prototype was *pitched* to the international evaluation panel, which assessed its market value.

The responses from two early-stage students revealed initial confusion about the reason for the step-by-step approach. The students reported that the biggest challenge was the lack of time to find information, to develop solutions, and to polish the idea.

3) Access to expert performances and the modelling of processes

The evaluation questionnaire revealed that the sparring during the Creative Clinic allowed the experts to model their roles and expertise for the students. Two students reported that they learned professionalism and entrepreneurship. The Creative Clinic was generally reported to be very important for co-creation and learning. It allowed the students to present their assignments to the experts to receive feedback and sparring assistance.

The “go-around method” was used. The students presented and discussed their task with four creative industry experts; however, some indicated that this was demanding and frustrating. The students said that having prior knowledge about the experts would have allowed them to determine the type of help that was most needed and, thus, to optimise the assistance. The students were at different stages of their studies. The questionnaires from those early in their studies revealed initial uncertainty and insecurities because of the perception that their peers were more advanced. The students reported having experienced time constraints during their interactions with the experts.

4) Multiple roles and perspectives

The students represented several nationalities and study areas. The companies were international. The questionnaires and reflection diaries indicated that the experiences related to competence, cultural perspectives, and international activities were mainly positive. Student diversity was considered important. For example, the visual arts students assumed the role of visual experts, and the business students focused on business and marketing. The students also indicated that the collaborative development of the main task to create common value for the companies required an understanding of both companies' perspectives.

The importance of getting to know peers when starting group work was also highlighted in the diaries. The students also reported that understanding cultural differences was important for working with peers from different countries and cultures. The challenges included some peers' lack of expertise in the companies' specific fields. This made them question their competence to create added value for the companies. A reflection diary revealed that one of the creative teams was homogenous in terms of the students' study areas. In addition, the students were familiar with one another. The diary entry noted that working life skills would be better practiced in a more diverse group of students who were not already familiar with one another (see also Paulus et al., 2012).

5) Collaborative and creative knowledge construction

The questionnaires and reflection diaries revealed that the online tools (Facebook, Skype, Padlet) facilitated collaboration. However, some students reported that the company members' occasionally delayed responses made it difficult to consider their perspectives during the design process. One student emphasized that collaboration required ICT and social media skills, the absence of which created challenges for the group. In their reflection diaries, several students reported that the collaboration with the companies enabled them to develop working life skills. Specifically, the discussions with the experts in the Creative Clinic were considered beneficial for learning. One student mentioned online collaboration as a mandatory skill for future working life. Overall, the students reported receiving encouragement from the relaxed atmosphere and team support.

Openness, curiosity, encouragement, and a psychologically safe climate of respect and acceptance facilitated creative multidisciplinary teamwork (Ness & Riese, 2015; Paulus & Dzindolet, 2008). However, one student mentioned that the atmosphere in their group was not good and that ideas were not valued. Several diaries and questionnaires highlighted communication as the biggest challenge. Difficulties in reaching the

companies and scheduling cross-border collaboration because of time zone challenges were mentioned. Several students indicated that the commitment and motivation to work online was an important matter that required group agreement. According to one student, communication problems can lead to confusion and misunderstanding in on-line collaboration.

6) Reflection

Decision-making requires reflection (Herrington et al., 2010). Some of the diaries described the collaborative selection of ideas as an opportunity for reflection (see also Herrington et al., 2010). The students explained their choices to the companies and teachers at the checkpoint and to the international judges at the final pitch. In the Creative Clinic, reflection was also an element of the expert sparring when the students had to justify their approaches. Several students mentioned in their diaries that important learning occurred as they enhanced their knowledge, attended business events, and met with experts in the Creative Clinic. These steps were followed by discussions with the teachers and creative groups. The students then spoke and wrote about the most important lessons that they had learned.

7) Articulation

The questionnaire responses and diary entries indicated that the students discussed, justified, and presented their ideas for their peers, the companies, the teachers, and the external experts throughout the workshop (see also Hero & Lindfors, 2019; Herrington & Herrington, 2006; Herrington et al., 2010; Keinänen & Kairisto-Mertanen, 2019). Several diaries indicated that the use of online tools for brainstorming and co-creation in the Creative Teams enabled the students to discuss, to communicate, to explain, and to justify their proposals. The discussions with the teachers in their roles as coaches allowed for the exchange of ideas when the students had to justify their approaches. The interactions occurred either online with the companies or in a hybrid environment, with some students online and others in the same physical space.

8) Coaching and scaffolding

The role of the workshop teacher was to coach, to support, and to encourage students during the creative process (see Herrington et al., 2010). In the evaluation questionnaire, 77% of the students characterised this guidance as excellent, and 23% deemed it good. The evaluation questionnaires and reflection diaries indicated that the students received

assistance from the teachers at different stages of the process. For example, the students indicated that the teachers facilitated ideation and co-creation by helping them to refine their perspectives and find solutions to challenging situations and providing encouragement, as well as useful materials and links to techniques and online tools. One student's diary entry indicated that knowing that the teachers were available, even if their help was not always needed, was helpful.

Several students indicated in the questionnaire that learning to use new online tools was important for successful online collaboration. Most (85%) indicated that they received either very much (39%) or quite much (46%) of information about working online from their teachers. Many diaries and questionnaires indicated that the guidance and support encouraged them to learn and to use new online information sources. The guidelines for working online were found to be important because they provided a common body of knowledge to facilitate group work. One student's diary entry discussed the challenge of determining the project stage and next steps. Inadequate ICT and social media skills, as well as knowledge about the creative process and online collaboration, were perceived as challenges by a student who asked the teachers to emphasize the importance of online collaboration at the start of the project.

9) Authentic assessment

In CS2.0, assessment includes the evaluation of the final outcome but also in relation to the collaborative process and the targets of the co-creation and the different stages of the CS2.0 process (Herrington & Herrington, 2006; Herrington et al., 2010). According to the diary data, some students found that the comments and evaluations facilitated learning, creativity, and co-creation. They appreciated the diversity of the assessments provided by the coaches, experts, international jury, and companies. However, the questionnaires indicated that some students experienced a lack of interaction with and desired more feedback from the companies. The students obtained feedback from a target customer of their choice for their prototypes and final presentations. Several diary entries indicated that this assessment was important.

Implications of the Student Experience for the Refinement of Creative Steps 2.0

The students identified the challenges that they encountered. Suggestions for refining CS2.0 are presented in Table 3.

SUGGESTIONS FOR REDESIGN CREATIVE STEPS 2.0	HOW TO REDEFINE CREATIVE STEPS 2.0
Creative but suitably challenging authentic context and activities and clear instructions for a step-by-step approach.	The level of complexity of the tasks must be proportionate to the level of competence of the students, but considered sufficiently challenging. The step-by-step approach must be clearly presented at the beginning of the work to all participants so that everyone can understand the meaning of the task and creative methods and participate in the activity.
Enrich co-creation and collaboration with multidisciplinary teams and encourage the use of everyone's expertise.	<p>Creative work benefits from a multidisciplinary team and it is important to consider the team's diversity and different perspectives in terms of co-creation to enrich learning experiences.</p> <p>The added value of the Creative Clinic consisted of the sparing provided by the experts, but the format of the working method needs to be re-evaluated to be more practical and beneficial to participants.</p> <p>Students should be given more advance information to prepare beforehand for Creative Clinic. Students should be offered support to expand their knowledge of the business case and encouraged to utilize their own skills to work together, especially first-timers.</p>
Enable, coach and scaffold online collaboration.	<p>At the beginning of the work, encourage and support the Creative Team to get to know each other, create common team rules for online collaboration, set a timetable and commit to collaboration.</p> <p>Guidance must be attached to the online work, the importance of basic skills in online collaboration must be emphasized and students who are less skilled in online work need to be given more guidance and support so that co-creation and the creative atmosphere are not jeopardized.</p>
Coaching and supporting co-creation and generating a creative climate.	<p>Coaches should enable the strengthening of a creative climate and a sense of psychological safety from the outset.</p> <p>Collaboration with companies must be made smooth and interactive, therefore, the possibility of companies' participation needs to be assessed, the realities of real life need to be considered and alternative solutions may need to be sought.</p>

Table 3. Suggestions for refining Creative Steps 2.0.

To summarize, CS2.0 must have a creative, but challenging, authentic context and implementation. Clear guidelines must be provided for the step-by-step approach. The benefits of multidisciplinary teams should be recognized (see also Hero & Lindfors, 2019), and the teacher should encourage everyone to use their skills. Coaching and support for co-creation, a creative climate, and online collaboration must be ensured from the outset (see also Paulus & Dzindolet, 2008). Coaching and scaffolding must be available throughout the creative and authentic learning processes.

Conclusion and Discussion

This design research aimed to refine the CS2.0 model. The students' experiences were evaluated, and their successes and challenges highlighted areas for refinement. The results indicate that the step-by-step approach of CS 2.0 is beneficial for creative and authentic learning to achieve innovative competence. In the creative process, the focus is the exploration and generation of new ideas; however, in innovation, ideas are implemented (Poutanen & Ståhle 2014). CS2.0 combines these elements.

In the present implementation of CS2.0, learning was realised through an authentic task that was accomplished through the cross-border collaboration of students and entrepreneurs. The creative methods and online tools promoted learning. The students gained professional knowledge and developed an understanding of entrepreneurship by strengthening their innovation and working life skills with the help of experts and teachers. The suggestions for further development were based on the challenges identified by the students.

A limitation is that CS2.0 was not a part of the curriculum. This might have had a positive effect on the students' motivation. The functionality of CS2.0 should be explored in more detail as part of the curriculum. A greater focus should be placed on online collaboration. Finally, evidence of learning outcomes, besides that gleaned from student self-reports, needs to be collected and analysed.

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