Cyborgs' collaborative writing in Virtual Learning Environments

Hilli, Charlotta

Published in:
Genom texter och världar

Published: 01/01/2019

Document Version
Final published version

Peer-reviewed article

Cyborgs' collaborative writing in Virtual Learning Environments

Charlotta Hilli[1]

[1]Faculty of Education and Welfare Studies, Åbo Akademi University, Vaasa, Finland.

Abstract

In this article, collaborative writing in Virtual Learning Environments is studied through the cyborg metaphor. The cyborg is a hybrid, it is not online or offline, it is not human or machine, it is a mixture or a fragment. Technologies are seen as our partners and we are as much formed by them as they are by us. The cyborg metaphor is examined through interviews with thirteen Finnish upper secondary school students. Digital spaces and collaborative writing enhance and disrupt what students do and how they interact while embedded in complex material worlds. Online collaborative writing can dissolve and establish boundaries empowering students to write better texts or restraining student agency. It is understood as weaving a digital tapestry of new coding practices while living on the edge of an information explosion where information and identities are fluid.

Keywords

online collaborative writing; posthumanism; technoculture; Virtual Learning Environments; cyborg

1. Introduction

Writing can be a powerful act and online it is easy to join forces, so to speak, with other people in web-based documents. Here, collaborative online writing is understood as cyborgs writing together. Writing is perhaps the oldest form of constructing a cyborg because it pushes the boundaries of what it means to be human. The human being is represented in the symbols on the chosen surface for writing meaning information is no longer embodied in the human being. Information is relying on technology – not the human body – to be saved, stored, and shared. Digitization makes information digital on a global scale; as information has lost its human body, the cyborg is now also digital (Hayles, 1999). Writing has always demanded tools, for example, clay

Contact: Charlotta Hilli, charlotta.hilli@abo.fi

To cite this article: Hilli, C. (2019). Cyborgs' collaborative writing in Virtual Learning Environments. In H. Höglund, S. Jusslin, M. Ståhl & A. Westerlund (Eds.), *Genom texter och världar. Svenska och litteratur med didaktisk inriktning – festskrift till Ria Heilä-Ylikallio* [*Through texts and worlds. Swedish and literature education – festschrift for Ria Heilä-Ylikallio*] (pp. 155–166). Turku, Finland: Åbo Akademi University Press.

tablets or digital tablets. From a *technocultural* standpoint, technologies are not merely mediating tools between us and the world, they are our organs or partners; we are as much formed by them as they are by us. This idea of formation is important to understand as it is dynamic, situated, and historical, and, it is the basis for the idea of the cyborg (Haraway, 2007, pp. 249–250).

Donna Haraway (1991) created the cyborg as a metaphor, a hybrid that pushes the distinctions between human and machine. A cyborg does not equal a human being with an added artificial hand or leg (Hayles, 1999). Accepting the cyborg metaphor means accepting its hybrid and fluid nature. The cyborg is not online *or* offline, it is not human *or* machine, it is always a mixture. Jesse Stommel (2012), co-founder and editor of the online journal *Hybrid Pedagogy*, summarizes educational implications of the cyborg metaphor:

> In classroom-based pedagogy, it is important to engage the digital selves of our students. And, in online pedagogy, it is equally important to engage their physical selves. With digital pedagogy and online education, our challenge is not to merely replace (or offer substitutes for) face-to-face instruction, but to find new and innovative ways to engage students in the practice of learning.

Virtual Learning Environments are generally considered to be interactive, collaborative, and communicative digital environments, synonymous with distance education or e-learning (Annetta, Folta & Klesath, 2010; Bates, 2005). Online social interactions can enhance a sense of community among distance students making actions meaningful as they are contextualized through the relationships formed (Luckin, 2010). The students are part of digital *and* physical contexts, excluding neither and respecting both when online learning or virtual learning is considered.

The context for this article is a virtual course I designed as part of my PhD thesis (Hilli, 2016). I was conscious of the importance of social interactions for student learning and engagement. Students wrote texts collaboratively in online documents (Google documents) and published them online (Wikibooks). In this way, affordances of the Virtual Learning Environments were included in the course design to encourage students to use available digital information to create new knowledge together. Interviews with thirteen upper secondary school students are revisited to provide examples against which the backdrop of the cyborg metaphor is understood. The question I want to explore is: In what ways does collaborative writing in Virtual Learning Environments challenge or support the cyborg metaphor?

First, the cyborg metaphor is discussed through texts by Donna Haraway, N. Katherine Hayles and Lars Løvlie. A contextual discussion about distance education in Virtual Learning Environments then follows. The

article ends with a discussion on writing cyborgs in a distance educational context to make the rather abstract notions of the cyborg explicit.

2. The posthumanist cyborg

The cyborg is a creation of the 20th century. It is transdisciplinary as it combines biologic and cybernetic theories with transhuman and posthuman theories. In the mid 1900s, the father of cybernetics, Norbert Wiener (1894–1964) envisioned the first cyborg as a human extension of machines. Wiener, being a liberal humanist, sought to preserve the autonomous and self-regulating human fearing a blurred boundary between humans and machines (Hayles, 1999, p. 86). The fate of the cyborg is entwined with the cultural, scientific, and intellectual movements of transhumanism and posthumanism carrying with them ideas of an ethical duty "to enhance the capacities of the human being, whether they be of a biological, psychological or moral nature" (Pastor & García-Cuadrado, 2014, p. 344). An artificial leg enhances the movements of a person improving the life of that person remarkably making it an ethical duty for doctors and scientists to support the enhancement. But, in a digital age, the anti-human cyborg Wiener feared becomes less of an abstraction when biology and cybernetics are combined.

According to Max Tegmark (2017, pp. 155–156), the futurist Ray Kurzweil envisions cyborgs as redesigns of the human body by improving the human DNA and replacing organs with intelligent biofeedback systems. The future of the cyborg will mean the end of the sacred human being of the modern era; the body can be eliminated as human consciousness is uploaded making it able to move between and act in different virtual spaces. As exciting or terrifying future scenarios might be, artificially intelligent cyborgs are left for others to debate. This article uses the cyborg as a metaphor for possibilities and challenges of 21st century education.

The cyborg metaphor is embedded in posthumanist critique of liberal humanism. Posthumanism turns against the idea of a dualism between mind and body as it accepts and respects the contextuality and embodiment of human beings. Haraway states (2016), "the cyborg is a disassembled and reassembled, postmodern collective and personal self" (p. 163). A code that needs to be written and understood. The cyborg metaphor carries epistemological implications. If indeed the boundaries between human and machine fade, who has knowledge, where is knowledge located? It leads to ontological issues of what a human without technology would be. Haraway (2016) writes: "it is not clear who makes and who is made in the relation between human and machine. It is not clear what is mind and what body in machines that resolve into coding practices" (p. 60). Similar questions can be raised when writing is concerned about the blurred boundaries between the

words used, the texts created, and the person writing and creating the words and texts.

Understanding the cyborg is painful for some, since it challenges ontological and epistemological assumptions deeply embedded in Western culture of wholeness, unity and truth (Haraway, 2016). However, those who do not identify with the norms are no strangers to the concept of the cyborg. They are the ones living *in between* because of their ethnicity, sexuality, socioeconomic background etcetera. It is here, in this *in between*, that the cyborg emerges. It is not a dichotomy – one or the other – it is a combination or a mixture. In that sense, it is a hybrid as it transgresses boundaries many take for granted.

Lars Løvlie (2006) calls the in between, *interface*, a boundary or a border, where the I meet the world; in the meeting, transformations can take place. Haraway (2007) prefers *infolding* because it brings flesh into the discussion; while interface is something smooth like the digital screens around us, infolding is a worldly embodiment with uneven surfaces and wrinkles that can be magnified under a microscope. Through infolding, Haraway highlights the relationships between humans, nature, and culture, as it is the thing that connects the three. In this way, she offers a reconciliation between human, nature, and machine combining "bio and techno", or biopolitics (Haraway, 2016, p. X). To Løvlie (2006), her combination of nature and culture as embodied transformations equals educational processes of self-cultivation, or *Bildung*. I have written elsewhere (Hilli, 2018) about the implications of technocultural *Bildung* in Virtual Learning Environments as different forms of online communication in different interfaces are made possible and refrain from discussing that topic here.

The cyborg metaphor is interesting in contrast to Virtual Learning Environments as they are man-made, therefore, they retell some of the myths of wholeness, of origin, of surveillance typical for Western culture (Haraway, 1992, 2016). There is also the hint of transformation and collaboration, of living on the boundary of something unrecognizable, as cyborgs can weave or write new stories and myths, unrelated to previous myths, power structures, and social norms.

In a postmodern view, digitization does not threaten human existence, it heightens it and extends it. Printing technology resulted in coffee houses, libraries, and the idea of education for all. Digitization had led to algorithms, simulations, and virtual spaces to meet, and, perhaps the idea of a truly democratic and non-hierarchical dialogue (Løvlie, 2006). But the internet is not neutral, nor is the cyborg innocent. Digitization is not the answer to an original question or the end for human beings that would contradict the idea of the posthumanist critique of liberal humanism (Haraway, 2016). The cyborg metaphor provides few, if any, answers. It offers analytical concepts to study the in between and the wrinkles in the complex realities people and technologies interact in.

3. To learn at a distance

Distance education is an old form of education. It dates back to the 19th century and letter courses (Moore, 2013). Different technologies have supported the teacher and student throughout history; pens, letters, and postal services made education accessible to students living far away from the school. According to Tony Bates (2005), technology is often in focus when decisions on distance education are made, for example, what Learning Management Systems to use for sharing information. However, educational questions in relation to the technology used are equally important to discuss. Technological developments make it possible to further bridge the distance between teacher and student through *synchronous communication* (in real time) if the system supports it (Anderson & Dron, 2011; Harasim, 2012).

Bates (2005) defines distance education as a method of education students can take part in whenever and wherever they want to. It is suggested as a flexible solution for adult students combining work and studies. Researchers suggest *blended learning* is appropriate for younger students as it combines face-to-face meetings and online assignments (Means, Bakia & Murphy, 2014; Reese, 2015). Some researchers assume the retention rate of between twenty and thirty percent in distance courses are partly due to lack of social interactions between teachers and students, but the course design and other factors are also possible explanations for the dropout rates. It is difficult to compare results from studies on distance education since the technology used, course designs and assessment methods vary (Annetta et al., 2010).

Online student collaboration is one way to improve learning, satisfaction, and retention rates among distance participants (Harasim, 2012; Hrastinski, 2008). Technological advances make it possible to rethink the pedagogy in Virtual Learning Environments to include social interactions through synchronous and asynchronous student collaboration. Virtual Learning Environments may entail a range of advanced digital environments, like Learning Management Systems (Google+) and virtual worlds (Second Life). Generally, Virtual Learning Environments are collaborative, and students are able to communicate and interact in multiple ways in them (Annetta et al., 2010; Hilli, 2016). In certain online milieus, participation is open and unrestricted where anyone can take part of the course information and assignments. In the course presented here, restricted systems (Google+, Google documents, Google Hangout) and unrestricted systems (Wikibooks, Second Life) were used. The students had unlimited access to them.

4. Course design and method

The virtual course design included weekly lessons with synchronous communication within the group (Second Life, Google Hangout). The course design principles were consistent with social constructivist notions of learning confirming the importance of social interactions for learning (Harasim, 2012). Students searched for digital sources to complete assignments and write texts together. The groups consisted of three to four members. One of six student groups used Google Hangout to discuss their texts. The other groups used the chat function in Google documents. The groups wrote one longer essay and three shorter factual texts related to the course topic of social studies. The texts were published on a public Wikibooks page. They received and gave feedback on the texts. The groups were able to choose between several topics when writing. The course design, including Virtual Learning Environments and student collaboration, was new to the students.

The students were seventeen or eighteen years old and came from three Finnish upper secondary schools. Thirteen students out of twenty-four (seven girls and six boys) agreed to be interviewed after completing the course in 2013 or 2014. The interviews were recorded online in Adobe Connect and lasted between thirty and sixty minutes. To protect their identity their names have been changed and no information about their school is included in the transcriptions. The course was offered three times and ran between seven and nine weeks. For the students, the distance course was a flexible way to add more courses to their study plan for the year.

5. Cyborgs embodied in digital infolds

The group members planned for the collaboration to offer them the flexibility and responsibility to structure the activities. It was difficult for the groups to find time for synchronous meetings and delayed communication meant delayed writing processes. This is understood as aspects of *embodiment* in collaborative writing. Digital technologies extended the capacities among and between students making an online presence possible through shared information (Hayles, 1999). The students were part of digital *and* physical spaces relating to the hybrid nature of the cyborg. At one time or another, most students struggled to maintain relationships and fulfil responsibilities in the spaces they shared with other people. The course was one of many in their schedules; they had homework, extra-curricular activities, and families requiring their attention, too. The digital space was often the one they neglected as the physical spaces demanded their immediate attention delaying the online communication.

> *Because you had to collaborate a lot and figure it out together, and everybody had to be present, it took most of the time to find a time that worked for everyone and you needed to agree on who wrote what and so on. If it had been individual assignments, I would have written it all really quickly.* (Johanna)

Students with group members from the same school used opportunities of face-to-face meetings during the school day to plan ahead. Those who did not felt it was difficult to reach out to the distant group members. The digital space, although accessible at all times, required efforts and new skills to navigate. Haraway (2016) writes about *decoding social relations* as a consequence of living in information systems depending on electronics. The digital spaces (Google+, Google documents, Wikibooks) were new territories as the students had not used them before the course, nor were they used to online collaboration. They had to learn how to communicate with people they did not know to complete assignments virtually. They had to establish an online presence to support the writing process within the group.

> *At the end, when it was Mats, Mattias and me, we became rather pressed for time. Me and Mats have the same classes and go to the same school, so it was pretty easy to get the collaboration started there, but there was a communication breakdown with Mattias, so it became somewhat of an obstacle to make the assignments, but we worked it out.* (Jesper)

The students assumed the root of problems with collaboration was either a lack of communication or low motivation among group members. However, in light of the cyborg metaphor, the issues of decoding online communication occurred in the *infold* (Haraway, 2016). A lack of social and digital skills made the collaboration difficult as new social relations were taking shape in the digital spaces. The students were responsible for the interactions and each other in the *infold*; they could not rely on a teacher to structure the interactions or push them to interact there. It confirms the posthuman assumption of "human life as embedded in a material world of great complexity" (Hayles, 1999, p. 5). The students were embedded in the everyday school context and they were used to communicating with their peers and teachers in that setting. Online, they had to learn to decode communication and information patterns (Hayles, 1999, p. 279) in different settings to write collaboratively.

> *I think we were all a bit lazy, too. I don't know why the others didn't start working straight away. But perhaps a lack of time as well. In Google+, I had difficulties finding information. I know we had our own group page, and then the weekly assignments, but then under the column of each week there was a lot of material, so you didn't know exactly, or I didn't, know exactly what the assignment was. It was pretty difficult to find. If there had been an Excel list, or some other kind of list of*

> *assignments, like the one you made for us later, I think it would have been easier, but I think our laziness was the biggest problem.* (Mattias)

The *infold* (Haraway, 2007) provides a visual aid to analyze the wrinkles of collaborative writing surfacing on closer inspection. Collaborative writing required efforts to reach a point where writing together was described as smooth, if that point was indeed reached. Ideally, collaboration leads to a better text and more knowledgeable cyborgs, alas, this did not always happen. Collaborative writing required discussions to understand and accept each other's perspectives – it was not as straightforward as individual writing processes – it meant a willingness to communicate about negative feelings as well as positive ones within the group. To some students, the collaborative writing process disrupted the creative flow and independent style of writing revealing the wrinkles in the *infold*. Giving up their language or lowering their individual standards of writing conflicted with their identities as writers.

> *Writing together was difficult for me, because we all write in different ways and we are on different levels when we write and then to merge that. Sometimes I wrote something, and then I didn't like what the other wrote, but you can't do much about that, perhaps talk about it, but I find it easier to write on my own.* (Daniela)

Students who appreciated the collaborative writing process found it easy to divide the tasks within the group and they benefited from the group members' support when searching for digital information. The flow of information between the cyborgs were in these cases smooth, undisrupted and without boundaries (Hayles, 1999, pp. 84–85). Once the collaboration in the *infold* was ongoing the distance between the students diminished. The students became classmates at a distance working towards common goals and supporting each other. They were deeply connected to and integrated with the digital tools while collaborating; they were as much a part of the tools as the tools were a part of them resolving into new *coding practices* as the texts unfolded within the groups (Haraway, 2016, p. 60).

> *Some things might be a bit unclear for someone and then you always have someone who helps you, when writing essays for example everyone has different knowledge about economy and if you divide it and find the most essential things you get really good essays, and at the same time everyone in the group learns the things the others know. You learn while you write good essays, I don't think there are any downsides to being in a group.* (Johan)

Difficulties in finding digital information was demotivating and perceived as an annoyance as the students could not complete their assignments. Løvlie (2006) writes that "action forms interfaces between humans and the world" (p. 6). Digital information was lying in the *infold* between the students and knowledge – between the cyborgs their communication – a lack of

information halted the dialogues with the world leaving the cyborgs speechless.

> *I don't think you have enough group work in school. Or, the ones you have are not the same as the ones you will probably have at a workplace. To work together at work to find a solution or to prepare a presentation as a group is probably something you will do a lot. And then the fact that everyone searches for information on their own and then discuss it with each other, writing your own parts. Sharing the workload in the group where everyone divides it between themselves instead of one person taking the lead, that worked really well. It was fun.* (Marika)

Power relations are sometimes upheld and sometimes challenged by digital technology. The students were dependent on each other to complete assignments requiring an uninterrupted flow of information between them and the world (Løvlie, 2006). They weaved new *coding practices* as the texts unfolded within the groups. The online collaborative writing process disrupted students who were forced to accept coding practices they did not feel comfortable with. They described an identity crisis that the digital space or collaborative writing brought on (Haraway, 2016). They felt restrained by the space or the collaborative process revealing problems with the cyborg metaphor. Online collaborative writing can dissolve and establish boundaries, beneficial in some cases, disruptive in other.

6. Cyborgs weaving a new digital tapestry through collaborative writing

In a distance course, the cyborg metaphor can reveal boundaries relevant for collaborative writing processes. Shared information can establish a social presence and construct a cyborg identity, likewise, the absence of shared information can reveal issues related to the same processes (Hayles, 1999, p. 84). Digital technology can challenge power structures and offer equality through collaboration and access to information, but it can also manifest harassment towards minorities (Åberg, 2017). Most distance courses apply individualistic approaches that support flexible course completion and individual learning goals (Annetta et al., 2010; Bates, 2005). As technology and online educational practices develop simultaneously, student collaboration has become more frequent in course designs (Anderson & Dron, 2011; Harasim, 2012). This paper suggests that there are benefits and challenges to introducing collaborative writing for upper secondary school students. It can support aesthetical, communicative and social skills among the students as they have to assess, discuss and edit, for example, the tone of the text, the quality of grammar and composition. In most cases, collaborative writing strengthened the texts and empowered the students as authors.

The students were dependent on other students to get started, get ahead, and get finished. In that sense, they were open and connected to the world, to the other cyborgs, to the culture around them (Løvlie, 2006). Haraway (2007) refers to Don Ihde when defining humans as "bodies in technology, in fold after fold, with no unwrinkled place to stop" (p. 253). The concept of the infold suggests a fluid and inconstant relationship with the world. The cyborg is not eternal or immortal, it is always in flux (Haraway, 1992). Likewise, collaborative writing lasts only for a while and is open to many interpretations. In educational contexts, assignments have deadlines and courses end, groups dissolve and new ones emerge, knowledge is challenged and renewed. Nothing is constant. Digitization is not neutral and whole, it never will be, it is fragmented and fluid, just like the cyborgs fighting to stay alive in a digital age (Haraway, 2016). Collaborative writing can quell the individual writing style in favor of team consensus forcing students to lower their standards of writing constraining their agency.

From a technocultural perspective it is not important to separate human and machine as they are one. Haraway (2016) writes about an "ontological separation in our formal knowledge of machine and organism" something she contributes to the "high-tech culture [...] where biological organisms become biotic systems, communications devices like others" (p. 60). The students did not say they were writing with a specific technology, they were simply writing. When the students were searching for information they were critically assessing and comparing sources while embedded in digital and physical spaces entwined within the infold of virtual interactions.

The move from an organic and industrial society into the age of information systems changes how we talk, act, and think on a cultural level. The brain is compared to a computer, the mind to artificial intelligence, labor to robotics. Herein lies the break with the past as the computer, artificial intelligence, and robotics are not natural. The cyborg is the creature who has adapted to this new age (Haraway, 1992, 2016). Issues with collaborative writing were often seen as a lack of communication between group members or a lack of access to information serving as examples of how profoundly the students had adapted to new discourses where information patterns can explain issues within a system (Hayles, 1999).

The posthuman critique of the liberal humanist is trying to part ways with concepts of oppression and domination (Hayles, 1999, p. 5). The cyborg metaphor highlights human agency and embodiment in physical, digital, and virtual spaces. The students were weaving a new digital tapestry while living on the edge of an information explosion where everything is constantly updated and changed, nothing is fixed or resolved. New coding practices can emerge through interactions between humans and technologies. The collaborative writing process supported some students and disrupted others. Writing was a way to establish and construct a social presence and define boundaries related to the cyborg identity. To some students the digital spaces

and the collaborative writing processes enhanced what they could and wanted to do. To others, the same spaces and processes disrupted their sense of identity and agency.

The goal of education is for transformations to take place. Løvlie (2006) calls it "hypertransformation" (p. 7) as people make new experiences online – they play, they chat, they send videos or pictures to each other – the dialogues are intense and always fluid. Words written online are not only letters and numbers in sentences, they are a part of the writer, the writer makes them, they make the writer as they reflect something of the writer. This article shows that complex hypertransformations are deeply embedded in student identities, different spaces, social relationships, and technologies like Virtual Learning Environments.

References

Anderson, T. & Dron, J. (2011). Three generations of distance education pedagogy. *The International Review of Research in Open and Distributed Learning*, *12*(3), 80–97.

Annetta, L. A., Folta, E. & Klesath, M. (2010). *V-Learning. Distance education in the 21st century through 3D Virtual Learning Environments*. New York: Springer.

Bates, T. A. W. (2005). *Technology, e-learning and distance education* (2nd ed.). Oxon: Routledge.

Harasim, L. (2012). *Learning theory and online technologies.* New York: Routledge.

Haraway, D. (1991). *Simians, cyborgs, and women. The reinvention of nature*. London: Free Association Books.

Haraway, D. (1992). The promises of monsters: A regenerative politics for inappropriate/d others. In L. Grossberg, C. Nelson & P. A. Treichler (Eds.), *Cultural studies* (pp. 295–337). London: Routledge.

Haraway, D. (2007). *When species meet.* Minneapolis: University of Minnesota Press.

Haraway, D. J. (2016). *Manifestly Haraway. The cyborg manifesto. The companion species manifesto. Companions in conversation (with Cary Wolfe).* Minneapolis: University of Minnesota Press.

Hayles, N. K. (1999). *How we became posthuman. Virtual bodies in cybernetic, literature, and informatics.* Chicago: The University of Chicago Press.

Hilli, C. (2016). *Virtuellt lärande på distans. En intervjustudie med finländska gymnasiestuderande* [*Virtual learning at a distance. An interview study with Finnish upper secondary school students*]. (Diss.). Turku, Finland: Åbo Akademi University Press.

Hilli, C. (2018). Rethinking communication in virtual learning environments through the concept of *Bildung. Seminar.net – International journal of media, technology and lifelong learning*, *14*(2), 109–119.

Hrastinski, S. (2008). Asynchronous and synchronous e-learning: A study of asynchronous and synchronous e-learning methods discovered that each supports different purposes. *EDUCAUSE Quarterly*, *31*(4), 51–55.

Løvlie, L. (2006). Technocultural education. *Seminar.net – International journal of media, technology and lifelong learning*, *2*(1), 1–19.

Luckin, R. (2010). *Re-designing learning contexts. Technology-rich, learner-centred ecologies.* Oxon: Routledge.

Means, B., Bakia, M. & Murphy, R. (2014). *Learning online. What research tells us about whether, when and how*. New York: Routledge.

Moore, M. G. (2013). The theory of transactional distance. In M. G. Moore (Ed.), *Handbook of distance education* (3rd ed.) (pp. 66–85). New York: Routledge.

Pastor, L. M. & García-Cuadrado, J. Á. (2014). Modernity and postmodernity in the genesis of transhumanism-posthumanism. *Cuadernos de Bioética, 25*(3*),* 335–350.

Reese, S. A. (2015). Online learning environments in higher education: Connectivism vs. dissociation. *Education and Information Technologies*, *20*(3), 579–588.

Stommel, J. (2012). Hybridity part 2, what is hybrid pedagogy? *Hybrid Pedagogy*. Retrieved May 3, 2019 from: http://hybridpedagogy.org/hybridity-pt-2-what-is-hybrid-pedagogy/

Tegmark, M. (2017). *Life 3.0. Being human in the age of artificial intelligence*. Alfred A. Knopf: New York.

Ågren, P. (2017). *Formbar framtid. Essäer i skärningspunkten mellan nutid och framtid* [*Shapable future. Essays at the intersection between present and future*]. Books On Demand.