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The emergence of online teaching practices: A sociomaterial analysis

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Abstract

The aim of this article was to analyse relations between online teaching practices and their virtual material arrangements. Two higher education online settings were studied using an online ethnographic approach in which observation of the teaching process was of central importance. The first setting was a course in education carried out on itslearning[®] (a learning management system) and the second setting was a language course in Second Life[®] (a virtual world). A sociomaterial perspective based on practice theory was used in the analysis, and the focal point was the co-constitutive relation between teaching practices and material arrangements in online settings. A number of relations between practice and arrangement were identified and analysed in the results section. It is argued that the relation between online arrangements and practice is not fixed and determined beforehand, but emerges and alters as the teaching unfolds.

Keywords: arrangement; teaching practice; sociomaterial; higher education; internet research

1. Introduction

This article sets out to study the co-constitutive relation between teaching practices and material arrangements in online settings. Even though online teaching today is a common feature of the everyday work life of higher education teachers, research on the relation between different online teaching environments and the teaching practice is still scarce. As I will elaborate on below, in sociomaterial perspectives on teaching and learning, the material is seen as co-constitutive of the higher education practice and not just as a background or a surrounding context in which actions take place. Hence, I will argue that teaching should not be seen as merely a social process but is also something material. The framework for my study is that the teacher, the students and the material arrangements – in terms of folders, discussion forums, screens and chairs available online – relate to each other, and together they co-constitute the act of teaching and learning. Research on online teaching therefore cannot be carried out in a material vacuum. On the contrary, it is both necessary and central to view the material and the

social as relational. The article is structured in six sections. Firstly, in this section, previous research on virtual worlds and learning management systems in education is discussed, followed by a presentation of arguments for applying sociomaterial approaches in educational research. Secondly, the practice theoretical perspective used for analysis in this article is outlined and related to the practice of online teaching. Thirdly, the settings and the way they were studied are presented. The results are elaborated upon in the fourth and fifth sections; the fourth addresses the learning management system (LMS) setting, and the fifth the virtual world setting. The sixth and final section is a discussion on the unfolding of online teaching practices based on the results presented in this article.

Well-established forms of information and communication technologies (ICT) in higher education settings are LMSs, which are platforms mainly for asynchronous discussions in text-based form. Other forms of ICT which are somewhat newer are virtual worlds, which are three-dimensional spaces in which participation takes place by using an avatar (Bolldén 2014). Virtual worlds are mainly used for synchronous communication. Previous research on virtual worlds in higher education addresses student perspectives, such as students' attitudes towards and satisfaction with using virtual worlds, students' learning outcomes and students' social interaction in-world (Hew and Cheung 2010), potential problems, potential uses and recommendations when using virtual worlds (Inman, Wright, and Hartman 2010). Conole and Alevizou called for more empirical research on virtual worlds and stated that 'much reporting remains exploratory in relation to teaching and the changing of teaching experience' (2010, 39).

Previous research on LMS concerns aspects such as affordances, gains in efficiency and benefits of using LMS in education, roles and competencies of teachers, and how LMS could be used in supporting traditional offline teaching. Furthermore, studies focusing on LMS and more specifically on teaching concern whether teachers are supporters or barriers when technology are introduced, staff training, and how LMS can change the teaching practice in terms of LMS' potential for supporting constructivist approaches (Habib and Johannesen 2007; Johannesen 2013; Johannesen, Erstad, and Habib 2012). Johannesen concluded that 'among other things, more research about educators' use of the VLE [virtual learning environment] at all levels of education is necessary' (2013, 6) and that 'there is less attention given to the relationship between educators and the VLE and what kind of teaching practice they both represent' (2013, 14). The area of teaching and learning strategies in e-learning is attracting growing interest (Hung 2012). However, there are few sociomaterial studies of teaching practices online, according to Johannesen (2013), who set out to study LMS in both higher and primary education with an actor-network theory perspective.

A growing plethora of texts argues that sociomaterial perspectives should be applied in the educational field (Fenwick and Edwards 2013; Fenwick, Edwards, and Sawchuk 2011; Landri 2012). Fenwick contended that 'practices of work . . . are most often discussed in social and cultural terms' (2010, 106). University teachers working in online environments of different kinds are working in environments full of digital objects. Against this backdrop, teaching in such environments could thus be understood as interacting with virtual materiality, teaching *with* and *among* these objects. Therefore, I set out to study online arrangements in higher education by taking a sociomaterial perspective. Previous research shows that LMS contribute to shaping the teaching practice but also shows that the teacher does so (Habib and

Johannesen 2007). This article sets out to study this co-constitutive relation by analysing material arrangements and their relation to online teaching. I have done so by using a practice theoretical perspective based on Schatzki (2002). The choice of Schatzki's practice theory is a recognition of the significance of non-human entities in online teaching practices. At the same time, (and as I will elaborate upon in the following) Schatzki's perspective recognises that the human entity, the teacher, has a unique position regarding the relation to the online arrangement. I will argue that the online teaching practice can be understood as taking place in a material setting which co-constitutes online pedagogy.

2. The arrangement of online teaching practices

According to Schatzki (2002) a practice is a set of organised activities and arranged human and non-human entities that co-constitute each other. Activities consist of doings and sayings belonging to the practice. The activities carried out in a practice are intertwined with arrangements of entities, such as humans and artefacts. Furthermore, entities are interconnected to each other in different ways; they relate to each other and have positions and also have meaning. The entities and their interconnectedness is an arrangement which in turn is a central part of a practice. Schatzki's view of arrangements is that they are not stable: 'relations, positions, and meanings, like the arrangements of which they are aspects, are labile phenomena, only transitory fixations of which can be assured' (2002, 24). This instability relates to the intentionality human entities direct towards arrangements and parts thereof but also to the fact that objects in arrangements make a contribution to the practice. The intentionality and the contribution of objects together contribute to the fluid character of arrangements. Various types of practices can take place in a material arrangement. Schatzki contends that 'which practices occur, moreover, is in the hands of the humans involved' (2002, 122).

An online teaching practice can, based on Schatzki's view of a practice, be understood as a set of organised activities in terms of teachers' and students' doings and sayings, and material arrangements in terms of online settings. The activities carried out in a teaching practice, such as teacher-led discussions, presentations and exercises, are intertwined with online arrangements of entities. An online arrangement could be understood as arranged spaces online, such as discussion forums on a text-based platform or a classroom in a virtual world.

Several researchers have described online settings as spaces and places (see e.g. Boellstorff 2008; Savin-Baden 2011; Tsatsou 2009). Tsatsou (2009) contends that space is still a relevant concept when society is permeated by electronic media and communication. According to Tsatsou, ICT creates new virtual spaces online, such as Second Life[®] (SL) and online discussion forums. She also contends that 'electronic media re-situate people and contribute to the process of place-making' (2009, 27) and that space is not dissolved nor has it lost its substance; rather it has to be reinterpreted. Tsatsou claims that virtual spaces 'do not abolish the significance of space; rather, they alter the structural conditions under which people conceptualise and experience space' (2009, 23). Savin-Baden (2011) also denotes SL as a space and also describes it as a site of educational practice. Online spaces create new settings which, according to Fenwick and Nerland 'entail learning new ways of working' (2014, 2). It has been argued that these online spaces hold artefacts, although virtual ones, and that these should be

treated as real objects: the ‘inanimate objects of a virtual world are as real as objects in the physical world – although different’ (Jakobsson 2002, 71). Hence, entities in an online teaching practice could be understood to comprise human entities such as teachers and students and also online artefacts such as chairs, screens and folders. In online teaching practices, online arrangements co-constitute the teaching practice.

Since the research focus is directed towards online teaching, teachers’ doings and sayings are central. Students’ doings and sayings are only discussed in order to understand teachers’ doings and sayings. Thus, my analytical framework for the study is seen as relational to both teachers’ doings and sayings and to the online space in terms of the virtual material arrangement (see Figure 1). This article aims to analyse relations between online teaching practices and their virtual material arrangements. The research question seeks to show how online teaching practices unfold in the two settings studied.

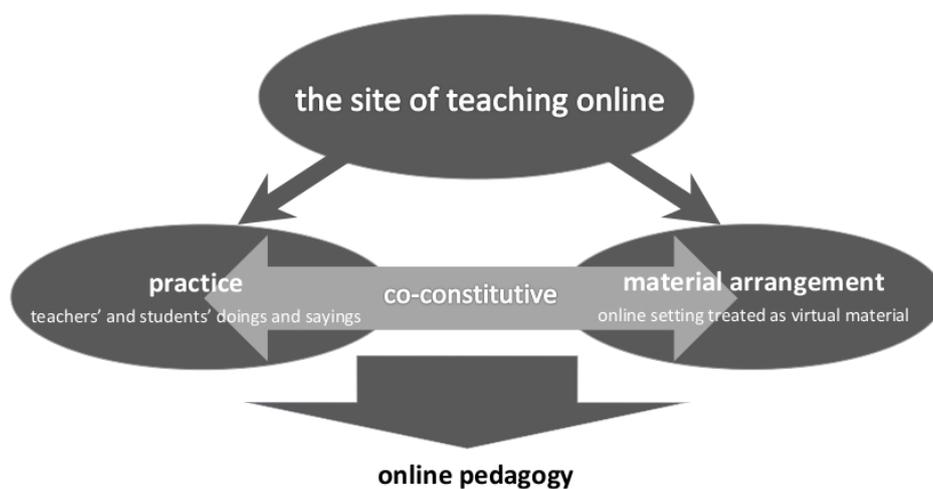


Figure 1. Analytical framework.

Two online courses constitute the data in this article. The reason for choosing two online settings instead of one online and one offline setting was to pluralise the depiction of online teaching practices that takes place online. The strategy was to choose one mature, more widely used setting, and one more new-fangled one. Drawing on two settings made it possible to create variation in the empirical data which forms the basis for the analysis. However, it should be noted that the reason for including two settings was not to make comparisons between the settings per se, but instead to make each example distinct by having another setting constituting the background. The online courses and the methods used in this article will be presented in the following.

3. The settings and the way they were studied

This paper is part of a larger study in which two settings were studied. The settings were selected by purposive sampling (Bryman 2008) and also by taking account of their accessibility in relation to the envisaged time interval for data collection. The first setting was a university course in a master’s programme in education in which the LMS itslearning® (IL) was used. The

second setting was a single subject course in language at university level carried out in the virtual world SL. Both courses were studied with an online ethnographic method that was mostly inspired by Williams (2007), Kozinets (2010) and Hine (2008). Primary data were observations of the teaching in the courses. Both courses were followed from launch to the end, focusing on teachers' doings and sayings in the teaching practice. Teacher 1 and Teacher 2 were associated with the IL setting, and Teacher 3 with the SL setting. The data in the SL case consisted of 211 pages of field notes, 20 hours of recordings from the observations, and one deep interview with Teacher 3, carried out in order to get an overall understanding of the course. The interview lasted approximately two hours and was transcribed verbatim, constituting 24 pages. Document analysis (course syllabus, welcome letters etc.) were also carried out. The data in the IL case constituted the whole course area that was used on IL by Teacher 1 and Teacher 2 and their students. This included 18 discussion forums, 508 threads, 2937 posts and 25 folders with information and around 20 documents. One deep interview with Teacher 1 was also carried out, which lasted around one and a half hours and which was transcribed verbatim and rendered into a 23-page document. Informal conversations were conducted with Teacher 1 (for approximately five hours) and with Teacher 3 (13 hours).

The data was imported to NVivo[®] for analysis, which was an iterative and reflexive process (Srivastava and Hopwood 2009). First, the different sources of data were read through and meaning units were identified based on the research question. In the second step, the theoretical perspective of practice theory was added to the analysis and the data was further interpreted and re-grouped into meaning units and also into broader categories and themes. Data sources, such as field notes, recordings and interview transcripts, were first analysed separately and then across the different sources of data. The results are divided into two larger subsections in which each online course is analysed regarding the co-constitutive relations between practice and arrangement.

4. IL – the education course

This section begins with an introductory description of the arrangement in the IL setting. It is followed by three subsections which analyse the design, absence and blurring of spaces on the platform. The subsections open with an overview and are followed by an analysis and a summary.

The course conference on IL had a start page (see Figure 2) divided into three central areas; a menu for navigating and accessing the course content, an area containing a bulletin board, and an area with various sorts of notifications, e.g. about events and recent course changes. The menu contained six main folders which in turn comprised subfolders, discussion forums and documents. The first main folder, named *Outline of the course*, contained information about the course, such as organisation of the course, grading and information on assignments. The second folder, *Working groups*, was the main space in which students could act. The folder had many subfolders in which students were divided into groups which had their own set of designated spaces in terms of discussion forums linked to assignments, and spaces for uploading documents and for shared documents. The folder *Bibliography* contained literature to be read during the course, and *Filed documents* contained resources from a

previous course in the programme. The *Coffee shop* contained a discussion forum dedicated to informal discussion among students, and the *Local tutor forum* had a supporting function concerning university-specific matters. The main way to communicate in the course conference was in writing, using asynchronous text messages in discussion forums (see Figure 3). When creating a message it was also possible to insert an audio and/or video recording, but these functions were not used in the course. Figures 2 and 3 do not illustrate the communication taking place, but only serve to give a visual depiction of the arrangements and structure therein.

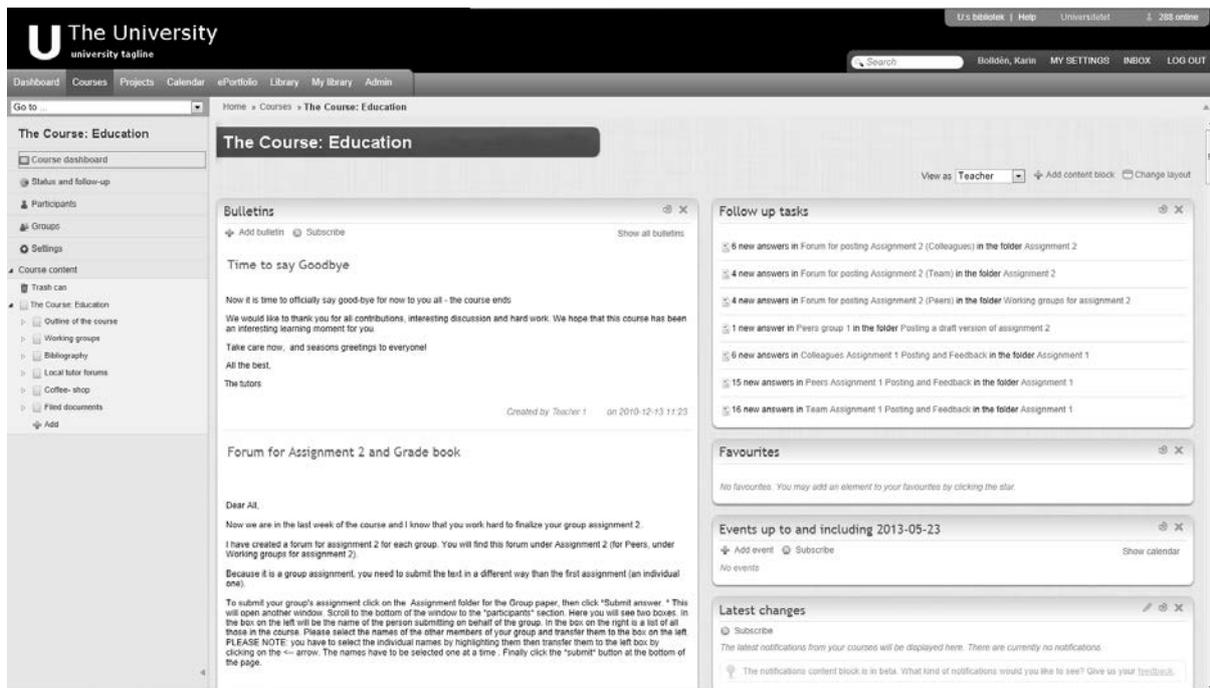


Figure 2: Start page for the course. (Edited screenshot by Karin Bolldén. Permission to use screenshot granted by itslearning®.)

4.1 Empty spaces as intentional design

Teachers in the IL setting intentionally arranged empty spaces in the design of the course conference. This means that teachers left spaces empty but gave them meaning and purpose by pedagogical instructions in adjacent spaces. Teachers made the empty spaces intelligible for the students by instructing them in how they should work within them. This will be further elaborated upon below.

One of the main folders in the course conference was the *Working groups*. The main activities in the course were carried out in this folder and it was the most comprehensive folder regarding documents, discussion forums and posts. The working group folder was structured by the teachers. One example is the space for the group called *Colleagues 1*:

This is space for Colleagues 1.

Colleagues 1: Student 1, Student 2, Student 3, Student 4 and Student 5.

There are a discussion forum and a folder where you can post files and share them.

Best wishes Teacher 1

Prior to giving these instructions, Teacher 1 had posted information concerning the assignment that should be carried out in the space. Teacher 1 made the space intelligible for the students by stating what it was (a space for the group Colleagues 1), for whom the space was designated (giving names of the students in the larger group), what it contained (a discussion forum and a folder) and what activities the space was intended for (discussion, and posting and sharing files). The example above is representative of a general way of structuring the working group folder, except that Teacher 2 gave fewer instructions concerning the designated spaces.

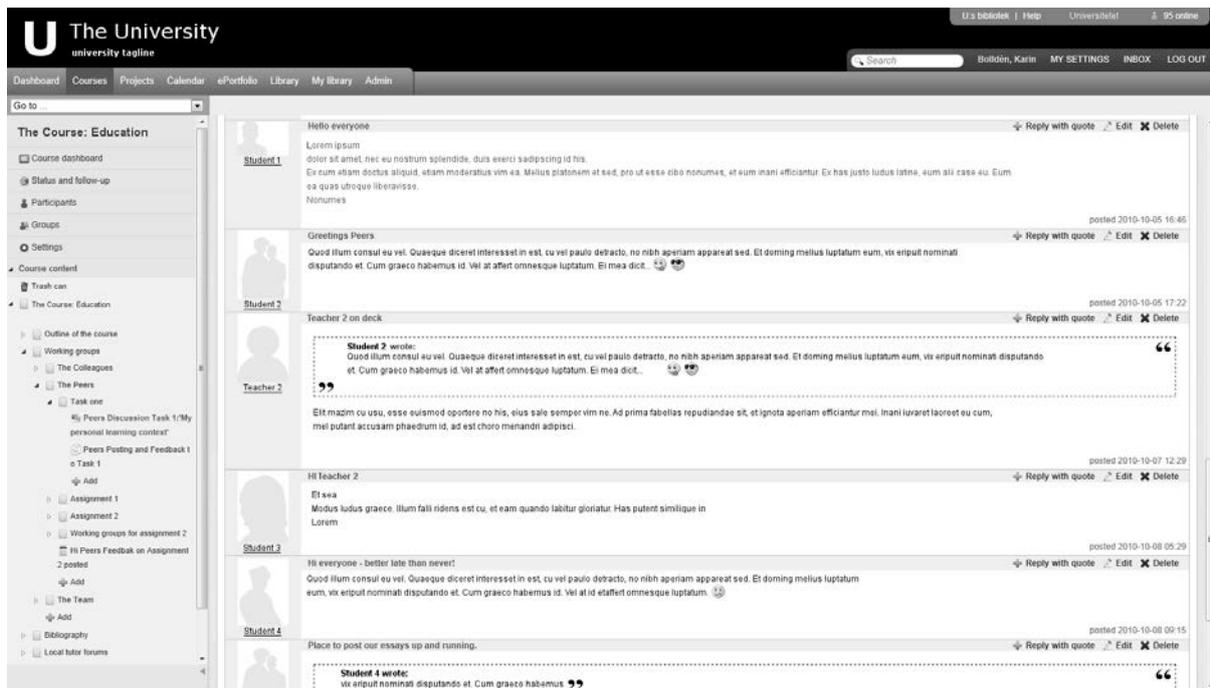


Figure 3: Example of a discussion forum. (Edited screenshot by Karin Bolldén. Permission to use screenshot granted by itslearning®.)

The way of arranging the *Working group* folder can be understood as a strategy of designing empty spaces. As mentioned, the main content in this folder was produced when the students arrived in the setting and took it into their possession. The arranging was accomplished by filling the space around the empty space with information and instructions on how to act and interact with the empty space. This information was located in the very beginning of subspaces, such as in a folder or in a discussion forum. It was also located in other main folders, such as the *Outline of the course*, *Bibliography* and *Filed documents*. The folders surrounding the *Working group* folder and instructions in the folder preceding the empty spaces contributed pedagogical messages for the empty spaces. To leave space empty was an intentional action by the teachers. They explained to the students why they did so in the folder *Outline of the course*, where they gave their views on teaching and learning:

So, what is our view on what it takes to learn in a web-based course? We know from research and experience that learning requires that the learner is active and engaged in his/her learning. You will notice that the topics for the assignments are quite widely formulated, and require quite a lot of reading and writing from you. This is deliberate; to leave space and options for the participants to let their personal contexts, interests and experiences have an influence on how the essays are written. We hope

that this will inspire you. We will leave ample space for discussion and hope that you will all engage in learning together.

To leave space concerned both topics on assignments but also space for discussions. The latter was not just a matter of making space for discussions temporally, but also materially. This was visible in that there were several spaces for discussions, empty areas at the beginning of and throughout the course. In this way, the arrangement of empty shells as designated spaces signalled that the floor was the students', for work and discussions. The teachers' intentionality clearly affected how the material arrangement was structured. In sum, empty spaces can be seen as an example of a co-constitutive relation between teachers' intentional activities and a structured arrangement, with empty spaces given meaning by the surrounding arrangement.

4.2 Emerging absence of designated spaces

Many of the activities taking place on the LMS had their own designated space, such as theory forums for discussing certain pedagogical theories. However, the activities of students posing questions that concerned issues such as technology, and questions that concerned instructions for assignments did not have their designated space but still emerged in the arranged space. This will be elaborated upon further in the following.

An additional main folder in the course was a local tutor forum which contained several discussion forums, one for each university that was involved in the programme. A teacher in the programme associated with the university where the student was enrolled was responsible for each discussion forum. When entering the folder, the intent of the folder was expressed as 'for local university-specific issues'. According to Teacher 1, the purpose of the folder was to offer the students a communication channel for administrative purposes. During an informal conversation, Teacher 1 also mentioned that students sometimes interacted with the folder for communication purposes, in order to arrange physical meetings. Hence, this folder served the purpose of arranging offline meetings. When analysing this arrangement and its relation to practice, it became clear that the way students interacted with the folder was in line with the intentionality expressed by Teacher 1. However, it was also clear that the folder served other purposes, mainly concerned with questions on course-related areas, such as how instructions for an assignment should be interpreted, where to post on the LMS, missing members, and reporting and solving technical problems related to the LMS.

When analysing the arrangement of the course on IL in its entirety, it became clear that there was no designated space for questions to be posed, regardless of their content. Questions needed to be posed somewhere in the arrangement and then answered in order to carry on the practice of teaching and learning. In sum, the absence of designated spaces is an example of a co-constitutive relation of students' needs and activities and an emerging absence of space for these activities. When a designated space is not offered, the activities emerge in other spaces, intentionally designated for something else.

4.3 Blurring designated spaces

Teachers in the IL setting structured the online space in order to separate informal discussions from subject-related and formal discussions. This was done by creating different spaces for the two kinds of discussions. But these spaces were blurred in that discussions taking place in them went beyond the intended content. This is further analysed below.

Another of the six main folders in the course on IL was the coffee shop. According to Oxford Dictionaries, a coffee shop is ‘a small, informal restaurant’ (Oxford Dictionaries 2014). Here, the teachers had created an informal space for interaction among students. Since the environment was text-based, conveying informality was accomplished through wordings such as the name of the designed space, *coffee shop*, and the accompanying description of the space, *The place to relax and sip a virtual coffee...* and lastly the name for the only content in the folder, a discussion forum with the name *This is a place for relaxing... and getting to know each other*.

The coffee shop was active during the whole course solely due to interaction between the students, and the teachers did not read the content in the folder. The teachers’ intention with the arrangement of the coffee shop was to split up social chatter and subject-related talk in order to emphasise that academic language should be used in the course. The types of discussions that took place in the coffee shop are difficult to categorise because they were fluid. The content can be characterised on a sliding scale, from informal conversations that were not related to the course, to conversations that concerned the course in different ways, of which some were concerned with subject matter. Hence, the activities in the space were in line with the teachers’ intentions, but the coffee shop served purposes that were closely connected to the activities in folders that contained subject-related discussions. As seen in the above example of the coffee shop, it is difficult to demarcate where the informal conversations stopped and the formal ones began. Previous research has highlighted the problems of trying to split up informal and formal communication in separate areas on an LMS, as social chatter has been shown to contain ‘complex processes of meaning-making’ (Reneland-Forsman 2011, 147, my translation).

When analysing the designated spaces that the teachers had arranged on IL relational to the teachers’ intentions, the result could be described as emergent blurring of designated spaces. Teachers’ actions, together with the arrangement of the course conference, prefigured that a certain communicative content and form should appear in different spaces, such as: *For your support, there will be forums designated for group discussion for each of the theoretical perspectives on learning as we go along*. (IL setting, Colleagues Assignment 1 Posting and Feedback). As seen with both the local tutor forum and the absence of a space for posing questions, and with the coffee shop, the students’ activities with and in the arrangement were in line with teachers’ intentions, but also added functions to the space. Another way to express this is that the students, to a certain extent, re-made the designated space for their own needs. In sum, blurring designated spaces is an example of a co-constitutive relation of teachers’ intentionally arranged spaces and students’ doings and sayings. Students’ doings and sayings in the space were at certain times not in line with the teachers’ intentionality. This suggests that arrangements do not prefigure a fixed practice, not even if a teacher prescribes a particular way of carrying out activities. Hence, the relation between arrangements and practice unfolds and is not given.

5. SL – the language course

The language course in SL was mainly carried out through speech, i.e. by oral communication, although text chat was occasionally used as a complement. The majority of the time in the SL course (approx. 70%) was spent in a classroom setting. This section elaborates on the material arrangement of the classroom in the SL setting related to the practice taking place. The analysis shows how the designated space was interacted with and also modified. It also shows how the space was given meaning and made intelligible.

Much of the time in the course was spent in a classroom-like setting surrounded by a summery forest landscape (see Figure 4). The building had a roof but no walls, and a wooden floor with a surrounding wooden fence. Inside the building there were chairs in rows, divided by an aisle. The chairs were directed towards the front of the room where an open space separated the chair section from the front section, which in turn consisted of two screens on the front wall. A pollster function was also located inside the building; however it was not used in the course.

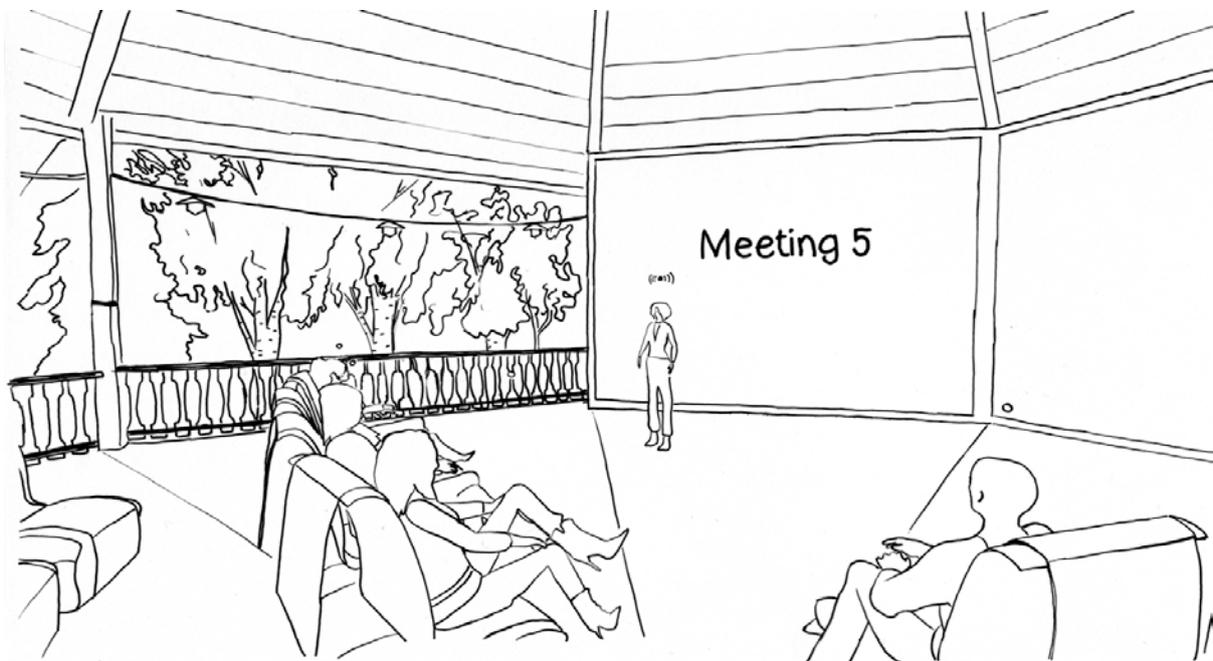


Figure 4: The classroom setting. (Line drawing based on snapshots in-world. Line drawing by Karin Bolldén. Permission to use snapshots granted by land owner in SL.)

5.1 Interacting with the materiality of the designated space...

In this section an analysis of how the classroom setting was mostly occupied is carried out. Teacher 3 was frequently positioned in the open space in front of the students with the screens behind her/his back. The description below will elaborate on how the setting prefigured student behaviour of taking a seat and listening to Teacher 3.

The classroom was occupied in four different ways by the human entities: the teacher standing in the open space and students sitting on the chairs; students (one or more) standing in the open space and the teacher sitting on a chair on the front row; both teacher and students (one or more) standing together in the open space; and finally, no one in the open space (e.g.

both teacher and students sitting on chairs or students sitting on chairs and the teacher leaving the setting). The first way was the most common one; for approximately two-thirds of the time during class the teacher was in the open space and the students were on chairs. The second way of arranging the classroom occupied approximately a fifth of the time, and the third and fourth ways about one tenth of the time each. It was the teacher that governed how the space was being occupied, e.g.: *Right Student 1, now you can stay where you are. Student 2, can you come up to the front as well, and Student 3, if you can come up to the front you are very welcome, can you do that?* (Video recording 20120215A, 28:48-29:00).

Activities in the classroom space occurred at the beginning of every meeting and also most frequently in the course. In this setting, Teacher 3 presented the aim, content and structure of each meeting and the course as a whole, as well as the assessments and how students would be graded on them. The teaching of Teacher 3 was characterised by dialogue, with an emphasis on teacher-led discussions and exercises. For most of the time, the open space and the screens were occupied by the teacher. Teacher 3 was almost always online and in-world before the students were. For the most part, Teacher 3 went to the open area and loaded the screens with slides that were to be presented during the meeting. When the students arrived, the teacher greeted them orally and directed their actions: *Hello there Student 1, nice to see you. Do come in and take a seat* (Video recording 20120314A, 00:10-00:15). By these actions Teacher 3 claimed both the space and the screens. Teacher 3 also directed arriving students' attention towards the material arrangement, signalling that the chair was an artefact belonging to the student and that it should be used for sitting. The whole setting can be understood as prefiguring certain student behaviour, and thus was similar to many offline classroom settings. Classrooms offline have had this appearance for a long time (Cuban 1993) and seem to continue to do so, even if they turn out to be online in an environment where it is possible to fly.

In sum, the classroom setting can be understood as prefiguring that the students should occupy a certain position. Positioning the students as seated, looking at what was at the front of the classroom, i.e. the teacher and the screens, enjoined a certain meaning to the student entity in the arrangement. This could be understood as a relation between both the material arrangement containing items such as chairs, but also of a teacher's intentional activities towards the students concerning how to interact with the virtual materiality. Hence, occupying a space was a co-constitution of both activities and materialities which prefigured certain activities. However, for one-third of the time the virtual arrangement of the classroom setting was modified, which I now turn to.

5.2 ... and modifying it

Teacher 3 intentionally modified entities, positions, meanings and activities in the online setting in order to bring about a certain teaching situation. In the following, examples of these modifications of the online arrangement will be described.

Arrangements in themselves are not stable, and relations, positions and meanings among entities can alter (Schatzki 2002). One example of when the classroom arrangement was

modified was when Teacher 3 directed the students (one or more) to stand in the open space and perform certain activities while the teacher took a seat on one of the chairs on the front row or stayed in the open space with the students. These activities could include making a presentation, practicing oral skills by interacting with other students, or warming up exercises such as this: *But first of all it says three nice things, so what nice things have happened to you this week? Why don't you stand up, come out here and tell each other what nice things have been happening to you* (Video recording 20120314A, 9:45-9:59). Teacher 3 literally modified the students' positions by directing their actions, orally, asking them to stand up, to come in front of the screens and to stand in a circle, and further by telling them to walk up to each other and perform oral exercises such as introducing themselves formally to one another. The meaning of the open space therefore altered depending on the activities carried out.

The open space that the teacher occupied in front of the class could be understood as a material separator between those who mostly talked and those who mostly listened. The materiality supported a difference in activity between those who stood up and those who sat down. The same applied when students occupied the open space and the teacher was sitting down during examinations. Then it was mostly the students who talked and the teacher who listened. But the meaning of the open space altered through how the exercises were carried out. It sometimes became a space where interaction occurred between the students and between students and teacher. The teacher instructed the students to come forward and told them how they should position their online body: to stand in a circle with their faces turned towards each other. The open space was now used as a platform for interaction where everyone should communicate, both teacher and students. This is an example of how the teacher modified the arrangement, through regrouping and positioning of students and teacher in the classroom, inviting more student activity and talking. This took place in an arrangement consisting of online artefacts, namely an open space and chairs, and where the human entities were moving in relation to these artefacts and to each other. The students moved from the chairs to the open space and the teacher from the open space to the chair, or moved from the centre of the open space more to the periphery.

Another example of how Teacher 3 modified the material arrangement concerns the screens. Only the teacher had the right to control the screens i.e. to upload slides on them and change slides on the screen during a presentation. In order to make it possible for the students to get access to the screens for their presentations, Teacher 3 informed the students about her/his right to control the screens and instructed them to send their slides prior to the meeting so that the teacher could upload them. To upload slides cost 10 Linden Dollars (the currency in SL) and Teacher 3 informed the students that the teacher would cover the cost. Just before the students made their presentation, Teacher 3 instructed them on how to change slides during their presentation:

Teacher 3: Now, when we get to the point where you need to use them you're going to have to tell me, very clearly, that, this is the next slide and stuff like that, all right? (Video recording, 20120411A, 10:33-10:43)

What happened was that during the presentation the student asked the teacher to change the slide when appropriate. The situation with the screens can be understood to mean that the setup of the arrangement contributed to the teacher's control of the screens. But the teacher also

allocated control to the students by encouraging them to create slides for their presentations, which were then uploaded via the teacher's account. Put another way, the teacher adapted the arrangement, i.e. adapted the technology to the pedagogy by circumventing technological restrictions in order to carry out the teaching practice in a way that corresponded to the teacher's intentions.

Schatzki (2002) contended that arrangements could be more or less stable in different ways and to various degrees. The online classroom can be understood as consisting of both non-human entities in the form of artefacts, such as chairs, an open space and screens, but also of human entities such as teachers and students. To modify the artefacts in this setting was difficult for the teacher because it demanded rights. To give students the possibility to upload slides by themselves was also difficult, since it demanded a change in rights. This does not mean that it was impossible, just that it was more difficult than other solutions. What were modified in the above were not non-human entities per se, but instead their meaning. Also, the activities of human entities were modified, perhaps because these were easier to modify compared with non-human entities per se. The entities in the arrangement that were artefacts were hence more stable in their physical online positions in relation to other entities (humans), but the ways they were interacted with and their meaning could vary.

In sum, the modifying of the designated space in SL is an example of a co-constitutive relation of how artefacts in a given arrangement get their meaning by human activities in the teaching practice. Depending on the activities taking place, the arrangement might be modified and entities may have their meaning altered. This suggests that an arrangement in the teaching practice is not permanent, but emergent.

5.3 Making space intelligible and giving it meaning

Teaching in the SL setting included making the online arrangement intelligible, both for oneself as a teacher but also for students, most of whom were new to this environment. Teacher 3 frequently helped the students understand the meaning of objects and activities in the online setting. This will be elaborated on in the following.

The classroom setting was at times an arrangement which included students standing on chairs or sitting in each other's laps, students walking into walls or not standing up and coming or responding when asked to do so. If this had been an offline situation, the behaviour would have seemed very strange. But the behaviour is understandable when one is aware of the online arrangement. Teacher 3 was aware that the online behaviour could be explained by lack of internet speed or technological know-how. The teacher also made the arrangement intelligible for the students during the course. One example concerned the understanding of the white dot above each avatar's head. During a meeting, one of the students ran into problems with the sound, but this was sorted out and the teacher commented upon it:

Teacher 3: Good, okay, it was probably a temporary bandwidth thing, because if you can see a little white dot over your head that means that your sound is working. And if that dot disappears it means that there is not enough bandwidth for you to speak, but as you see it came back after a bit. Do not worry if that happens in the real thing, we will do something about it, right. (Video recording, 20120328B, 17:06-17:30)

This can be understood as making the arrangement intelligible, but the teacher also contributed to making intelligible how to act in the arrangement. One example of how the teacher contributed to making the arrangement intelligible to act in was when Teacher 3 instructed the students to use open text chat for communicating when they had problems with their sound. Some of the activities carried out in the classroom setting can be described as causal relations between the technology and the human entities, where the teacher compensated for deficiencies that occurred. Deficiencies concerned for example sound that was too low, too loud or too bad, or deficient bandwidth which in turn resulted in the content on the screens not loading for some of the students. One example of sound problems was when a student's voice was so low that other students could not hear the question the student asked. Teacher 3 intervened and repeated the question. Another example is that Teacher 3 instructed students to use the 'push to talk' function instead of leaving the audio channel open when intrusive background sounds appeared. Furthermore, when students were not able to see what was on the slides because of bandwidth issues, Teacher 3 was careful to describe what was on the slide. All of these examples can be understood as showing a causal chain of actions. The technology caused deficiencies in the teaching practice which triggered actions by both the students and the teacher, and the teacher tried to compensate for the technological deficiencies. In sum, the relation of making the online space intelligible and giving it meaning is a co-constitution of the materiality of a virtual world and how it should be understood in a teaching and learning practice.

6. Discussion

So, how do online teaching practices unfold? First, this study suggests that online teaching practices unfold in the situation rather than being determined a priori. An online arrangement is set up in a certain way but teachers make it intelligible *in a specific way*, as a certain kind of teaching practice. Hence, the kind of teaching practice that will take place is not given or determined by the technological arrangement (the particular kind of LMS or virtual world). This suggests that teachers have to understand their role in the teaching practice that emerges. The results of this study suggest that teachers are intentional designers, where the teacher, along with the rest of the arrangement, prefigures a certain teaching practice and certain student behaviour. This study also suggests that existing technology (a particular LMS or virtual world) and its particular setup could be arranged and interacted with in several ways, not just one, a priori, set way. Even if the material arrangement is stable in terms of online artefacts that are not movable or editable in other ways, the meaning and position of these artefacts in relation to other entities could alter. This implies that it is not possible to design an arrangement beforehand and be certain that it will lead to a particular teaching practice. This study has shown that the teaching practice is emergent. Teachers' and students' activities *in* and *with* the rest of the arrangement are crucial when discerning the emergent practice. However, students may have other needs than those the teacher has provided for (such as absence of designated spaces, as described in section 4.2). This implies that teachers need to show attentiveness as the teaching practice unfolds; paying attention to what kind of activities emerge and if appropriate, adjusting the arrangement. Furthermore, this study suggests that even if teachers

have arranged the online space in a certain way, that will not determine the activities that take place (see e.g. the case of blurring spaces in section 4.3). This implies that even if the arrangement is well-structured (e.g. spaces are named) and divided (e.g. a hierarchy of folders and subfolders exists), teachers have to be aware of the messy process of learning. It seems that learning activities do not allow themselves to be subsumed so easily in a well-defined structure.

Second, online teaching practices unfold as a process of making the technological arrangement and activities carried out therein intelligible (see e.g. the case with the white dot and the open chat in section 5.3). Hence, this study implies that teachers need to possess a professional knowledge of the particular technology (e.g. a virtual world), and the particular arrangement (in the virtual world) in relation to subject matter, in order to make it intelligible as a certain kind of teaching practice. Third, online teaching practices unfold as a process of compensating for technological deficiencies and circumventing technological restrictions. The activities of compensating and circumventing technology are needed in order to carry out the teaching practice in a way that corresponds to the teacher's intentions. These two processes also concern the aspect of professional knowledge of the particular technology in question. That teachers circumvent technological restrictions suggests the versatility of online arrangements.

IL and SL had certain built-in functionalities, such as a function for making an audio recording post on IL or a pollster function in SL. Some of these functionalities were incorporated in activities in the teaching practice and some were excluded. This could be understood to mean that the software platforms of IL and SL contributed to the teaching practice by offering possible ways to act; however, sometimes these possibilities were treated as irrelevant and were ignored. The software platforms of IL and SL also affected the teaching practice by triggering actions, such as when students with low bandwidth could not see what was shown on the slide on the screen, which caused the teacher to describe the content. Another example of how the software platforms affected the teaching practice was when the setting resembled informal areas such as a coffee shop, or formal ones such as a classroom, contributing to how the setting was to be understood. Hew and Cheung (2010) showed that previous research on virtual worlds has often had a student perspective. This article contributes to research on virtual worlds by giving a teaching and teacher perspective, showing that in order to understand the teaching practices in these settings it is not enough to only analyse the material arrangements; it is also crucial to analyse the doings i.e. the activities that take place. Schatzki contended that 'in the social site, making something happen consists in bringing about or leading to some feature of orders and/or practices. . . . Examples are intervening in and modifying an arrangement and bringing about an action by occasioning it' (2002, 192). This is what human entities did in the online teaching practices; they intervened and modified the arrangements in order to bring about certain activities. This study has contributed to the understanding of online teaching practices by proposing that the designing of spaces is not fixed and determined once and for all. Instead, it should be understood as emergent and something that can be changed and modified along the way.

The need for more empirical research on online teaching has been pointed out, both regarding empirical research on virtual worlds (Conole and Alevizou 2010) and on LMS where the teaching practice is studied (Johannesen 2013). This article can be seen as a response to these calls, as the findings indicate that an online teaching practice is not fixed and stable, but

fluid and ongoing, and both activities and arrangements contribute to its constitution. Furthermore, *potential* uses of virtual worlds have also been studied (Inman, Wright, and Hartman 2010). The adopted practice theory perspective made possible a close-up analysis of how teaching practices unfold in a classroom setting in a virtual world, which may contribute to new insights regarding the understanding of online pedagogy as sociomaterially relational.

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