ENTANGLEMENTS OF POSTHUMANIST BILDUNG IN VIRTUAL LEARNING ENVIRONMENTS

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ABSTRACT

This study investigates processes of *Bildung* in the entanglements of space, time, and student collaboration in a Virtual Learning Environment, itslearning. It is a novel approach as the theoretical framework of posthumanist *Bildung* was introduced in 2017 by Carol Taylor. The data was read with theories on posthumanist *Bildung* during the diffractive analysis to understand differences in the entanglements between human agents (participants) and non-human agents (deadlines, delayed communication, course content, online posts). The questions pursued are as follows: In what ways are space, time, and student collaboration entangled in the Virtual Learning Environment? What effects do these entanglements produce in the material-discursive practices during the course? Data are reflections by 62 participants in an online course in a Finnish university of applied sciences (2018). The implications of the study are that collaboration in Virtual Learning Environments can involve many entanglements (e.g., cognitive/emotional, theoretical/practical, personal/professional) that matter and are meaningful to the participants because these entanglements are produced in relation to other people and to the time and technologies available.

Keywords: posthumanist *Bildung*, higher education, distance education, MOOC, entanglements

1. Introduction

This article is an empirical study in higher education where we wonder about entanglements of space, time, and student collaboration in relation to posthumanist *Bildung*. Posthumanist *Bildung* is a nascent field, introduced by Carol Taylor (2017). It offers new ways of perceiving *entanglements* of how humans do, know, and act in relation to spaces and the difference these entanglements can make. Taylor (2017) calls these entanglements *knowing-in-becoming,* which includes emotion *and* cognition *and* doing. Posthumanist research moves beyond dichotomies like emotion or cognition, theory or practice, human or machine to avoid drawing sharp edges around concepts. Instead, it studies the messiness of human existence in a material world and the entanglements of body, mind, and space (Bayley, 2018).

According to Taylor (2017), the agency of spaces and humans both matter in posthumanist *Bildung*. "The environment is not just a reser-voir of information whose circuits await mapping, but also a field of forces whose actions await experiencing" (Deleuze, 1988, p. ii). The people acting in a particular space matter, but space also matters (Barad, 2007). The space for learning is more than a container of information; it becomes an agent through all the actions it is entangled in. People log onto a Virtual Learning Environment where they act through/with/in the digital system. People share and shape the space with other human agents (teachers, students, IT-personnel), with non-human agents (quizzes, texts) and more-than-human agents (chatbots, personalized digital feedback). Entanglements in a digital space may include all of these agents, depending on their effects on the different agents' actions.

Researchers consider Virtual Learning Environments to be digital environments synonymous with e-learning or distance education (Annetta, Klesath & Folta, 2010; Bates, 2005; Weller, 2007). In distance education, time and space are of interest as the general definition of distance education is that teachers and learners are separated by time

and space (Moore, 2015). Student collaboration is often included in online courses to support social interactions between participants to reduce isolation and distance between learners (Anderson & Dron, 2011; Cherney, Fetherstone & Johnsen, 2018). Previous studies on online collaboration offer diverse perspectives on the phenomena. For example, measurements of communication patterns in online discussion forums (Oztok, Zingaro, Brett & Hewitt, 2013). The importance of creating a sense of belonging within the online community to avoid alienation among students who are navigating a digital platform and collaboration at the same time (Peacock, Cowan, Irvine & Williams, 2020). Psychological and cognitive factors for collaborative learning online are other areas of previous studies (Cherney et al., 2018). However, posthuman theories that move beyond material and psychological dimensions are, to our knowledge, rarely included in studies on collaboration in Virtual Learning Environments.

This article's authors collected the empirical data during a distance course in a Finnish university of applied sciences (2018). The course topic was leading teams, and it lasted five weeks during the summer semester (June–July). The data are written reflections by 62 participants from different higher education institutions. The questions pursued in the article are as follows: In what ways are space, time, and student collaboration entangled in the Virtual Learning Environment? What effects do these entanglements produce in the material-discursive practices during the course? The students collaborated asynchronously on the digital platform, itslearning. It provided the participants with the flexibility to work or travel while studying. The participants read the course material before they took part in the online discussions by adding posts to a discussion forum. It made us consider spatial and temporal aspects of the course when the collaboration was, so to say, produced differently than if participants would meet in a synchronous videoconference or if they were free to choose the platforms they wanted to use for collaboration.

Jeremy Knox (2016) has studied Massive Open Online Courses (MOOC) in higher education from posthumanist perspectives. A MOOC can involve hundreds or thousands of participants and be designed in different ways. Some MOOCs are incredibly flexible; other courses are more structured. Some MOOCs include only individual course work, while others are designed for collaborative tasks. However, MOOCs generally build on humanist assumptions of the participant as an autonomous, rational, and self-directed learner that initiates online activities. The idea is that every participant should reach the same learning goals and that each participant has the same skill set to do so; this derives from the humanist position where everyone is essentially the same (Knox, 2016, p. 309). The course design often builds on feedback from non-human or more-than-human actors in the digital system, while few human interactions are included. Generally, the digital space is seen as a neutral tool. However, the universities and their partners, the technologies used, the required activities on the platform, and the data gathered about participants are examples of the complex entanglements between humans and non-humans. Previous research rarely addresses these kinds of entanglements when MOOCs are concerned (Knox, 2016).

The distance course studied in this article is a MOOC with around 240 participants with diverse backgrounds and different motives for taking the course. Besides the individual and collaborative tasks, the course design also included social interactions with the teacher via chat or email. According to Knox (2016), this is one way to challenge humanist and universal assumptions about course participants and provide support according to their individual needs. Furthermore, Knox suggests that posthumanist research can enrich distance education by acknowledging the digital platforms' agency and their role in the relations established during courses. Although MOOCs claim to offer courses at a time and space convenient for the learner, a typical outline is a linear course structure that requires participants to complete a topic before moving on to the next. This outline suggests that all learners learn at a certain pace and in a particular sequence. It forces participants to follow a timeline set by the university and understand the content within the platform. In contrast, students engage less with the outside world and knowledge outside the university. Knox questions the fast-paced and efficient ideas embedded in many MOOCs and if they allow time for reflection among participants. These ideas seem to cater to a certain kind of autonomous learner responsible for very few humans and non-humans besides himself. These are some temporal and spatial

entanglements that posthumanism addresses, which matter for distance education if it is to be inclusive, responsible, and ethical in the future (see also Bayley, 2018).

The article continues with a brief background on *Bildung* and posthumanist *Bildung* (section 1.1). After that, we establish the theoretical frame of posthumanist *Bildung*. We discuss the key concepts (entanglements, material-discursive practices) for the analysis in section 2. In the third section, we present research on collaboration in Virtual Learning Environments to provide a contextual frame for the article. We discuss the diffractive analysis in the fourth section. The results (section 5) are then presented, followed by a discussion (section 6). A general conclusion ends the article.

1.1. Background

Bildung has a long and rich history. According to Rebekka Horlacher (2016, p. 118), "*Bildung* adapts to different historical, social, and cultural contexts without losing its relevance or significance…the term's strength lies in its inconstancy, openness, and arbitrariness." A basic definition of *Bildung* is "cultivation of the inner life" (Biesta, 2003, p. 62). It means a process of self-improvement where transformations of the Self take place in relation to culture (i.e., the society). *Bildung* is a German concept closely related to education, often translated to self-cultivation in English (bildning in Swedish, sivistys in Finnish, dannelse in Danish and Norwegian). Michael Uljens (2003) defines *Bildung* as a never-ending personal process - open, reflective, intellectual, and moral - interlinked with culture, other people, and efforts for a better world. Human beings need to interact with the world to take part in processes of *Bildung* - these processes are about personal development *and* making the world better for others. *Bildung* assumes that human beings have an *ethical responsibility* for others (Horlacher, 2016). Dietrich Benner (referenced in Horlacher, 2016, p. 119) suggests postmodern *Bildung* mediates between the individual and society, without sacrificing individuals' needs to those of society, or vice versa.

Posthumanist *Bildung* belongs to a postmodern and critical strand of the *Bildung* tradition (Taylor, 2017). It questions the focus on inner life and personal reflections. A humanist position may disregard other species and material aspects of educative processes. Posthumanist *Bildung* offers analytical tools to understand human and non-human agencies for being/knowing/doing, or "the materiality of educative relations" (Taylor, 2017, p. 422). The Self is not detached from the world or an outside observer. Human beings are frequently involved in many different kinds of meaningful relationships. Some relationships are with other human beings or other species. Some relationships are entangled within spaces, time, and technology.

Virtual Learning Environments may offer space and time for entanglements between course participants, course materials, and with different non-human and more-than-human actors. However, Virtual Learning Environments are not neutral, nor are they the only answer to educational questions on organizing education in the future. Distance education can be part of the solution, but a posthumanist *Bildung* investigates the messiness of it all and the troubles it brings too (Taylor, 2017). For example, collaborative online writing can empower students to produce better texts if they can access digital tools (chats, video conferencing, online documents, information) to structure their collaboration and texts (Hilli, 2019). Interactions with classmates and teachers may offer support and feedback to focus further and strengthen the text. Online collaboration can also quell the individual writing style in favor of team consensus, forcing students to lower their writing standards, constraining their agency. Difficulties in accessing information or lack of timely communication with the group may further complicate the writing process (Hilli, 2019).

2. Posthumanist *Bildung*

Carol Taylor (2017, p. 433) defines posthumanist *Bildung* as a matter of spirituality *and* materiality to make a material difference in the world. It is sensitive to the agencies of other humans, animals, non-humans, more-than-humans, and the materiality and embodiedness of human existence. Posthumanist *Bildung* is about

being/becoming/belonging in the world and being aware of the relationships taking shape and the part other agents play in them. "A posthuman *Bildung* is, therefore, nothing more or less than education as an ethico-onto-epistemological quest for (better ways of) knowing-in-being" (Taylor, 2017, p. 433). It means ontological, epistemological, and ethical entanglements of humans of the world, with the world, and for the world. Instead of dividing the content to be learned from the process of learning, or the learners, or theories from practice, posthumanist *Bildung* sees them as entangled in students' "knowledging" (Taylor, p. 430). In education, course content and learning goals are examples of material agents that co-constitute *material-discursive* knowledge processes. Processes of *Bildung* would then be entanglements of material-discursive practices course participants are embedded in, affect, and are affected by during their studies. Essential concepts for the analysis are *entanglements* and *material-discursive practices*.

Annouchka Bayley (2018) explains becoming and embeddedness as being in flow, just as space, time, and matter are also already in motion. Students carry with them knowledge, experiences, fears, and are entangled in many spaces that matter to them. Therefore, these entanglements should matter to educational practices. Thus, posthumanism moves beyond dichotomies, for example, human and non-human, space and action, cognition, and emotion - they are seen as co-constitutive of each other. Karen Barad (2007, p. 185) explains it as follows:

> Practices of knowing and being are not isolable; they are mutually implicated. We don't obtain knowledge by standing outside the world; we know because we are *of* the world. We are part of the world in its differential becoming.

To Barad (2007, p. 139), matter is not limited to the material world and physical spaces. Ideas are entangled with matter making the discursive world entangled with the material world. Both are essential for knowing/being/acting in the world. Barad uses *material-discursive practices* for the relationships between matter and meaning and the effects they have on each other through entanglements or intra-actions. Entanglements bring focus to boundaries/effects/differences of material-discursive practices (Barad, 2007, p. 140–141). To Barad, material-discursive practices are entangled in intra-actions produced and performed forever - much like *Bildung* processes that are never finished and ongoing forever.

Rosi Braidotti (2019) discusses two concepts that we relate to *Bildung*; posthuman knowledge and affirmative ethics. To Braidotti, posthuman knowledge is non-linear, non-hierarchical and a shared effort within a community of learners that transverses, for example, local and global, nature and technology, time, and space. Affirmative ethics (Braidotti, 2019, p. 166) stresses the relationships we are involved in and the responsibility we have to create a community of empowerment and "ethical propensity". In this study, the context of student collaboration at a distance may benefit from the posthuman turn for several reasons. It implies a turn towards knowledge as something situated and enacted in between people and in between people and technology. Collaboration in a posthuman view includes an ethical responsibility to respect multiple agents and welcome and empower others to collaborate actively.

In this article, agency is extended to the course participants, temporal and spatial matters in the online course's material-discursive practices. A previous study on upper-secondary school students' collaboration suggests that Virtual Learning Environments can offer communicative spaces for empowering students to act for the benefit of their fellow course mates and the world (Hilli, 2018). Immediate and delayed forms of communication can make the process diverse and inclusive within a group of students. The process was signified by participants' theoretical, practical, and ethical knowledge to understand and act in the digital space (Hilli, 2018). It is one way to understand human and non-human entanglements and complex material-discursive practices taking shape during a course through the participants' backgrounds, the design of the learning environment, the selected content, and the methods or activities participants take part in. In the next section, we discuss virtual collaboration and previous research on it.

3.   Collaboration in Virtual Learning Environments

Online collaboration is a growing research field within distance education, partly because technological developments have made collaboration possible. Social psychological approaches to learning (social constructivism, sociocultural theories) have also influenced platform and course designs (Anderson & Dron, 2011). Cherney et al. (2018) did a meta-synthesis on small group work in online courses and found conflicting results (e.g., group size) and definitions (e.g., social presence). The authors identified a lack of theoretical frameworks and empirical research on effective teaching strategies for online collaboration. The most common theoretical framework was social constructivism and knowledge as constructed through social interactions. The authors suggest a need for experimental studies that measure specifically cognitive outcomes since many studies investigated affective outcomes (e.g., student satisfaction). Educational researchers did most studies, and there was a lack of interdisciplinary perspectives. The role of communication in digitally mediated environments was rarely included in previous research. However, it requires more exchanged messages between users to achieve the same closeness level as in face-to-face interaction.

Benefits of collaboration include student appreciation for the knowledge group members bring to the discussion, leading to deep learning and new perspectives. Other advantages include improved knowledge acquisition, retention, accuracy, the creativity of problem-solving, and higher-level reasoning among students (Barkley, Major & Cross, 2014; Pascarella & Terenzini, 2005). Students perceive collaboration as fun, and it allows them to get to know fellow students better. Cabrera et al. (2002) found that cooperation supported college students' openness to diversity, appreciation for fine arts, their development of interpersonal relationships, and active and responsible citizenship - aspects closely related to *Bildung* (cf Horlacher, 2016) and posthumanist *Bildung* (Taylor, 2017).

Issues with collaboration include a reluctance to take part in collaborative tasks for different reasons. Students do not want to rely on others to complete a course and prefer individual assignments (Barkley et al., 2014). Students may lack interpersonal skills and avoid communicating with group members. Some students do not fulfill their commitment to the group and do their part of the group work. Peacock et al. (2020) suggest that online group work is a flexible way to provide learners with relevant resources and educational opportunities. However, studies show that learners are reluctant to participate in online discussions because they lack academic skills. Learners may also miss a sense of belonging with the group and in the online environment, which is why community building and relationships between learners are essential.

Linda Harasim (2012, p. 102) suggests certain discourses characterize discussion forums: place-independent, time-independent, many-to-many, text-based (with multimedia), internet-mediated. Forums are accessible from any device that is connected to the internet. Users can include texts, videos, graphics while communicating. Participants can access information outside the learning platform too. Forums are accessible 24/7, and asynchronous tools offer participants the flexibility to communicate at a suitable time and in a place of their choosing. The group discourse supports interactions between participants and the different perspectives they bring with them. Discussions can provide diversity through several views, and shared knowledge-creation processes can be creative. However, discussion forums are rarely designed to follow the phases of collaboration. It can be cumbersome for users to organize online discussions with voluminous posts or threads on different topics (Harasim, 2012; Weller, 2007).

Virtual Learning Environments often include collaborative tools (e.g., discussion forums, shared documents) that can be used for different group tasks and within different time frames (Annetta, Folta & Klesath, 2010; Bates, 2005; Weller, 2007). Online interactions between students can be delayed (asynchronous) or immediate (synchronous). Asynchronous communication gives students the flexibility to add comments when they have the time for it, and they can reflect on the content and the discussion before answering. Synchronous communication adds to the spontaneity between participants, and questions or comments can be addressed by teachers or participants immediately. It is less flexible than asynchronous communication as it requires group members to be present in the

same online space at the same time (Falloon, 2011; Weller, 2007). Adult learners are assumed to prefer asynchronous discussions because of their schedules and many other engagements (Hrastinski, 2008; Oliveira, Tinoca & Pereira, 2011).

Asynchronous communication can leave participants feeling isolated from their peers, leading to decreased learning (Weller, 2007). Samuels-Peretz (2014) investigated interaction patterns in asynchronous discussions in an online course. The online discussions allowed equitable participation, and the focus of the discussions was on the content rather than popularity (e.g., likes, ratings). The others generally ignored students who did not add anything new in their posts. Samuels-Peretz suggests that participants may be unsure of how to participate, and model examples from the teacher may be one way to establish guidelines for the discussions (cf. Peacock et al., 2020).

Oztok et al. (2013) investigated students' usage of synchronous and asynchronous tools in online courses at a Canadian university. They introduced a synchronous instant-message function for participants to exchange private messages instantly or once they logged on to the digital platform. Participants could add and reply to notes on an asynchronous discussion board. Asynchronous discussions automatically created a thread where all notes were visible. The authors found that the most avid asynchronous users also actively used synchronous messaging. Previous research confirms that students combine different modes of communication for various purposes. Drawbacks of synchronous written communication include difficulties of seeing the links between messages (Holmer, Lukosch & Kunz, 2009) and the lack of technology to moderate the discussions (Harasim, 2012).

Previous studies on online collaboration suggest cognitive, emotional, and relational aspects can become entwined within the collaboration. Some participants seem to struggle to take part actively. Spatial aspects seem to matter as participants may have access to different or few tools for collaboration. The communication between group members can be organized and enacted in different ways on a digital platform. In the next section, we discuss the method of data collection and analysis.

4. A description of the online course and the Virtual Learning Environment

The context of this study was an online course on team leadership in a Finnish university of applied sciences (June–July 2018). The course was a part of a three-course module, all online and all related to leadership. Three teachers had developed it over some years. The course had 241 participants from different universities and disciplines, and most students did not know their peers. The language of instruction was English. The coaching teacher (Tigerstedt) had made teams of ten people and discussion forums for each team. All discussion forums were visible for all participants.

The learning goals were: 1) Formulate, theoretically motivate and discuss team leadership and successful working in teams. 2) Critically discuss different leadership and team theories. 3) Understand and interpret the importance of shared visions and the meaning of the whole in successful team performance. 4) Demonstrate and discuss a variety of team leadership strategies and tools that are adaptable to different and challenging work situations. 5) Show increased leadership efficiency in teams. The formative examination consisted of individual and team assignments. The assignments and digital tools were as follows: 1) Active participation in a discussion forum (team-wise discussions with a clear aim or topic). 2) Completion of quizzes. 3) An individual blog assignment. 4) A team assignment consisting of a written report on a specific course topic. 5) Active participation in peer-reviewing the team reports of other student teams.

The course content was published weekly for five weeks. Some elements or assignments had to be done during a specific week, after which they closed. Other tasks were open throughout the course. It was not a purely self-paced course since this would have led to challenges in the collaborative phases. The coaching teacher had weekly online office hours for synchronous support and offered asynchronous support via e-mail and the LMS messenger service (itslearning).

The main tools were discussion forums and shared online documents. Most groups used asynchronous communication in the discussion forums. Some groups included synchronous group chats on social media (e.g., WhatsApp, Messenger). The course took place on the university's online platform, itslearning. The platform was familiar to most students. Below is a screenshot of the course assignments in the Virtual Learning Environment.
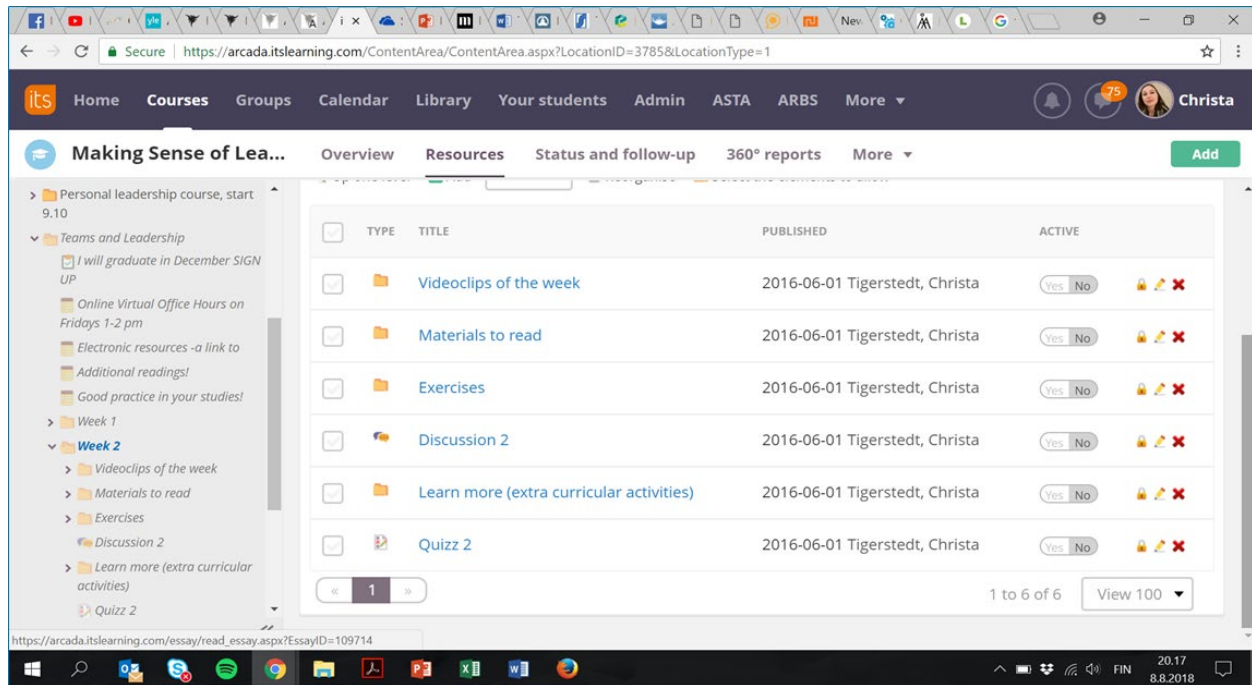
Picture 1. Screenshot from the course learning environment.

The data and ethical considerations

The data were three written, individual reflections on the online assignments; in the beginning, midways, and at the end of the course. The reflections were between one and three pages long. The reflections were written in English, although most participants were not native English speakers. Grammar errors have been corrected to improve readability. The higher education institution approved the study before the course began. The coaching teacher informed the participants about the study when the course started. 90 participants out of 241 agreed to take part in it. Sixty-two participants (36 women, 26 men) turned in all three reflections leaving the authors of this paper with 186 reflections on 68 pages.

Analytical cuts

The diffractive analysis (Barad, 2007; Bozalek & Zembylas, 2017; Lenz Taguchi, 2012) of the entanglements in the Virtual Learning Environment meant reading the reflections with theory and through each reflection. The reflections were printed out, interesting sentences were highlighted, notes were made on paper, and post-its, while the final writing process took place in an online document. Reading became an act of infolding where each reflection deepened the overall understanding, continually adding to the infold. The literature on diffractive analysis and posthumanist *Bildung* was likewise read several times, making the reading a slow process as it added another infold (Haraway, 2007).

Diffraction is driven by a desire to add new knowledge to the field and change the future (Barad, 2007). Diffractive patterns discern where differences occur and when patterns of differences are produced (Haraway, 1997, p. 34).

Diffractive patterns matter in *material-discursive practices* as they affect how the practices unfold (Barad, 2007, p. 72). Five agential cuts were made at entanglements that enacted the boundaries within the entanglements (Barad, 2007). Patterns of differences were identified in the entanglements of the human agents (the participants) and temporal and spatial agents that mattered for the collaboration.

The diffractive analysis is not representative. It shows the differences found in the data. Other cuts would show other boundaries within other entanglements (Bayley, 2018). Entanglements are difficult to study since they "change from the moment to the next or from one place to another" (Barad, 2007, p. 74). New studies will undoubtedly shed a different light on collaboration in Virtual Learning Environments as the contexts of and actors involved in the entanglements will be different. One of the authors (Hilli) analyzed the reflections while the other author taught the course and provided knowledge about the context and access to the data (Tigerstedt). Both brought something to the analysis when the data collection was planned and initiated. Once the analysis was underway, both were affected by it, exemplifying the researchers' ontological, epistemological, and ethical entanglements with the data and the results (Barad, 2007). In the next section, we present the five agential cuts that transverse the spatial and temporal entanglements within the collaboration.

5.   Analysis: Spatial and temporal entanglements in online collaboration

The sections below include the five agential cuts of the analysis. We have included excerpts from the data to give the participants a voice. They provide examples of the differences in the data and the deeply entangled material-discursive practices. The sections are divided by headings that follow the process of infolding described above and the *spatial* and *temporal entanglements* with *material-discursive practices* in the course.

Agential cut 1: *Online collaboration as experimenting with conflicts.* The first cut identified entanglements of material-discursive practices among the participants. Personal and professional motivations to take the course that was entangled with the content and materials of the course and method of collaboration. The human agents (the participants) faced authentic conflicts during the collaboration that made theories on conflict management relevant. They reacted differently to the conflicts. Some participants became more active and took charge of the discussion by adding more posts in the discussion threads to motivate and include others. Some participants withdrew from the collaboration and stayed silent when they received no response from their team members.

Agential cut 2: *Online collaboration whenever/wherever.* In the second cut, temporality and spatiality were entwined as the participants could take part in the course whenever and wherever they had access to itslearning. Personal and professional entanglements meant some participants were working, traveling, or taking time off in different locations, meaning they were temporally and spatially restricted from taking part in the collaboration.

Agential cut 3: *Delayed communication and inaccessible spaces.* Temporal (deadlines) and spatial (internet access, itslearning) entanglements affected the collaboration in the third cut. Deadlines seemed to set the collaboration in motion, while a lack of internet access in some cases became a material strain on the collaboration. The design of the course page in itslearning played its part in the relations established between the group members. In some cases, it created a negative distance between the participants because of the information overload the participants experienced every time they logged on to itslearning. Within that entanglement, a paradox was later identified (agential cut 5).

Agential cut 4: *Online collaboration as shared and extended knowledge.* The fourth cut opened up entanglements between the relations between participants in relation to spatial and temporal matters. In their online posts in itslearning, the participants could share their knowledge on the topics discussed and their personal experiences. The responsibility for the collaborative course work was extended to each group member. In their asynchronous communication, the participants actively decided how to entangle themselves with the content, with the activities, and with the group members.

Agential cut 5: *The paradox of online collaboration.* A surprising spatial and temporal paradox was opened up in the fifth cut. The same flexibility that motivated participants to take a summer course on team leadership also meant delays in communication because group members were not communicating in the same place at the same time around the same content. In some groups, it led to conflicts that participants tried to solve by changing their behavior toward group members. Some participants tried to avoid conflicts by not taking part in the collaboration actively (cf. agential cut 1).

Agential cut 1: Online collaboration as experimenting with conflicts

The participants had professional reasons for taking part in the course as well as personal ones. They wanted to become better team members, leaders, and communicators throughout the course. They also wanted to expand their knowledge and get to know their group members. The participants reacted in different ways to issues with collaboration. Some participants became frustrated, silent, and withdrew from the collaboration, unable to implement the theories they studied during the course. Others saw the conflicts and the course content as practical experiments on how to handle conflicts, and they took an active part in the group communication by responding to posts and by encouraging their team members to take part in the discussions. To some participants, the collaboration offered agency to implement the course content in a practical setting in relation to the group members.

> *The entire course was one big experimenting playground. I found opportunities to create and dissolve conflicting situations in a team discussion, participated in team formation, observed people say one thing and do the opposite.*

Agential cut 2: Online collaboration whenever/wherever

The online course meant flexibility for participants to take part in discussions whenever they had the time and wherever they were. Flexibility was entangled with *temporal relations* such as deadlines and schedules when the group work was concerned. Deadlines set the actions in motion in most groups and created an incentive to collaborate. The deadlines were a cause for concern as other responsibilities (e.g., work, travels) during the summer called for the participants' attention, making the collaboration more difficult or more focused depending on the team. The deadlines were an important part of the course's *material-discursive practice* in relation to the flexible and open group assignments that the groups decided on amongst themselves.

> *I believe that it brings a lot of flexibility - you don't need to be physically present during the class. It is a big advantage, especially during the summertime, as it allows you to work from anywhere and at any suitable time, of course, within the deadlines given. At the same time, this flexibility might be dangerous, as you have to always manage your time properly, not postponing everything till the end, and working constantly.*

Spatial issues with the design of itslearning were entangled with temporal matters relating to asynchronous communication. The design meant the participants saw the posts made by all participants from every group anytime they logged onto the platform. It created a sense of confusion and frustration among many participants. They felt that hidden group folders would have been better for the collaboration to run smoothly. The asynchronous communication did not necessarily support relationships being established between group members. The combination of issues with accessing the group discussions and a lack of communication between group members created problematic disconnections in many groups. Something many participants felt would not have been as acute if they had communicated synchronously, which at the same time would have created a fixed time to meet as a group.

> *I didn't really like the way the discussions were presented or the week plan interface, it wasn't user friendly enough for me, and I didn't see a lot of things when I should have seen them (as some of the discussions*

and surveys). I will definitely try to meet people personally or in a Skype call before starting working with them and make our goals and objectives clear and connect in a soulful/personal way first.

Agential cut 3: Delayed communication and inaccessible spaces

Spatiality and *temporality* were entangled with the *material-discursive practices* of the course as participants im/patiently waited for group members to take the time to respond and to join them in the discussion forum. To some participants, asynchronous written communication in itslearning meant a positive delay in the sense that participants could build on what previous posts had said by relating to what others had written. The relations between the human actors (the participants) were entangled with non-human actors (course materials, online posts) in an on-going discussion that invited group members to continue on threads if they felt they had things to add.

> *Online discussion is nice in the sense that you don't have to try and come up with things to write about yourself, but rather you can just continue on the topics that the other wrote about, which is really nice. I think our online discussions in this course have been OK. I noticed that sometimes the discussion takes place really late in the week, probably because of people doing the reading and watching of video materials later than others and this can be frustrating if you are ready to discuss at the beginning of the week and no one else is there.*

The asynchronous discussions created a *temporal* and *spatial distance* signified by long silences between participants when they were waiting for their group members to respond to get on with the collaborative tasks. The delay forced the participants to wait and postpone their coursework, which aggravated some while others realized the temporal and spatial flexibilities they enjoyed came with a downside when the group work was concerned. Many participants did not have access to the internet all the time, which prevented them from taking part in discussions, depending on their spatial location. To some participants, it also made it more difficult to actively and positively contribute to the collaboration.

> *I'm used to collaborating at my work where we agree on times to work or answer questions, so the discussion format hinders myself from working when I want to. The fact that you must sometimes wait several hours or days to get a response may bug me. Saying that I expected to have better internet connectivity in the countryside so that I could have written and communicated better. Even though I am not as good at it as I would want to be.*

Agential cut 4: Online collaboration as shared and extended knowledge

A good discussion was entangled with several material-discursive practices; *theories* and *practice*, *cognition* and *emotion,* and *personal* and *professional* dimensions. The participants drew on their previous experiences, and they included facts they knew from before or from the course material. Many participants also invited others to share what they knew and what they had learned. Facts became entangled with personal experiences in the written asynchronous communication that ideally was light, fun, or personal, making the discussions interesting and easy to learn from and relate to. It created an important connection within the group at a distance because they showed each other consideration and invited the others to join in the discussions by being friendly, funny, or personal.

> *The best kind of discussion (in the course, Personal leadership discussions were hands down amazing, and we all learned a lot) is when everyone participates because it is easy and you can contribute with own experiences mixed with facts; this way, you get a lot of different perspectives and keep it light - then, it's easy (and fun) to comment and actually DISCUSS; not just post a bunch of facts in a thread. This is why when I comment, I try to ask something from the others, in the end, to make it easier for them to write something because they can start with answering a question. I feel sad that the first discussion wasn't a success.*

The online discussions exemplified *entanglements* between *the human* (the participants) and the *non-human* (assignments, course content) agents. Through other participants' perspectives/actions/responses/feelings, the human actors became part of an extended and shared knowledge practice. They gained access to new worlds the participants would not normally become part of. Together they unfolded personal and course matters by reading what others wrote and actively taking part in the discussion threads. In a sense, they reshaped the course content through the many perspectives available within the group as they moved within the virtual space through their posts. An interesting spatial matter unfolded in the discussions as the collaboration extended to spaces outside itslearning and into the lives and locations of the participants.

> *It's a great way to communicate with various people about the given topics. The discussions have included interesting insights and suggestions that broadens my own thinking. Online collaboration in discussion forums is less meaningful if the participants aren't active. One of the reasons for my active participation in the discussions is that it's fascinating to communicate with various people and to discuss subjects that aren't necessarily the ones discussed with my friends outside of the course or the school. It's interesting to see how they feel and respond to my posts and also how the discussion develops. I hope that I can bring some insights based on my experiences and opinions, that adds to the discussion. Also, by being an active team member, I hope that other students will get more out of the collaboration., That there are as many opinions as there are people. Also, there are a lot of viewpoints that I haven't thought of before someone has brought it up in the discussion.*

Agential cut 5: The paradox of online collaboration

The *temporal* and *spatial* entanglements highlighted a paradox with online collaboration. The participants wanted to collaborate with people online because it was flexible and because they wanted to meet and learn from people from different parts of the country with different backgrounds. They were open to the possibilities of collaboration from the start. Many participants invited group members to extend and challenge their previous knowledge. They also wanted to or had to work/travel and take part in the course in their own time. It meant they could not be tied up to a shared timetable. However, the participants perceived a shared timetable as necessary when decisions needed to be made within a short timeframe brought on by course deadlines or as a way to establish relations between group members. The participants generally agreed on the spatial issues with the open group discussions and the extensive flow of information during the course. Many participants complained of a lack of communication within their groups that halted or disturbed the collaboration. This dissonance suggests the *material-discursive practices* (course design) concerning collaboration did not support all groups. Successful group work seemed incidental and based on if groups happened to have active and engaged members that included everyone in the discussions.

> *I like the way it gives me an opportunity to collaborate with people who come from different schools in Finland. What I find less meaningful is the fact that online collaboration brings challenges with communication. Communicating on Facebook or WhatsApp isn't always working because not everyone can be on a computer all the time, and that way, not everyone can participate in decisions. What makes me very hesitant to participate in the discussion is the fact that this course has extremely many folders and it is really hard to keep up with every assignment and discussion. What makes me eager to join the conversation is that the people in my group were very nice. I hope that my post on LinkedIn would raise interest and questions and obviously some discussion around the topic. Well, so far, I can't name a specific skill I've learned, but at least my attitude became more positive towards online collaboration. Before I thought that it is not an effective way to study.*

6. Discussion

This study investigated spatial and temporal entanglements in student collaboration in a Virtual Learning Environment. Posthumanist *Bildung* (Taylor, 2017) was used while analyzing the data. The following questions will now be addressed: In what ways are space, time, and student collaboration entangled in the Virtual Learning Environment? What effects do these entanglements produce in the material-discursive practices during the course? The diffractive analysis identified entanglements within the collaboration relating to *spatiality* and *temporality* in the online summer course that lasted five weeks. The participants were working full-time or traveling while completing the course. Their entangled personal, professional, and study lives created moments of focus or concentration when they were free or had access to the internet. The course timeline became a temporal agent as it created stress or focus among participants with its deadlines. The Virtual Learning Environment (itslearning) became a spatial agent in the collaboration because of the design of the discussion forums and the course page that created a flow of digital information deeply entangled with what the participants knew, did, and felt.

In five agential cuts, we have opened up spatial (e.g., online, written posts) and temporal (e.g., flexibility, deadlines, delayed communication) entanglements in the Virtual Learning Environment. The participants wanted to take part in the course anytime and anyplace. The asynchronous communication forced participants to wait for replies and respect the timetables of the group members. In some cases, it created time for better replies and comments and time to read the course material in relation to the discussions. In other cases, the delayed communication put a strain on the collaborative processes as participants were waiting for their group members to join them. The asynchronous communication also created a disconnection within many groups because there was a delay in communication, which is in line with previous research on online collaboration (cf Falloon, 2011; Hrastinski, 2008; Weller, 2007).

The participants wanted to take part in the course for different (e.g., theoretical/practical, cognitive/emotional, and personal/professional) reasons, and these entanglements were also enacted when participants communicated with others. Personal development was supported by online collaboration, which is in line with previous research (Cabrera et al., 2002). From a posthumanist *Bildung* viewpoint, the participants were looking to extend their "knowledge-in-becoming" (Taylor, 2017, p. 433) through the personal experiences, the course content, and the knowledge group members shared. Knowledge became something produced between the participants and between the participants and the technology provided. The participants respected the views of the group members and learned much with them. They also wanted to extend that same "knowledge-in-becoming" to their group members by offering their perspectives on the topics discussed. Many participants wanted to empower everybody in their group. In their communication, they related to one another and showed consideration for one another.

Spatial issues with the course page's design on itslearning were entangled with participants' actions or inactions. The participants felt overwhelmed or confused by the information when 240 participants were adding posts every day. This partly confirms the critique by Harasim (2012) and Weller (2007) that online spaces are not necessarily designed to support different collaboration phases. In this study, the participants wanted hidden group folders to ease and focus the collaboration. The discussion threads seemed to support relationships and "knowledging" (Taylor, 2017, p. 430) in many groups. Written asynchronous communication supported the participants' agency as it was easy to follow the discussions, reflect on posts, and build on what others had written when participants had time to do so, which is in line with previous research (Holmer et al., 2009).

In this study, participants missed meeting face-to-face to collaborate, and they felt that written communication limited the possibilities to reach shared decisions, get to know each other, and execute the group assignments effectively. Some groups managed this issue by using instant messages (e.g., WhatsApp, Messenger). Videoconferencing may support online collaboration through its temporal immediateness. However, it requires shared time frames, spaces, and access to the internet that may be difficult to combine with the desire and need for flexibility, as expressed by most participants in this study. This was the paradox with online collaboration that may

be important to address in the course design and with participants. Adding synchronous communication tools to the Virtual Learning Environment would allow groups to take action in the online collaboration depending on the assignments. As Oztok et al. (2013) point out, online participants generally use asynchronous and synchronous tools in combination and for different purposes.

Setting up groups with active course participants would be one way to avoid passive participants. At the start of a course, teachers may need to be specific about the importance of active participation for all group members' sake to include ethical considerations as part of the collaboration. Teachers can support groups to decide a pace that works for them to make the discussions inclusive and focused spatially and temporally. This way, group members would know when to expect replies and check in on the discussion forum. Temporal cues like deadlines are other ways for teachers to encourage active participation and create a structure for those who need it to get started with the course work.

The collaboration in this study was produced in the relations between the participants and a personal kind of asynchronous communication that was inviting, welcoming, and factually relevant. The participants appreciated comments that were built on what had already been written in other posts. Discussions were not about stating facts or adding unrelated comments. Good online discussions meant adding to the collaboration by including personal experience, relevant course content, and new perspectives in the comments. The discussions included different kinds of entanglements of being/knowing/doing (Taylor, 2017). This can be compared with Samuels-Peretz's study (2014), where relevant content and constructive comments were important for the participants, and in the best-case scenario, the online discussions gave them a voice of their own.

In this study, many groups never established relations between group members. Discussions often included a few active group members. We agree with Samuels-Peretz (2014) that guidelines for online communication may support participants taking part in online discussions. Relationships and a sense of belonging are not easily established in online environments. They build on active and meaningful participation from the teachers, tutors, and other learners (cf Cherney et al., 2018; Peacock et al., 2020). Furthermore, it is important to design the space for collaboration *and* the assignments for collaboration to provide easy access to information and shared spaces. Otherwise, participants may be overwhelmed or hesitant about how to take action in the Virtual Learning Environment.

Future studies and limitations

In future studies, a lack of communication and collaboration would be important to investigate (Barkley et al., 2014). This study suggests that participants may be disinclined to take part in online collaboration if group members are inactive. At the same time, it presents an interesting paradox; other participants may also be waiting for someone else to write the first comment, which delays the collaborative processes. It confirms the importance of a good dialogue within the group relating to how they respond and act towards each other. The course design can produce guidelines that open up collaboration as shared and extended ways of knowing, being and acting together. Addressing the complexities of distance education to make it more inclusive, meaningful, and relevant in the digital age is something posthuman perspectives can help with (Bayley, 2018; Braidotti, 2019).

The posthumanist *Bildung* framework helped to dissolve dichotomies between, for example, personal/professional, content/method, time/space to open up new patterns in the data besides the well-known issues with online collaboration (i.e., lack of interpersonal skills, lack of guidelines, problems with group dynamics) (see, Barkley et al., 2014). Simultaneously, much theoretical and empirical work remains when it comes to the myriad of concepts related to posthumanist *Bildung* and their empirical implications. Posthumanist *Bildung* is a reasonably new concept introduced in 2017 by Carol Taylor. We encourage the reader(s) to remain open to the many question marks this study leaves us with. *Bildung* falls back on a number of traditions that have been debated for a long time. Posthumanist *Bildung* is just one of many ways forward. It is a way that cherishes and empowers relations between humans, non-humans, and more-than-humans to make the future better for multiple others (Bayley, 2018; Braidotti,

2019). This means *knowing, being,* and *doing better* by accepting entanglements and relations relevant to educational practices.

Conclusions

This study has wondered about asynchronous collaboration in Virtual Learning Environments with the help of posthumanist *Bildung* (Taylor, 2017). Spatial (e.g., discussion threads, online posts, digital information) and temporal (e.g., flexibility, deadlines, delayed communication) matters became entangled with the material-discursive practices of the course (course content, assignments, method) and the personal and professional lives of the participants. The participants shaped and reshaped the collaboration by entangling themselves with course materials, personal experiences, and the experiences and knowledges of the group members in their online posts. It meant active and empowering processes open to multiple others and knowledge as shared and extended between people, time, and spaces (Braidotti, 2019). Collaboration in Virtual Learning Environments can involve many entanglements (e.g., cognitive/emotional, theoretical/practical, personal/professional) that matter and are meaningful to the participant. These processes are produced in relation to other people and to the time and technologies available.

Acknowledgments

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