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Fostering sustainability competences through co-creation of digital storytelling - Effects of COVID-19 on higher education students' reflective learning

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Abstract

During COVID-19, online collaboration became more accessible than before, enabling higher education students and teachers to organize virtual mobility experiments and run projects with stakeholders across cultures. In this paper, we focus on three blended intensive programs, two in Finland and one in Hungary, to explore how the pedagogical approach of project-based digital storytelling combined with reflective writing contributed to students' sustainability competence development during the pandemic and after. In these programs, multicultural teams of students worked on real-life digital storytelling projects aimed at driving sustainable changes in people's thinking, behaviour, and lifestyles. Digital storytelling has proved effective in fostering students' 21st century skills through engagement and co-creation with the wider world. Based on qualitative content analysis of 67 semi-structured learning journals, we explore students' developments in values-thinking, collaborative, and self-awareness competences during their digital storytelling projects. With insights from student reflections on their virtual, online, and blended learning, we discuss challenges and successes of project-based, collaborative, and reflective learning and propose best practices for using collaborative digital storytelling as a transformative method to foster sustainability competences across cultures.

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Introduction

The COVID-19 pandemic brought unprecedented changes in higher education (HE) worldwide and accelerated underlying trends that had long been initiated but had not seemed an immediate necessity before the pandemic (Crawford et al., 2020; Ma et al., 2021; Marinoni et al., 2020; QS, 2020). As a result, universities felt the need to bring about a complete transformation of their educational service, which induced the pedagogical renewal of classroom management and teaching practice. With the shift to emergency remote teaching, it became apparent that these methodological innovations were a must. Higher education institutions' (HEI) responses to the pandemic required the establishment of new digital learning environments and spaces (Bygstad et al., 2022; Laufer et al., 2021; Marks et al., 2021), the use of new forms of educational resources (Mishra et al., 2020), the application of new teaching approaches and methods (Mishra et al., 2020), and new motivation and attitudes to teaching (Kulikowski et al., 2021; Sangwan et al., 2021). Courses were transferred to fully online environments using digital platforms that were first new to most players, teachers, and students alike. Teachers needed to resort to digital teaching materials and select online applications to aid classroom work online. Working in a digital environment implied that both teachers and students acquired and developed higher-level digital literacy to assist the teaching and learning process (Falloon, 2020; Pawlicka et al., 2022).

Conventional teaching methods, classroom activities, and assessment practices had to be revisited and some of them were replaced by more effective approaches and tasks that supported better the achievement of the course's learning objectives and outcomes in an online educational environment. Studies have shown that tasks that were aimed at developing students' higher-order thinking skills (HOTs) came to the fore and were used more frequently in online and blended classrooms (Jankowski, 2020; Koris & Pál, 2021; Pál & Koris, 2021). Digital teaching and learning contexts relied more on students' engagement and interactivity, and thus tended to adapt teaching methods that ensured experiential and immersive learning. Also, employing competency-based, project-based and problem-based teaching approaches proved to be a key to success in students' academic achievement amid the corona crisis (Adinda, 2021; Hira & Anderson, 2021). Fully online courses and blended courses should consider individual learner differences and ensure more customized, individualized learning, which places teachers in the role of mentors or coaches. Clearly, the pandemic prompted a paradigm shift in education and created a new normal that paved the path to the future of higher education (Pacheco, 2021).

Not only did teachers need to renew their pedagogical approach, but also students' mindset and attitude to learning had to be changed, and they had to develop transversal skills (Ievers et al., 2022). Part of these skills were related to the learning process and learner autonomy, for example, self-direction, perseverance, self-initiation, accountability, thinking skills, as well as media and digital literacy. Another set of competences stems from the necessity of coping with challenges posed by remote and blended teaching and such competences include collaborative, critical-thinking, and problem-solving skills, as well as creativity (Ievers et al., 2022). The COVID-19 crisis created a learning context that allowed room for reflective learning, and students grasped the opportunities and demonstrated their high-level reflection attitudes by submitting detailed, high-quality learning journals or student portfolios (Koris & Pál, 2021).

A growing body of research exists into the challenges and opportunities the COVID-19 pandemic brought on HE (for example Koris et al., 2021; Ma et al., 2021; Marinoni et al., 2020; Pál & Koris, 2021; QS, 2020) and the necessary teacher and student competences the pandemic fuelled to develop (for example Drajati & Putra, 2022; Jankowski, 2020; Levers et al., 2022; Koris & Pál, 2021). In addition, there is an extensive body of literature on reflective writing and sustainability competences from the pedagogical point of view (for example Brundiers et al., 2021; Engle et al., 2017; Glasser & Hirch, 2016; Hanning et al., 2012; Lambrechts et al., 2013; Lozano et al., 2017; Perez Salgado et al., 2018; Rieckmann, 2012, 2018; Sephard et al., 2018; Sterling et al., 2017; Wals, 2015; Wilhelm et al., 2019). However, no systematic body of research to date has been devoted to the exploration of combining digital storytelling with reflective writing to foster sustainability competences. Therefore, it is particularly interesting to analyse how the acquisition of sustainability competences can be traced in students' reflective writing in the various stages of remote and blended teaching and learning through digital storytelling. With insights from students' reflections on their learning during and after the COVID-19 pandemic, we discuss the challenges and successes of project-based, collaborative, and reflective learning and propose best practices for using digital storytelling as a transformative method for fostering sustainability competences across cultures.

Key Sustainability Competences

The notion of sustainability competence in this paper refers to ways in which to define and articulate students' knowledge, skills, values, and attitudes as learning objectives that are considered crucial for them to master in order to handle complex sustainability issues, problems, and challenges in their studies, personal lives, and professional contexts (Barth et al., 2007; Gardiner & Rieckmann, 2015; Lambrechts et al., 2013; Lozano et al., 2017, p. 3). After the publication of the well-known and much referenced systematic literature review and conceptual analysis of sustainability competences by Wiek et al. in 2011, a growing number of studies have been devoted to defining and discussing clusters of key sustainability competences in higher education. As new lists and definitions of sustainability competences continue to be proposed, several sustainability competence frameworks and competing labels for similar competences currently coincide (for example Brundiers et al., 2021; Engle et al., 2017; Glasser & Hirch, 2016; Hanning et al., 2012; Lambrechts et al., 2013; Lozano et al., 2017; Perez Salgado et al., 2018; Rieckmann, 2018; Rieckmann, 2012; Sephard et al., 2018; Sterling et al., 2017; Wals, 2015; Wilhelm et al., 2019).

According to Brundiers et al. (2021), it is important to see sustainability competences as distinct yet interdependent, forming a holistic framework that supports the analysis and handling of sustainability challenges (cf. Cebrián et al., 2020; Redman & Wiek, 2021; Vare et al., 2019). The present paper is based on the refined framework proposed by Brundiers et al. (2021) that discusses and builds on the following key sustainability competences identified, and later operationalized, by Wiek et al. (2011; 2016): systems thinking competence; anticipatory or futures-thinking competence; strategic competence; interpersonal or collaborative competence; and normative or values-thinking competence. All these key competences contribute to an overarching critical problem-solving competence. In addition, Brundiers et al. (2021, pp. 20-21) suggest that two additional competences be added to the framework: implementation competence and

intrapersonal or self-awareness competence. The key learning objectives of all these eight key competences are summarized in Table 1.

Table 1

Key sustainability competences and key learning objectives (adapted from Brundiers et al., 2021, pp. 21-22; Wiek et al., 2016, 2011)

Competence	Learning objective
1 Systems-thinking competence	Ability to approach complex problems critically and analyse them across different domains and scales
2 Anticipatory/futures-thinking competence	Ability to form and adjust visions and scenarios in relation to the status quo
3 Strategic competence	Ability to plan and create sustainability transition strategies and interventions
4 Implementation competence	Ability to carry out iterative implementation actions, to monitor their successes and challenges, and to further develop disruptive and transgressive long-term action
5 Normative/values-thinking competence	Ability to identify and assess one's own values, contextual, cultural, and historical values, shared values, practised values, and oppressive societal structures
6 Interpersonal/collaborative competence	Ability to engage and inspire team members and stakeholders in ways tailored to their knowledge and needs
7 Intrapersonal/self-awareness competence	Ability to be critically self-aware, to assess one's feelings, behaviours, positions, and roles, and to motivate and self-regulate one's learning
8 Integrated problem-solving competence	Ability to combine competences to tackle sustainability challenges within and across disciplines as appropriate

The key competences 1-4 in Table 1 underline the importance of approaching sustainability challenges as complex wholes that must be addressed with thorough systemic knowledge and understanding, keen anticipatory visions, strategically planned interventions, and conscious action geared to making practical changes on the ground (Brundiers et al., 2021). The key competences 5-7 in Table 1 can be seen as cross-cutting competences that underline and underpin sustainability actions through their focus on communication and collaboration, value-based deliberation and ethics, and critical self-awareness. Brundiers et al. suggest that values-thinking competence should be treated as the lead competence, "clarifying values embedded in all other competences" (2021, p. 24). Finally, the problem-solving competence (8) integrates all key competences to form an overall solutions-oriented approach to tackling sustainability challenges on personal, social, and global levels.

According to Brundiers et al. (2021, p. 22), step-by-step pedagogical scaffolding is of key importance when developing sustainability competences. So as not to overwhelm students with too complex a set of competences and learning objectives at once, objectives related to the personal and familiar should be addressed first, before moving on to more abstract societal and global issues and challenges. In the present paper, our focus is, therefore, on the underpinning

and cross-cutting competences 5-7 of Table 1, which are seen as something personal and familiar for students to develop and reflect on in any learning context. We argue that it is important to engage students in practising and assessing their 'soft' skills needed for interpersonal encounters, value deliberation, and critical self-reflection, as such transversal skills are in high demand in professional contexts (Brundiers & Wiek, 2017). Familiarity with and awareness of the underpinning competences 5-7 then prepares students for diverse topic-specific sustainability issues, drawing on competences 1-4 in more complex disciplinary, transdisciplinary, and professional contexts on social and global levels.

Pedagogical Approach: Project-based Digital Storytelling and Reflective Learning Journals

In recent years, increasing attention has been paid to pedagogical approaches deemed suitable for developing sustainability competences in higher education (Brundiers & Wiek, 2017; Lozano & Barreiro-Gen, 2021; Lozano et al., 2022, 2019, and 2017). Lozano et al. (2017, pp. 5-6) argue that to support teachers, learners, and curriculum designers, there is a need to create a systematic framework of pedagogical methods used to foster sustainability competences in higher education. All in all, a diversity of pedagogical approaches is needed for fostering sustainability competences, and it is important to apply various alternative methods aimed at engaging students in participatory activities and critical thinking and reflection. Such alternative methods can include, for example, problem and project-based learning around real-life sustainability challenges; collaborative learning with peers and stakeholders; brainstorming and dialogues on online discussion forums; case studies; critical reading and writing; peer assessment; reflexive accounts; and group and personal diaries (Brundiers & Wiek, 2017; Brundiers et al., 2010; Lambrechts et al., 2013; Murga-Menoyo, 2014; Sipos et al., 2008).

According to Lozano et al. (2017), project and/or problem-based learning is among the pedagogical approaches that cover a broad range of sustainability competences, so adopting a project-based approach "would be a good way to bring SD competence development into virtually any course" (p. 10). In project-based learning, students usually work in self-directed collaborative teams on real-life sustainability challenges that can be interdisciplinary, interinstitutional, and international, also engaging university-external stakeholders from the public and business sectors (Lozano et al., 2017, p. 7). In this paper, we explore how international higher education students' project-based collaboration and reflection activities contributed to their sustainability competence development. In our three case projects, multicultural and multidisciplinary teams of students worked in collaboration with industry partners to co-create digital storytelling content aimed at driving sustainable changes in people's thinking, behaviour, and lifestyles.

Digital storytelling (DST) has proved effective in fostering students' 21st-century skills through engagement and interaction with the wider world (Barber, 2016; Fisanick & Stakeley, 2021; Lazareva & Cruz-Martinez, 2021; Moradi & Chen, 2019; Niemi & Multisilta, 2016; Robin, 2016; Robin, 2008; Yang & Wu, 2012). Such 21st-century skills include, for example, communication, collaboration, creativity, critical thinking, digital literacy, and self-regulated learning. These go well together with soft skills relevant to professional sustainability practice in the world of work and with interpersonal, ethical, and intrapersonal skills that underpin key sustainability competences. As concrete examples of skills developed through a project-based approach with multiple stakeholders and real-life sustainability challenges, Brundiers and Wiek (2017) mention the

following: preventative self-care; effective and compassionate communication; collaborative teamwork; responsive project management; impactful stakeholder engagement; and advanced continuous learning. Similarly, in an international digital storytelling project connected with a real-life sustainability challenge and involving industry stakeholders, Vesala-Varttala et al. (2021) identified skills development related to systemic curiosity; ethical commitment; moral vision; creative readiness; collaborative acumen; reflective learning; and hands-on change communication.

The digital storytelling process followed in the three case projects of the present paper was in line with the practice-based model proposed by Fisanick and Stakeley (2021), who see digital stories as "short (2-5-minute) videos that rely on still and moving images, a soundtrack, narration, and other components to tell a story" (2021, p. 2) and underline the importance of the step-by-step process of digital storytelling "as a participatory media practice" (Lambert & Hessler, 2020). The participatory process includes collaborative learning activities with team members and industry stakeholders related to background research, audience research, idea generation, storyboarding, experimenting with video-making software, and the final story creation, publication, and sharing. Digital storytelling projects were a feasible pedagogical approach in the COVID-19 era, as they can be planned, implemented, and evaluated in virtual project teams and through stakeholder collaboration online. Fisanick and Stakeley (2021) draw attention to the many virtual and online methods, applications, and platforms available to the participants of digital storytelling processes to form partnerships, exchange knowledge and feedback, and co-create and share digital storytelling products, concluding that building virtual project teams and strategic partnerships in COVID times could be seen not as a challenge but as "a unique opportunity to develop closer relationships with organizations that might otherwise be out of reach because of distance or cost" (p. 40).

In our digital storytelling case projects, developments in sustainability competences were accessed through students' reflective learning journal entries composed with the help of guiding prompts and reflection questions in line with the learning objectives of the sustainability project courses. Reflective journal writing is a much-used tool in higher education to nurture students' critical thinking and lifelong learning skills and to prepare them for future challenges (Alt et al., 2022; Cowan, 2014; Fabriz et al., 2014; Hume, 2009; McCarthy, 2011; McGuire et al., 2009; Moon, 2006; Ryan, 2015, 2011; Thorpe, 2004; Tsingos-Lucas et al., 2017; Walker, 2006; Wallin & Adawi, 2018). To help students structure and focus their reflective writing and better describe and analyse their learning experiences, guidance (in the form of questions, prompts, information, and feedback) is regarded as adding to the quality of reflection, also making learning journal data easier to handle, interpret, and assess by students, teachers, and researchers (English & Kitsantas, 2013; Moussa-Inaty, 2015; Nešić & Stojković, 2017; Wallin & Adawi, 2018). Redman et al. (2021) identify reflective writing as one of the major tools for learning and assessment used in connection with fostering sustainability competence developments, pointing out that learning journals have many benefits, such as being easy to integrate with any course (Sroufe et al., 2015), making visible and thus supporting students' sustainability competence development (Clevenger & Ozbek, 2013; Migliorini & Lieblein, 2016), and providing useful input for improving future course implementations (Galt et al., 2013).

However, reflective practices also have challenges that need to be considered when using reflection as a tool for fostering and assessing learning and competence development. Chan and Lee (2021) conducted a comprehensive literature review about the challenges experienced by higher education students in reflection tasks and found that students need encouragement, feedback, and scaffolding to successfully address challenges related to poor motivation and commitment to engage in journal writing; difficulties to understand the purpose and benefits of reflection; lack of appropriate training for reflection; lack of rhetorical and linguistic skills in expressing reflections; ethical and emotional discomfort when sharing personal feelings and innermost thoughts; dysfunctional teacher-pedagogical, institutional, and socio-cultural support structures; and devaluing attitudes related to reflection as a pedagogical and professional practice. In the context of sustainability competence development and assessment, Redman et al. (2021) underline the need to train students in reflection and to make them aware and knowledgeable of sustainability competence development. They also bring up challenges related to the subjective and not necessarily entirely honest or accurate nature of reflection, as students may manipulate their journal entries due to various personal reasons, linguistic challenges, or external motives such as getting a higher grade (see also Chan & Lee, 2021; Gordon & Thomas, 2018; Nešić & Stojković, 2017; Walker, 2006). In the present paper, we propose ways to help students and teachers become aware of these challenges and improve commitment to reflection in project-based sustainability education.

Aims and Research Questions

The aims of the study are 1) to explore HE students' reflective practices with a special focus on the development of their values-thinking, interpersonal, and self-awareness competences and 2) to assess, compare, and contrast their reflections and their competence development between three digital storytelling projects during and beyond the COVID-19 pandemic. This paper explores HE students' sustainability competence development and reflective writing through the following research questions:

> **RQ1**: Judging from their learning journals, how did HE students manage to develop their values-thinking and interpersonal competences in collaborative digital storytelling projects across cultures?
>
> **RQ2**: In their learning journals, how well did HE students manage to reflect on their sustainability competence development and show critical self-awareness of their learning?
>
> **RQ3**: What were the respective challenges and best practices of reflective learning through a fully online approach during COVID-19 and through blended learning implementations after COVID-19?

Methods and Data

Digital storytelling case projects

The current research is based on three blended intensive programs (BIPs) that used digital storytelling as a method for fostering sustainability competences across cultures. BIP1 and BIP2 were carried out in a Finnish HEI in May 2021 and May 2022, and BIP3 was implemented in a

Hungarian HEI in October 2022. In cooperation with partner universities across Europe, the Finnish HEI has hosted such intensive programs for international students since 2016. The concept of the program is built on an international real-life sustainability challenge for which multicultural student teams ideate digital storytelling solutions in collaboration with selected industry partners. Students engage in team building, audience research, and story planning both in their respective countries and collaboratively across cultures. Finally, they use their research results to co-create digital stories in video format with an aim to inspire and persuade their target audience to become personally engaged with the sustainability issue brought up through the stories.

Due to COVID-19 restrictions, BIP1 (Case 1) was carried out fully virtually and online over a period of 8 weeks. The project-based course hosted 35 students from 6 universities from around Europe. The real-life sustainability challenge of BIP1 was focused on how to support sustainable chocolate production, marketing, and consumption. In their digital storytelling project, multicultural student teams collaborated with two artisan chocolate companies to co-create inspiring video stories to encourage consumers to make more sustainable chocolate purchasing decisions. BIP2 (Case 2) was carried out in the framework of the same intensive program, but this time in a blended format with a 7-week online module followed by an in-person intensive week. BIP2 hosted 40 students from 12 European universities. The sustainability challenge of BIP2 was to promote sustainable tourism and off-the-beaten-track destinations in collaboration with selected industry partners. In their digital storytelling project, the students' aim was to raise awareness of the sustainable services and local delights of a small coastal town in southern Finland. BIP3 (Case 3) was implemented in Hungary, following the model of BIP1 and BIP2 in Finland and with a focus on promoting sustainable tourism in an urban (city) environment. The blended project was carried out with the participation of 54 students from 8 European universities. The main goals of the students' digital storytelling project were to discover one of the Hungarian capital city's less-known areas outside of its tourism business districts and to transform their perceptions and experiences into digital stories that would persuade target audiences to visit the off-the-beaten-track area and its local service providers. The underlying objective of all the digital storytelling projects was to develop students' key sustainability competences.

We applied the following 5-step digital storytelling process model to all our case projects: 1) Research and Audience Insight; 2) Concept Design; 3) Scripting and Storyboarding; 4) Digital Production; 5) Publication and Engagement (Morgado & Vesala-Varttala, 2023). In all three BIPs, diverse digital tools were integrated into teaching and learning practice at different stages of the collaborative digital storytelling process. The contribution of these digital technologies and practices to student-centred learning can be described and categorised with the help of the so-called SAMR model (Puentedura, 2020, 2009). According to the SAMR framework, digital tools can enhance students' learning experience if they substitute (S) a non-digital tool successfully and if they manage to augment (A) and improve students' actions. Further, digital tools can transform students' learning experience if they enable modifications (M) of tasks and roles and if they result in the creation of new tasks and redefinition (R) of educational activities. According to Blundell et al. (2022, p. 5), students' actions that are often categorised as transformations (M&R) among researchers using the SAMR model include "participating in project- or inquiry-based and independent learning, being creative in new ways, and engaging with people and places beyond the classroom." Such transformations are also typical of our DST projects where students carry

out creative tasks collaboratively and autonomously with team members, teachers, and industry partners across cultures online, virtually, and in person.

In their scoping review of researchers' use of the SAMR model, Blundell et al. (2022) point out that the choice of SAMR categories can vary in different contexts, and the categorisations depend, for example, on the relative novelty of given digital tools and tasks to students and teachers. We applied the model not to propose universal categorisations, but rather to illustrate the transformation potential of collaborative digital storytelling as a learning practice. Table 2 illustrates students' use of digital technologies during each DST process step 1-5 and the ensuing effects of enhancing and transforming their activities and learning experience through substitution, augmentation, modification, and redefinition in line with the SAMR framework.

Table 2

DST process steps, student roles and tasks, technologies used, and SAMR categorisation of educational activities

DST steps	Student roles and tasks	Technologies used	SAMR categorisation
DST1: Research and Audience Insight	- Cross-cultural team building and collaboration - Project briefing Q&A with all stakeholders across cultures - Autonomous background research and benchmarking - Gaining audience insight through surveys, interviews, and empathy mapping	- Shared Team Canvas online - Virtual chat and post boards - Online co-creation workshops via video-conferencing apps - Shared fact files online - Online survey tools, digital journaling tools, and online interviews - Shared Empathy Map online	- Modification of virtual and online team collaboration tasks across cultures (M) - Redefinition and facilitation of multi-stakeholder collaboration across cultures (R)
DST2: Concept Design	- Define the target audience and study their preferences and needs - Crystallise purpose, goal, and main message - Plan the type of story and explore potential media and channels - Plan story elements - Presentations of and feedback on each team's concept posters	- Shared Audience Profile Canvas online - Online mind-mapping, idea generation, and idea ranking tools - Shared Story Canvas online - Story Planner website and shared online tools - Shared concept poster template online - Shared peer assessment template online	- Substitution and augmentation of canvas tools and templates with shared online documents and platforms (S&A) - Modification of creative ideation, mind-mapping, concept presentations, and exchange of feedback online (M)

DST steps	Student roles and tasks	Technologies used	SAMR categorisation
DST3: Scripting and Storyboarding	- Prepare a DST script - Create a storyboard - Prepare a detailed audio-visual script for a selected medium - Present ideas and share continuous feedback within and across teams and with external stakeholders	- Story Planner scripting tools online - Storyboarding apps - Audio-visual script templates online - Video conferencing apps, virtual chat and post boards, online presentation apps	- Substitution and augmentation of scripting and storyboarding tools by using shared online documents (S&A) - Modification and redefinition of creative planning tasks by enabling continuous collaborative visualisation and feedback online (M&R)
DST4: Digital Production	- Make a shooting plan - Shoot video, take pictures, produce audio - Edit digital content for the selected media - Test and finalise with target audience members	- Shared shooting plan template online - Digital content generation apps and tools - Video-making and other content creation and editing tools - Digital content-sharing platforms and apps	- Modification and redefinition of digital and creative production tasks by encouraging collaborative experimenting online, learning from mistakes, and sharing and combining views and knowledge (M&R)
DST5: Publication and Engagement	- Decide metrics for monitoring performance - Prepare the story for publication - Make a sharing and engagement plan for all stakeholders - Present and pitch your story - Co-evaluate the DST process and products with stakeholders - Monitor and adjust digital performance	- Digital content-sharing platforms and apps - Performance monitoring data available through publication platforms - Shared assessment templates online	- Design of new tasks related to monitoring and improving online performance through real-life DST projects and engagement with stakeholder networks and audiences (R)

Open educational resources on digital storytelling, along with authentic samples of students' digital stories, can be found on the website of our Erasmus+ research and development project Learn to Change - Collaborative Digital Storytelling for Sustainable Change: https://blogit.haaga-helia.fi/learn-to-change/.

Learning journals as qualitative research data

To foster reflective and collaborative learning, students in BIP1 and BIP2 were encouraged to write a semi-structured learning journal with thematic prompts and guiding questions supporting the learning objectives of their real-life sustainability projects. Writing a learning journal was voluntary, as it was possible to pass the course without submitting the journal. In terms of assessment, students were told that their journal reflections would not be graded as such, but their reflective content would be used as evidence for formative assessment. A total of 25 students in BIP1 and 28 students in BIP2 submitted their learning journals, written regularly during the learning process. During the writing process, students were given continuous feedback by a team of teachers from the participating universities. In BIP3, reflection activities were carried out as online and in-person team discussions during the learning process, and formative assessment was provided in situ by teachers from the participating universities. In BIP3, students were also offered an opportunity to submit a semi-structured learning journal, with guided prompts and questions, where they reflected on the learning process and outcomes of their digital storytelling project after the completion of the course. A total of 16 students of BIP3 submitted their voluntary and retrospective learning journals.

The data used in this paper was collected from semi-structured learning journals of students in the three digital storytelling projects described above. All in all, a total of 69 students submitted their voluntary learning journals, and 67 gave their written consent to use their reflections for research purposes (25 in BIP1, 27 in BIP2, and 15 in BIP3). All the learning journals (BIP1-3) contained guided self-reflection prompts and questions focused on multicultural team communication and collaboration, values-thinking, self- and peer assessment, and self-regulated learning.

In line with the research questions, our analysis of the learning journal data is focused on identifying developments in the following sustainability competences: normative/values-thinking, interpersonal/collaborative, and intrapersonal/self-awareness. Through a qualitative content and thematic analysis (Nowell et al., 2017; Merriam & Tisdell, 2016; Miles et al., 2014; Elo & Kyngäs, 2008; Guest et al., 2012; Braun & Clarke, 2006) of students' learning journals, we first coded and categorised developments in students' knowledge, skills, values, and attitudes according to the sustainability competence definitions in Table 1, adapted from Wiek at al. (2011, 2016) and Brundiers et al. (2021).

Next, we analysed the quality of students' critical reflections adapting the "reflection scheme" applied by Alt et al. (2022), whereby students' short-term (course-related) and long-term (future-related) reflections were divided into three metacognitive reflection categories: 1) awareness of one's learning experience in terms of tasks and knowledge; 2) evaluation of one's learning experience in terms of limitations and effectiveness; and 3) regulation in attitude and behaviour to perform better in the future (Wilson & Clarke, 2004, p. 27). In addition to metacognitive awareness and evaluative understanding, students' reflection process should also involve "active engagement" and "deliberative action", which connects individual reflection with larger social structures and is aimed at instigating change and future improvement in both learning and action (Alt et al., 2022; Ryan, 2015; Sandi-Urena et al., 2011). In the same way, as with using the SAMR categorisations for describing the contribution of digital technologies to students' learning experience in DST projects, our categorisations illustrating the quality of students' reflections

(awareness, evaluation, regulation) are not meant to be universal or clear-cut. Rather, we used these categorisations as a tool to compare students' journal reflections and to determine whether similar developments in reflective learning competence could be found in journal entries across all case projects.

Finally, we compared and contrasted students' learning experiences and reflections between BIP1 (fully virtual and online) and BIP2 and BIP3 (blended with an online module and an in-person intensive week), aiming to identify challenges and best practices. Based on the analysis, we summarise key trends in students' sustainability competence developments and discuss the quality of their journal reflections during the COVID-19 pandemic and after. As development suggestions, we propose pedagogical nudges with which to foster and improve higher education students' commitment to reflective learning and sustainability competence development in collaborative digital storytelling projects.

Results and Discussion

Based on the qualitative content analysis of students' learning journals (N=67) from our three digital storytelling case projects (BIP1-3), we first present key findings related to students' values-thinking and interpersonal/collaborative competence development in Table 3 and Table 4.

Values-thinking competence developments

The guided prompts and questions related to values-thinking in the learning journals contained triggers that made students aware of both personal and collective values bearing on the real-life sustainability challenges and digital storytelling processes of the case projects in line with the values-thinking competence description in Table 1. As the three projects all had different sustainability challenges, the students' values-thinking competence developments were context-specific. However, similar developments in knowledge, skills, values, and attitudes can be detected in reflections related to all case projects: 1) awareness of the urgency and necessity of global transformation; 2) critical assessment of sustainability issues and oppressive systems; 3) reconsideration of one's own values, positions, and roles; 4) commitment to building shared values; and 5) motivation to foster change across cultures. Table 3 illustrates students' learning journal reflections on their values-thinking experiences in BIP1-3.

Table 3

Values-thinking skills development, sample reflections, and level of reflection in learning journals

Skills developed	Sample quotes	Level of reflection
BIP1:		
1) Awareness of the urgency of sustainability issues	(S19) *"I know now that the [cocoa] industry needs to change and become more sustainable."*	(S19) Awareness
2) Assessment of current sustainability actions and oppressive societal structures	(S25) *"For me, human rights are important when buying chocolate, but I don't always think about the environmental impact of chocolate production when buying it."*	(S25) Evaluation

Skills developed	Sample quotes	Level of reflection
3) Assessment of one's own values and lifestyles	(S24) *"My values have changed slightly. At the beginning of the course I was resistant to changing my buying behaviour because I always considered price as the most important factor."*	(S24) Evaluation
4) Motivation to improve knowledge, attitudes, and behaviour to inspire collective change	(S13) "*We all feel like we are in front of a very complex problem and that we really want to do something to change it."*	(S13) Regulation
5) Motivation to negotiate shared values across cultures to drive global change	(S5) *"I think it's very important to make sustainable changes to our thinking and behaviour now that we have the chance. I like this project because we are encouraging young people to change their lifestyle."*	(S5) Regulation
BIP2:		
1) Awareness of the necessity of transformation	*(S5) "We must tell everyone that sustainability is not just a fancy label. It is the only way if we want to enjoy our environment in the long run."*	(S5) Awareness/Regulation
2) Assessment of global sustainability issues and stakeholder expectations	*(S25) "It's important that companies be efficient and thoughtful of our resources, our Earth. They need to be fully transparent in employing policies and practices that are sustainable and respect human rights.*"	(S25) Awareness/Regulation
3) Assessment of personal goals, values, and habits	(S17*) "Self-reflection and soft skills became more important to me. I think they are more important than academic knowledge at this stage of the project."*	(S17) Evaluation
4) Emotional and ethical commitment to sustainability actions	(S13*) "I want to live sustainably, I have a big heart for nature and animals, so I attach a lot of importance to this. I am careful not to go on holiday by plane."*	(S13) Regulation
5) Motivation to raise awareness, inspire, and instruct to drive global change	(S6) *"I really want to discuss sustainability in tourism with our target audience."*	(S6) Regulation
BIP3:		
1) Awareness of cultural differences in values	*(S5) "I learned a lot about working with people from other countries, and it made me realise that not everyone has the same values."*	(S5) Awareness
2) Awareness of personal value developments	*(S9) "The intensive week was such an eye-opener. I got to meet so many new and amazing people and learned about new cultures.*"	(S9) Awareness

Skills developed	Sample quotes	Level of reflection
3) Assessment of shared values and mutual respect	*(S1) "I appreciate that we all were open and friendly to each other. We respected everyone's opinions and made it work."*	(S1) Evaluation
4) Motivation to reconsider roles, values, and habits	*(S12) "I must work on not being so ruthless to myself and others on my team. I shouldn't have unrealistic expectations for these types of projects. I believe these are things I have to work on through experience*."	(S12) Regulation
5) Motivation to develop attitudes and behaviour to facilitate change across cultures	*(S5) "We decided the next day to first talk about team values and rules before continuing the project. We all wrote down what we wanted from this team and the keys to good communication*."	(S5) Regulation

Collaborative competence developments

The guided questions in the learning journals have a strong focus on the analysis of teamwork, as teamwork plays a central and tangible role in students' digital storytelling projects. De Prada et al. (2022) claim that even though soft skills, including teamwork, are often indicated as a requirement in job adverts, little research focuses on the student's level of different teamwork skills and advocates convincingly for stronger support and development of teamwork in curricular and extracurricular activities of university programs. De Prada et al. refer to a test designed by O'Neill et al. (1999), focusing on six key soft skills for teamwork: coordination, decision-making, leadership, interpersonal development, adaptability, and communication. Our results show that students refer to similar components of interpersonal competence when asked to reflect on the successes and challenges of their teamwork experience and roles. We approach interpersonal/ collaborative competence as "the ability to engage and inspire team members and stakeholders in ways tailored to their knowledge and needs" (Table 1) and adapted the soft skills listed by O'Neill et al. as a model for coding and categorising our students' reflections on their collaborative competence. Based on the learning journals, our students developed the following skills in all three digital storytelling case projects: 1) transparency about the distribution of workloads; 2) inclusive decision-making; 3) shared leadership; 4) empathy and adaptability; and 5) engaging communication. Table 4 illustrates students' learning journal reflections on their collaborative experiences in BIP1-3.

Table 4

Collaborative skills development, sample reflections, and level of reflection in learning journals

Skills developed	Sample quotes	Level of reflection
BIP1:		
Empathy and adaptability	*(S9) "I think it is still important to look at the other dimensions of sustainability and to hear the opinions of all team members on such a controversial topic."*	(S9) Awareness

Skills developed	Sample quotes	Level of reflection
Engaging communication	*(S12) "We need to work on our team communication (especially concerning myself – I'm not very talkative and keep myself back most of the time)."*	(S12) Evaluation
Shared leadership and inclusive decision-making	*(S11) "I like to control and lead everything, and I know that having a leader in the team is important, but I feel that sometimes I don't listen enough to others' ideas although that's the point of the course and I know it is important that everyone participates in the project."*	(S11) Evaluation
Empathy and adaptability	*(S11) "Sharing with my team and listening to my team members' ideas was helpful. Being able to question my own idea was also useful and helped me to write a better character arc."*	(S11) Evaluation
Transparency in distribution of workloads	*(S14) "I suggested that we should share the responsibility along with tasks based on our skills or knowledge because I felt like I was doing too much."*	(S14) Regulation
Empathy and adaptability	*(S5) "I consider that I got better at learning from others and understanding that my ideas may not be always the best."*	(S5) Regulation
BIP2:		
Inclusive decision-making and shared leadership	*(S28) [It is important] "not to be afraid to express your opinion or point of view on some ideas and to be able to tell when you disagree and not just get along because the majority says so."*	(S28) Awareness
Empathy and adaptability	*(S25) "I think people weren't ready for my honesty. If I have something to share and I think it's okay to address it then I will because it's best to be real all the time than to pretend to be something we are not."*	(S25) Awareness
Dealing with language / communication challenges	*(S13) "Of course, there are also small moments when I want to say something but find it difficult to express myself because I don't quite know how to pronounce a word and then it gets stuck. I think it is quite a challenge for me to have entered into this."*	(S13) Evaluation
Engaging communication	*(S18) "I would keep myself and my team members motivated by reminding us of our purpose and not forgetting what exactly we are doing the work for. In addition, I think an enthusiastic and positive mindset will also help to stay motivated, so I hope I can contribute to this through my positive attitude."*	(S18) Regulation
BIP3:		
Shared leadership	*(S2) "Our team spirit was great since day one. We made the decisions together and listened to what*	(S2) Awareness

Skills developed	Sample quotes	Level of reflection
	everyone had on their mind. Dividing the roles came naturally, everyone picked a role which felt comfortable and they might have some previous experience on it."	
Transparency in distribution of workloads	*(S12) "I felt a lot of the workload fell on me and R. due to us speaking the most during the first days of the course (we were trying to break the ice > team chemistry)."*	(S12) Evaluation
Inclusive decision-making	*(S3) "In the team division part, the quietest ones may not share their opinion if there is too dominant a person in the team and we see each other for the first time."*	(S3) Evaluation
Adaptability	*(S8) "Generally speaking, it is good to have a plan as it gives a clearer picture of what one is going to do and how. However, changes are inevitable, better ideas might pop up later, one can develop more effective ways of doing things and acquire new knowledge, so the plan is just a roadmap. Sometimes one just wants to make a turn to a small street to explore what is there, but you can never do that if you want to control everything and set up everything in advance."*	(S8) Regulation

In what follows, we will discuss the answers to our research questions one by one.

RQ1: Judging from their learning journals, how did HE students manage to develop their values-thinking and interpersonal competences in collaborative digital storytelling projects across cultures?

Based on our qualitative content analysis illustrated in Table 3 and Table 4, we can say that digital storytelling as a pedagogical approach is well-suited to fostering sustainability competences across cultures. Our examples show that students in all our digital storytelling projects managed to develop their values-thinking and interpersonal/collaborative competences through their project-based collaborative learning in multicultural teams. Despite differences in the course implementations, sustainability challenges, and learning journals between projects, similar types of knowledge, skills, values, and attitudes were brought up and discussed in students' reflections. The learning journal templates used for BIP1-3 consisted of guided questions to induce students to reflect on their learning and develop critical understanding. The guided prompts and questions succeeded in supporting students to make visible their feelings, opinions, attitudes, and personal takeaways along with ideas for future development.

RQ2: In their learning journals, how well did HE students manage to reflect on their sustainability competence development and show critical self-awareness of their learning?

Based on the learning journals, and as illustrated with direct quotations in Table 3 and Table 4, students managed to develop competences in critical self-awareness and reflective and self-regulated learning in line with the intrapersonal/self-awareness competence definition in Table 1.

Students in all our digital storytelling projects managed to reflect on their learning experiences on levels of awareness, evaluation, and regulation (Alt et al., 2022; Wilson & Clarke, 2004). Our qualitative content analysis demonstrated that some students were able to go beyond mere awareness of their learning experiences and engaged in an active evaluation of their learning successes and challenges. Students in all our case projects also engaged with regulating their learning and demonstrated motivation to change their attitude and behaviour and reconsider their positions and roles to be better equipped for future projects and sustainability challenges. Even though there is a hierarchy in quality between the three levels of reflection, it must be noted that in the context of sustainability competence development, an increase in the level of students' critical awareness is already of crucial importance and a prerequisite for building meaningful engagement with larger and more complex societal and global sustainability challenges.

The content analysis of the learning journals also revealed challenges typically related to reflective learning and writing (Chan & Lee, 2021; Redman et al., 2021). We found that especially in situations of team friction or conflict, team members may not be entirely honest with their assessments and evaluations, finding it difficult to reveal their innermost thoughts and assess their own role and contribution in such situations. To make students more reliable evaluators of their experiences, teachers need to provide continuous formative feedback and encourage students to be aware of, evaluate, and regulate their competence developments in line with the project learning objectives (Gardiner & Rieckmann, 2015; Migliorini & Lieblein, 2016).

RQ3: What were the respective challenges and best practices of reflective learning through a fully online approach during COVID-19 and through blended learning implementations after COVID-19?

In BIP1 the teamwork took place completely virtually and online. However, the fact that teamwork was at the core of the project was seen as positive by students since many courses in the emergency remote teaching period did not foster collaborative learning, and students were often forced to learn on their own (Chen, 2021). Cooperative tasks increased students' motivation, and with the learning journals students felt that their voice was heard. By comparing the length and depth of the learning journals between all BIPs, an increased level of commitment to journal writing could be observed in BIP1, where students were open to expressing their feelings and attitudes in-depth and illustrated their experiences with extensive journal entries and detailed examples.

In contrast with BIP1, which was fully online, BIP2 and BIP3 included physical mobility when students worked face-to-face in multicultural teams. The blended format and its in-person component were found to be highly inspiring by students, which somewhat affected their patience to commit to written reflection. The learning journals of BIP2 were of good quality, but not nearly as elaborate as those of BIP1. As a pedagogical recommendation, teachers should carefully explain to students the short-term learning benefits and long-term career benefits of reflective writing. Furthermore, students should be helped to understand how reflective writing can make them better prepared to deal with the potential challenges of both online and in-person multicultural teamwork later in their studies or in the world of work.

In BIP3, the in-process reflection was carried out in the form of regular coaching discussions with each team, and some of the students submitted retrospective written reflections after the course. These reflections were significantly less detailed than those in BIP1 and BIP2. In BIP3, students'

reflections show awareness of their learning experience, but they do not often engage in deep evaluation of their learning experience. The in-person coaching and scaffolding and the guiding questions of the journal template were expected to pave the way for an in-depth self-reflection concerning students' learning experiences. However, despite the explicit encouragement to illustrate their thoughts with personal examples, many students' reflections included comments on a rather general level without specifying further ("Learning as part of a project team was great. It worked so well for me." (BIP3_S7). Only a few students who perceived challenges in collaboration and teamwork provided more detailed examples. Our pedagogical recommendation is that to inspire students of blended implementations to commit more to reflective writing and learning, teachers should provide them with a psychologically safe learning environment based on mutual trust and robust support for overcoming their "ethical and emotional discomfort when sharing personal feelings and innermost thoughts" (Chan & Lee, 2021).

Conclusion

The data for the present study was gathered through students' semi-structured reflective learning journals from three digital storytelling case projects (BIP1-3) and analysed by means of qualitative content and thematic analysis of their learning experiences from the perspectives of 1) sustainability competence development and 2) quality of self-awareness and critical reflection. The case projects shared a similar real-life sustainability challenge that was approached through similar digital storytelling processes and forms of teacher support, and students' learning journals contained similar thematic prompts. The differences between the case projects lie in the format of the intensive program and the stage of writing the learning journals. BIP1 was fully virtual and online, while BIP2 and BIP3 were blended with an in-person component. The BIP1 and BIP2 journals were written during the collaborative digital storytelling process, while the BIP3 journals were retrospective reflections. Based on the qualitative content analysis of 67 learning journals, we identified skills developments related to the values-thinking, interpersonal/collaborative, and intrapersonal/self-awareness competences and discussed challenges and best practices of remote (virtual and online) and blended (virtual, online, and in-person) learning during and after COVID-19.

Our analysis demonstrated that the fully virtual and online remote learning project during the pandemic created conditions that supported HE students' interest in and commitment to introspective self-awareness and reflective and self-regulated learning. The blended learning implementations after the pandemic, by contrast, brought about conditions where students tended to grow more impatient towards reflective practices and lacked commitment to assessing the interpersonal, emotional, and ethical aspects of their learning process. We, therefore, suggest that higher education projects actively explore ways to inspire students to engage in deep reflection to improve their academic and professional sustainability competences and enrich their digital and in-person collaboration with international peers.

Conflict of Interest

The author(s) disclose that they have no actual or perceived conflicts of interest. The authors disclose that they have not received any funding for this manuscript beyond resourcing for academic time at their respective university. The authors have produced this manuscript without artificial intelligence support.

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