

The three waves of the Internet – From closed to open classrooms - the evolution of educational communities within the digital medium environment

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Abstract

In this paper we sketch out how the old school system with classroom teaching changes in relation to the new conditions for teaching and learning shaped by the arise of the Internet and digital media. We propose that what is happening is a *deconstruction* of the old *closed* classroom in favour of an *open* community between learners, teachers and third parts. Yet, the deconstruction does not happen at once. Rather we suggest that it arises through three *waves*. In the first wave the old classroom is opened up. Students are distracted and teachers do not know what to do. Internet becomes a *challenge* to teaching and learning in this phase. In the second wave attention is drawn back to the educational interaction between teachers and students through the use of social media that re-stabilise the learning situation and intensify it. The Internet hereby becomes a reservoir of new *possibilities*. In the third wave teachers and students go a step further and succeed in establishing educational relevant interaction with third parts (authors, researchers, foreigners etc.) through the Internet. Only in this final phase the Internet becomes a mean of new *perspectives* that alter the old educational setting thoroughly. To analyse the three stages of deconstruction we draw on empirical findings from an

action-based research project that took place between 2011-2014 in an upper secondary school class in Denmark. We frame the empirical findings in regard to four classroom-coordinates: a spatiotemporal, a social, a factual and a meta-communicative. Further we try to understand how the situation in the class alters in each case. The upshot is a tentative theory of how classroom teaching transforms in connection with the arising of the Internet and the new digital media. Extremely tentative we also suggest in the end of the paper, that this result might hold for other social institutions as well, e.g. the family, political institutions etc.

The three waves

We are living in a time of a medium revolution comparable to when the printing press altered the conditions for society and broad about the conditions making modern society possible. Now with the current digital media revolution the conditions for all sectors in society change (again). This also holds true for the education system, which in the form we know it nowadays has many of its basic characteristics from the society that came about after the introduction of the printing press, for instance, central distribution of textbooks, students in classrooms and the teacher as interpreter of the content of the books and of what were true and false.

In a period let's say from around 2005 to 2015 the Internet has made a revolution possible in the Danish upper secondary schools (and elsewhere also). This impact of the Internet can be described as three waves.

In the first Internet wave we have observed that the schoolrooms are opened up, meaning that the students can *access* content, conversations, computer games, friends etc. from all over the world (through the Internet).¹ The schools themselves invest huge sums of money in equipment like networks and digital blackboards. And since 2005 upper secondary schools in Denmark have been demanded by law to make use of information technology (IT) in all school subjects. Yet, the teachers have huge difficulties in using the new media for educational purposes and either prohibit or ignore the use of digital media in this first phase of the Internet (Tække

¹ Before the Internet the walls around the classroom protected the educational system: "The interaction takes place in a closed room that are not public, so that distraction from the outside world can be minimized" (Luhmann 2006: 131).

& Paulsen 2013). Both strategies – prohibition or ignorance generally fails for several reasons, but first of all because the new problems with Internet-related distractions in the class room come from a lack of norm-building adequate with the new situations provided by the new communication space of digital media (ibid., Meyrowitz 1985). At the same time the new possibilities for teaching provided are not actualised or invented. In the first wave we consequently do not observe an actualisation or realisation of a new and improved teaching, but a destabilised teaching with students trying to multitask between computer games or social media and the educational interaction with teachers that do not know what to do.

The second wave arises when schools, teachers and students begins to make use of the possibilities of the new media for making better interaction between the students and the teachers. In this second ‘moment of the Internet’ teachers begin to use the new media to draw attention back to the classroom by using digital based written interaction within the class and shared documents where students collaborate monitored and guided by the teacher. The result is an intensified educational interaction where the attention is re-conquered and more and better possibilities of *participation* arise. For instance it becomes possible for teachers to get answers from *all* the students simultaneously through the use of microblogging media like Twitter, instead of only hearing one voice at a time. This – and similar uses - helps to get everybody involved and engaged in the educational interaction (Tække & Paulsen 2013; 2015a; 2015b). Through the use of shared documents and blogs and other new digital media (wiki etc.) it becomes possible for students to interact with each other more frequently, more smoothly, and more transparent for the teacher, who can participate in the interaction as well, simultaneously (ibid).

Despite the positive impact of the second wave it only consists of “more” and “better” interaction, not altering the classroom setting and the educational form radically. Yet *the third wave* – which is truly radical – is made possible by the digital literacy developed during the second wave.

The third wave arises when other persons than the students and the teachers becomes part of the educational interaction through the Internet. When this happens on a regular basis it radically changes the educational form that has existed more or less since the printing press. Instead of a closed system of interaction between teachers and students we now observe an open system of interaction, in which other persons outside the classroom participate and contribute. This brings truly new *perspectives* to the form of education. On regular basis students meet persons with other perspectives, views and responses and the teacher becomes a 'mediator of otherness'. In this wave the teacher build networks for educational proposes outside the classroom. Students connect to groups, other school classes, individuals and databases using the new medium environment as a natural part of their education. They are taking part in the *convergence culture* (Jenkins 2008) doing produsage (Bruns 2008), learning to navigate and take part in the new society and its forms of production, network, communications and cultures. The upshot is that teaching shift from being a *closed fabric* to an *open activity*, inviting many different people to participate. Instead of transmitting knowledge to the students the role of the teacher becomes to connect students with a relevant otherness and make knowledge production possible across borders and differences.

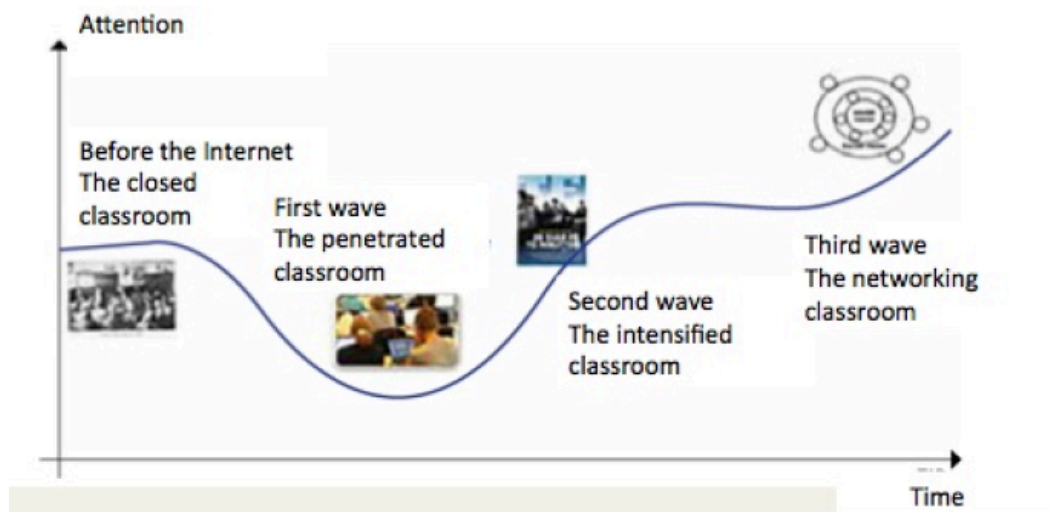


Fig. 1. The three waves.

The theory of the three waves is an *idealised* postulate that in its basic says, that when a new communication medium comes into being its communicative space will come to its full utilisation – in the beginning maybe for the worse but over time for the good (all other things equal and based on the (perhaps always partly false) premise that the content of the educational interaction has a good purpose and good consequences). Put differently it is argued – naively – that it is just a matter of time, before social systems have actualised their full potentiality, even if the process can be delayed like, for instance, like when the Catholic Church ran their imprimatur.² This paper tries to outline that the digital media can and will have their fully influence on also the educational system – even though strong powers try to hold the influence back – and that it empowers the schools with great opportunities and new perspectives for creating a much better and more adequate education. Yet we do not argue, that this idealised situation is just the case, without trouble, political resistant or different kinds of complications and drawbacks. Rather we try to emphasize and idealise the most important *challenges, potentials* and *perspectives* that the Internet brings to education, observed empirically and reconstructed theoretically - making it possible to qualify discussions on *how* to react and improve.

The Socio Media Education Experiment

We now turn our analysis towards the concrete difficulties schools and teachers meet if they try to move from first to third wave. The impetus is the action research project called “The Socio Media Education Experiment” – a project we carried out in an upper secondary school class during its three years of existence from 2011-2014 (Tække & Paulsen 2013, 2015a). The teachers in the experiment were called to abandon both prohibition and ignorance as general strategies in relation to media use. Further they where called to make use of digital media for educational purposes and in connection with this provoke ‘media reflexivity’ in the classroom. On this basic the teachers experimented through multiple actions like using Twitter during film watching and student presentation. From the second school year the teachers

² Theoretically according to Luhmann (2013) it’s clearly a matter of time before the social have formed its own structures within the scope of a new communication medium. The same assumption lies within the medium theory e.g. Meyrowitz (1985).

also had to make contact out of the classroom and include Internet-based otherness in the teaching. We have documentation in various forms like thousand of tweets, observations, pictures and interviews (ibid).

Analytical strategy

Before we scrutinise the empirical findings of the above-mentioned experiment let us present our analytical strategy in this paper. We want to find out how difficult it is for schools to utilise the Internet in meaningful ways. To investigate the difficulties we have developed the model with the three waves. Further we want to understand the impact the transition through the waves has on the form of education. To facilitate this understanding we frame the empirical findings in regard to four coordinates: *a spatiotemporal, a social, a factual and a meta-communicative*. We argue that these are important dimensions if one wants to understand how the social form of the classroom change and how far this alteration goes. Secondly we draw a distinction between *information* and *interaction*, making it possible to differentiate between four different modes of using digital media within the educational practise: The first mode we call "Internal in the class". In this mode both information and interaction arise in the class, as a closed system. The second mode we call "from outside and into the class". In this mode information are imported from outside into the class through the Internet, but the interaction is still limited to taking place between the teachers and the students in the classroom. The third mode we call "from the class and out". In this mode information is shared with the rest of the world outside the class but without real interaction between the class and the outside. The fourth mode we call "both in and out of the class". In this mode real interaction and information sharing *between* the class and outside happens. Before we enter our analysis lets say a few words about all these distinctions.

The four coordinates of the educational praxis

To analyse what happens with the form of education in the digital age, we propose that it is possible to differentiate between four coordinates or dimensions of any educational praxis. The first coordinate - *the social* - indicates *who* is allowed to access and contribute to the praxis. What roles are shaped and legitimised? What

are the social rules of communication within the educational practise? The second coordinate – *the spatiotemporal* – indicates *where* and *when* education is expected to happen – and where and when it is not, framing the educational time and space. The third coordinate – *the factual* – indicates *what* the education is about, that is the subject matter of the educational praxis. What is the aim(s) and what is the content to be learned and discussed in the educational praxis? The fourth coordinate – *the meta-communicative* – indicates *how* one is communicating about the communication in the educational praxis, thereby regulating the communicative norms of the educational praxis. The four coordinates are depicted in figure one.

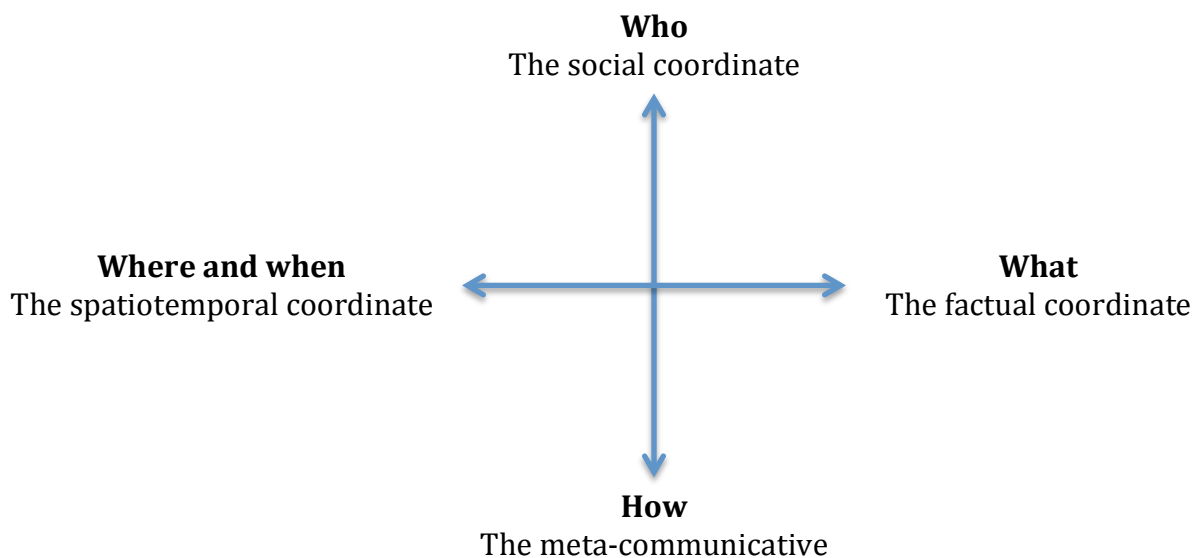


Fig. 2. The coordinates of the educational praxis

In each dimension we witness significant changes with the rise of the Internet and digital media. We analyze these alterations in the later sections, but briefly stated we think these changes can be outlined as follows:

The social coordinate in the digital age

Before the Internet participation in the educational praxis primary meant to answer the teachers question, this still works but with the Internet we see a move towards increased student-interaction with the teacher more in a facilitating role. Further we

observe a move towards more radical integration of other voices and persons than teachers and students, making the educational praxis more open to the cultivation of otherness than a praxis of 'teaching the same'. Instead of only learning about others, it becomes more likely and possible to learn *with* and *from* others. This ideal of working together across differences does not overrule earlier forms like copying, questioning or participating, but modifies the communication structure.

The spatiotemporal coordinate in the digital age

Instead of the echo-room in the old school combined with supplementing self-activity and dialog as orientating ideal a new ideal, comes into being, about creating a morphologic dynamic transformation-room, where students works on transforming and enriching knowledge and competences in corporation with each other and other others located other places outside the classroom, with the teacher as moderator providing feed-forward and feedback. The educational praxis becomes *dis-embedded* from local time and space, meaning that the interaction can take place anytime and anywhere, only limited by Internet-access. The clear-cut distinction between the classroom and communication outside the classroom becomes deconstructed. With the Internet and digital media both sides of the former distinction becomes possible to actualize anywhere and anytime, in different kinds of mix and hybridizations (Tække & Paulsen 2013b).

The factual coordinate in the digital age

This coordinate is about which themes, contributions, cases and subjects that find its way into the educational community's rituals of work. With the Internet we see a shift towards a new morphological praxis where factual content is processed in layers in different media both synchronic and diachronic as *multiplexing* and in *chains of media*. In the first wave this shift were in the form of *multitasking*, but in the second and especially the third wave it gets the form of *singletasking* with regard to the topic and as *multiplexing* in regard to media. This form of learning happens while the topic runs through several media and a complex communication structure, that not primary follows the teacher's instructions and few student's answers, but through many voices which get a chance to - and are invited - to

contribute with their different perspectives on the topic. Already with hypertext we see: “switches between the author and the reader modes” (Finnemann 1999, 28). Following Jenkins (2013; 2008; 2006) we now see a participation culture characterized by shaping, sharing, reframing, remixing and appropriation and with Bruns (2008) produsage and intercreativity. This is the new form and culture that finds its way into the classroom in the third wave and change the aim, scope and content of the educational praxis towards more open and unfinished knowledge-creations in a ‘shared, poly-contextualized and multi-perspective world’.

The meta-communicative coordinate in the digital age

The authoritarian role of the teacher comes to an end with the third wave but the role of the teacher does not become lesser important. The new teacher role must establish a new form of meta-communication that makes probable that digital literacy and digital *Bildung* develops – coping critically with the challenges, opportunities and new perspectives of education and learning in the digital age. Instead of instruction, directions and suggestions as educational primary speech acts, we see *initiation of reflection*, where the teacher still through instructions, directions and suggestions starts up processes, but more openly and with regard to the training of the student’s competences in media choices so they in theses situations develop their own judgment. Also the meta-communication must regulate the attention–economy of the educational praxis and the media habits and initiate reflexivity about all this. It must promote the community and its production of norms, reflect inclusion or exclusion of networks and persons and work to establish internal and external learning-networks.

Information – and interaction situation

What really change with mobile digital media is social information – and interaction situations. With the analogue electronic media the information situation also changed: the backstage of every type of person in society, for instance, the teacher, the president, or the doctor became known (Meyrowitz 1985). With digital media also parts of every individual person’s backstage will be known – but additionally also every information stored and accessible through the Internet is only one click

away. Hereto the interaction situation change radically with the digital media – now conversations can go on synchronically despite geographical distances.

The analytical scheme

In the following we try to empirically discuss the four coordinates of the educational praxis in relation to the four new modes of using digital media and thereby changing the information and interaction situation of the classroom. Table one sketch out the empirical characteristics and examples we elaborate on in the next sections.

	1. Internal	2. Outside in	3. Inside out	4. Both in and out
Information	Processing of “closed” information in teaching	Processing of “open” information from the web in teaching	Uploading of media content from teaching	Interchange between the class and the sounding world
Media	Books, film, Lectio, assignments	Google, Twitter, Wikipedia, websites	Wikispaces, weblogs, Youtube, Screencast	Twitter, Facebook, Skype, Google Sites
Examples	A film, a novel, a textbook	American convents business-sites	weblogs and Samleviden (the class’ Wiki). Uploading of solutions to equations.	Cooperation with other school classes, authors and the like. Live-TV-Twitter, building of student’s network.
Interaction	Micro blogging as supplement to oral interaction. Multiplexing. Writing documents together.	To follow sites and groups on the web and interact about them in the class-community	Call attention to own resources in external communication and open for comments.	To go into dialog with persons, classes, groups and networks in the surrounding world
Media	Twitter and shared online-documents	Twitter, Facebook, DR.dk	Twitter, Facebook and weblogs	Twitter, Facebook and Google+.
Examples	Watch film while micro blogging about it. Work in shared online-documents. Tutoring outside school time	To watch TV-programs from the web and tweet about them inside the class. To follow relevant persons and businesses on the web.	Internal communication about how to express content in the new media in weblogs, video and on Facebook	Interaction about the TV-documentary “Sikke en fest” on a global hashtag. Interaction with businesses, other classes in Germany and Denmark.

Tab. 1. Analytical-empirical scheme about the altered information and interaction situation

In the following analysis we take the four vertical columns one by one, together they form a cumulative move towards the third wave. In the first we see the arising of what we call *the re-closed educational community*. What happens is that the teachers by their use of Twitter and Google.doc (and other similar media) succeeds in gathering the students' attention on the educational topic – almost like before the internet, but thus getting the advantages of the digital media in regard to the students learning process – and both the teachers and the students develop digital literacy, for instance, in regard to competencies in micro blogging.

In the next column (outside in) the class finds information on the web and uses it in its internal educational interaction, giving rise to what we call *the external world processing educational community*.

In the third column (inside out) the class brings forward their interactions and knowledge products on the web. We call it *the open community of education*. Even though external people does not follow the content of the class, the students trained their skills in expressing them selves in digital media both technically and in regard to more social psychological aspects like being shy.

In the last column (both in and out) it is not only students and their teachers that interact with each other, now also external partners are included in the educational interaction. We call this *the expanded community of education*. This final part of the analysis brings forward examples that show the contours of the third wave. The students interact with resource persons like an author and extent their learning networks and the teacher becomes the 'architect of otherness'.

To sum up: In the first mode the students interact about the author's text, in the next they find resources about the text and the author on the web and work with source critique, in the third mode they create a weblog about the text and the author and in the last they interact with the author about the text and makes him a part of their network.

1. The re-closed educational community

We now turn to the empirical findings of the Socio Media Education Experiment. As documented in Tække and Paulsen (2013) one of the first results, was that the teachers in the experimental class temporary succeeded with re-capturing the attention of the students when the students attending the physical classroom simultaneously had to tweet about films, presentations and other contents chosen by the teacher. This re-colonization of the communicative space also has the advantage that the students had shared notes, for instance, about the film that they had discussed while they saw it (ibid.).

Student 1: When we saw the film, then the teacher questioned us on Twitter and we had to answer. I think it was really good.

Researcher: Why was it good?

Student 1: Because then you got it if it were something essential... something that you did not get.

Student 2: Instead of remembering it all after the film. It can be relatively difficult to remember a whole film afterwards.

Researcher: Wasn't it difficult?

Student 1: No not really, you lose only a few seconds because it runs at the same time. What you lose is just how the picture was.

Student interview 2 d. 2/11 – 2011

As evident in the interview, the parallel microblogging works as supporting in relation to both generating educational attention and understanding in the process, and as production of notes and memory, there can be drawn on later on in the educational work after the film. That the student has to relate actively to the teacher and other students questions trigger reflections and focus. At the same time the student can ask questions if its understanding blocks for keeping up with the plot. On the other hand the students do not look down on their screens to follow other things on the web or, for instance, makes homework for other subjects during the watching. This is also helped on its way because the teacher are sitting together with the students and anticipate the students to take part in the collective analytical work. However not everybody can manage to write while watching (like with writing notes), but in a writing interaction medium one still get benefit of what others write both under and after the film (ibid). We have documented similar

effects in relation to oral presentations and for example brainstorms about a novel before analytical work. The method falls short when the teacher gives presentations because she cannot have her attention on the student's attention while speaking. But on the other hand if the teacher feels that the students pay attention to other things or are stoned again Twitter is helpful.

I had some students today that did everything else than pay attention, or was totally passive while we listened to a German song. Then I asked everybody to tweet all the German words that they picked up. That helped on the activity.

German teacher 5:27 PM Mar 15, 2013 from the Google-site

Also if all students are "totally stoned" it has great effect to ask everybody to answer a question on Twitter. The educational community using microblogging in this way is able to *interpellate* students and thereby initialize engagement, maintain attention, activity, participation, and work-discipline. Also according to both observations and interviews with teachers and students more students are included in the educational interaction than if it were only ran through perception and oral speech. Also following our interviews the quality is better when also microblogging is used and the students feels that the educational interaction better calls for attention when it also is on your screen. The use of microblogging demands training; it is not essay to multiplex, express your self in 140 signs and being precise in an academic sense, using hashtags (#), links and tags (@). According to teacher interviews they experience that they cannot trigger educational interactions in other classes with the same quality and participation like they do in the SME-class. In the SME-class especially two of the teachers became Twitter-teachers because they used Twitter a lot in their teaching and these two teachers expressed a better trust relation to the students. They also got a much bigger knowledge about the students and the relations between the students helping them to be better teachers. After the students and teachers in the SME-class during the first year got the sufficient educational competences in microblogging the teachers began to give help to homework one hour five evenings a week.

Researcher: Do you think it's an advantage that you can get help when you are at home?

Student: Yes I do, because you know it is not always that your parents can help with all subjects. So yes it is great that you can write to your teacher and not have to wait until next day.

Student interview 17 14/3 2013

According to a teacher interview the teacher felt that she because the community also were mediated through written interaction had the opportunity to catch up on students that she hadn't had contact with during the school day. This suggests new possibilities of including excluded students.

Another medium that were used from the second year in the SME-class were shared online documents (they used Google.doc). This media use opened up for students working together in the same document from different personal computers while the teacher was able to monitor and interfere in all the groups' work processes. If it were homework the students could work from different geographical places. The teacher could help them directly in their document if they, for instance, followed a wrong trace. If it were group work in the school the teacher could go and talk with groups not working or having difficulties.

Reflections

Spatiotemporally we see rearmament inside the schoolroom with digital writing media, which provide a *re-stabilization of the education system* in spite of the new porous membrane around the classroom. This is however only partial while some attention still leaks out of the room. On the other hand we also observe an outgoing movement where the educational community is extended spatiotemporally through homework assistance and use of media on field trips etc. Yet in both cases the media are used to form a closed community of interaction between the students and their teachers relatively independent of time and space.

Factually seen the teaching materials still is books, newspapers and films like before the Internet. This is however modified by a shift because of the communicative changes resulting in a higher degree of written communication. The arguments and information are stored and retrieved in the work process and also more students are taking part in the educational interaction providing more viewpoints.

Socially the teachers re-increase their power through better possibilities for monitoring, intervention, control, interpellation and facilitation. The better

transparency provided by the digital media also let them get a better knowledge of the students and a better and more trustful relation to them.

Meta-communicatively seen the processes mostly are instructive, directive and encouraging. Not much initiation of reflectivity is going on. The web is ignored. The view on learning and digital literacy stays in the epochs before construction and appropriation. The Internet as a common shared world of otherness is not used in the teaching and the digital media are only used to create a renewed and reinforced attention on the activity in the classroom. Thus, we also saw the efforts to train and communicate about multiplexing.

2. The external world processing educational community

The SME-class is not only a community that uses digital media to exclude itself out from the outside world. It has also searched, found and retrieved, information online and executed source criticism and refined the information gathered.

One example on the external world processing educational community is a project about the Danish Author Klaus Rifbjerg (see Tække & Paulsen 2013, 147). The class uses Google to search the websites about the author and tweets links with comments using a hashtag, so everybody can take part in the discussion. At the same time the teacher begins a discussion about the validity of the different sources.

Another example is that the students have to follow persons on Twitter either because they talk a foreign language they have as an examination subject, or because they tweet about a relevant academic subject. They also follow selected hashtags to keep up with the newest developments and trends, for instance, on the stock market. In this way Twitter becomes a search engine.

Student 1: Yes, or usually we just follow them. Then we also can get the latest news – easy and simple, you know.

Student interview 17 14/3-2013

According to the teachers the students are much more engaged and motivated when they use information from the web in their school projects. They also points out that the students in a better way are able to relate to the more theoretical aspects when they work with “real” and actual cases found on the web. The teachers also find that it is more legitimate for students to put forward academic knowledge in the SME-

class compared to others, because of its work with searching and validating information from the web, which seemingly has a spill over effect so it never seems strange either in written nor in oral words to put forward knowledge. One of the teachers also argue that the class in comparison with others are better when it comes to search the web:

Teacher 1: Yes, they are stronger in regard to searching – no doubt about that.
Teacher interview 1 15/3 2013

Reflections

Spatiotemporally we observe that from the inside of the re-stabilised educational interaction system the students and their teachers reach out, through the class' porous membrane, for information and knowledge, from the whole world, that is embraced. The students work as an interactive community that scans its environment via search engines and draw knowledge home, which they share and discuss orally and via Twitter and other media. The work process prepares the ground for the creation of a transformer-space where the teacher and the students in cooperation find information, discuss them critically in the light of other retrieved information and slowly but undoubtedly build more qualified knowledge.

Factually, information, themes and topics in the teaching are no longer delimited to a textbook or other material provided by the teacher, but extended to every thing that can be found on the web. That means a compensation for out dated material, and that the students always –principally – can find relevant and actual cases to work with, and that the teacher no longer can be sure not to update his or her own knowledge during the day. Also the teacher gets a new *responsibility*, namely to teach, with out concrete preparation, in digital source criticism.

Socially we see that both teachers and students must adapt to new roles. The teacher is no longer a person with the truth embodied, but the person with the best skills and judgement to discuss and argument for what is most probable also through better skills for executing source critics. The teacher must also acquire huge knowledge of websites and forums within his or her field. The teacher then can be the architect of the educational community that during switches, collectively or

individually reach out of the class to relevant places to catch cases, discussions, information etc. This is a move away from the traditionally *echo room* to a new kind of learning-cooperation, where also the teacher learn.

The *meta-communicative* operations now rises above the purely instructive, directive and engaging speech acts and become reflection initiating in regard to how factual content are approached. The view on learning and digital literacy come closer to construction and appropriation, because the web now are included in the teaching in a critical and constructive fashion.

3. The open community of education

In this section we will focus on how the educational community of the class open itself for the surrounding world by opening up and give access to its own interactions and knowledge products in form of wiki, screencast, tweets and weblogs. In the open community of education it is the skills in relation to expression that comes into focus when talking digital literacy. In this regard the students practise, for instance, video cast to try to learn the conventions, as well aesthetically, socially, academically, and technically to try to live up to, and thereby potentially link to the surrounding world.

One example is that the SME-class from its first year began to build a wiki (see <https://samleviden.wikispaces.com>). Only teachers and students (and researchers) had permission to edit the wiki, why it only got limited external feedback. The gains from the wiki were that the students were socialised to share their knowledge with everybody without fear. Also they learned how to structure knowledge in a digital medium and that such knowledge is not better than the work and skills behind. Over all three years the students were very positive in regard to their wiki, especially for the shared notes and for its use in relation to repetition and exams. If a student had no notes, or had lost his notes, he could easily find other student's notes in the well-structured information hierarchy of the wiki.

Another example is that the SME-class halfway in their second year began to construct weblogs via blogspot.dk. The students used many different templates and designs that we interpret as an opportunity for differentiating themselves from each

other and also as facilitating aesthetically and technical ambitions. Yet, all in all the students in the SME-class were only encouraged three times to hand in their assignments as blog-post and the weblogs were only updated these three times. None of the blogs got external feedback maybe because they were not updated regularly, or marketed for at all, but the students got the chance to get hands on with one of the most common media on the internet.

Reflection

Spatiotemporally we see that from the inside of the re-stabilised educational interaction system not only do students and teachers reach out, through the class' porous membrane and embraced information, but also to a certain degree create academic products that can be accessed from the outside. The students form an interactive community creating wiki-texts, blog-posts, tweets, videocasts and screencasts, which can be picked up and linked to from the outside.

Factually seen the students and teachers now create their own educational materials in the new forms of expression that are evident on the web. Even though their productions did not get much attention from the surrounding world, the students have learned through their activities and they did also profit by them in regard to inspiration from each other and in relation to shared notes and in relation to repetition and exams. The sum of stored knowledge is increased, better structured, refined and retrievable (from any where any time) and provides the class with a factual foundation of new dimensions.

Socially, the teacher supports the students in their effort to express themselves in the different digital genres. The teacher must have hands on experiences with the newest forms of expression and give feed forward and feedback to the students and gradually open for external feedback and ensure that the students efforts get attention, for instance, in contact with other school-classes working with the same topics.

The *meta-communicative* operations now rises from the purely instructive, directive and engaging and become reflection initiating in regard to not only how factual content are approached, but also in regard to forming, designing and link ability.

The view on learning and digital literacy come closer to construction and appropriation, because the web now are included in the teaching in a critical and constructive fashion. Finally it must be pinpointed that the work with helping the students to be good media producers of knowledge imply a view on learning and digital literacy that comes close to construction and appropriation, because the web is used as a platform to get attention on the class' work through media products.

4. The expanded community of education

Now we have reached the fourth and final type of information and interaction cooperation, which analytically can be extracted. We call it *the expanded community of education*, because it in addition to teachers and students also includes other actors like resource persons, groups, networks and school classes. In focus are the possibilities for interaction both into and out of the school class. In the SME-class Twitter has been the primarily medium for this propose but also Facebook, Google+, Google Sits and Skype have been used.

From the second year in the SME-class the teachers had to work on cultivating the contact between the class and its surrounding world to establish dialogue with network resources. The partly re-stabilized educational community of the class should in this way achieve that the otherwise disturbing contact with the surrounding world, would be harnessed for the educational wagon, and hereby turnaround the situation for the better, so the contact instead of drawing attention away form the educational interaction would intensify it. Moreover our thesis was that this contact would enrich and inspire the information situation with angles and perspectives going beyond what the teacher could give. Generally seen this move would provide the class competencies in working in a modus adequate with convergence culture, intercreativity and produsage.

One example was that the Danish teacher initiated contact to the Danish poet Kasper Anthoni. The class red one of his poem collections and through two sessions they asked him questions on Twitter. According to the teacher the students usually have no or only little interest in poems but this contact really got them interested. Also according to the students the experience was very motivating and mind blowing.

Student 1: I think it was a totally different way to analyze poems. A much better way I think.

Student 2: Yes when we have the Author [on Twitter] we can question him if there is something we cannot understand in the poem and ask him what he did mean and then he can come with a tweet about it.

Group interview1 31/10 2012

Student 1: It helps with the interpretation. If I ask him how he got the idea, then he tells that he had a feeling, and then it is essayer to interpret the poem. I think it was good.

Group interview 5 31/10 2012

The interaction with the poet is exemplary for the concept of the third wave where the class definitively moves out of the echo room. The teacher falls a little back but still take the *responsibility*, he let the students get to the resource and let it be the centre for their attention and reflection. The teacher have made the connection to and appointment with the poet, helped the students to read the book, with good questions and with their organisation in groups to the sessions. These efforts are good investments because of the students' motivation and engagement triggered by the direct contact with a real author through Twitter.

In another example a teacher gave the class assignments where they should contact local companies using predefined types of media that the teacher knew that they used, like Twitter and Facebook. This also gave a very positive result in regard to motivation, engagement and the information situation. The students, also some of them not usually motivated, explained in interviews that it was relevant and authentic to communicate with local businessmen and that it helped them to apply theory to their cases.

Another example is two courses where other school classes were contacted – one in Denmark and one in Germany and both with very positive results. Again we see that the students were very engaged and motivated by communicating with others outside the class, here with other students of the same age. According to the teachers more students were drawn in to the schoolwork than usually. It felt more important to the students to contribute and also the quality were higher than normal, because of a feeling of being observed by others at the same age, and of representing their own class. In relation to both classes they also got new perspectives and information transgressing the information given by their own

teacher. In relation to the German class it also became important to write correctly and the students felt that the language written by the German students were a more real German than in the books and spoken by the teacher.

Student: I feel that I learn better by communication instead of reading a book. Also the lingual not just the grammatically. If you communicate with one from Germany then you learn better German than if you sit in the class and talk German. That's the way it is.

Student interview 13 14/3 2013

Moreover the students also felt that they themselves had something to contribute with for the other classes.

Gradually the students build up networks for example including the poet, that they could ask questions both when they were at home and in the class. An example was where a student asked her sister who studied economy in Copenhagen:

Student 2: We were to a presentation about the American president election and then the presenter said something I did not understand – and we had to use Twitter under the presentation so I wrote my sister on Twitter about it. Then she answered and I could catch up and understand the presentation again.

Group interview 6 efterår 2012

After the presentation the student explained the difficult part of the presentation for the rest of the class. Again we see new and helping knowledge come from the surroundings of the class through the new media.

The last example was a course where some of the students and teachers from the class after appointment an evening sat at each their home and watched a TV documentary about the financial crisis and used Twitter to interact about it. After some time one of the students observed that the rest of Danes who watched the documentary and were on Twitter used a global hashtag to interact about it.

Researcher: So you were discussing the documentary with the others from the class and then it were extended. What do you think of that?

Student: you also got other peoples opinion [...] and there were really many opinions and tweets and it was going on log after the program ended. It was really exciting.

Researcher: was it good for the discussion that it was not just the class and your teachers?

Student: Yes I believe so. Because we maybe have a little bit the same opinion in the class, because we have the same teacher, and it is the same things we do. And then there were other peoples opinions, people that is another place in their life, and have another perspective on society.

Student interview 9 9/1-2013

There is knocked an educationally relevant hole in the class' re-stabilized educational interaction, and perspectives arrive from the outside. The typical situation in the echo room where the teacher *decides* what is good and what is bad and true and false fades away. As we saw with the poet the cultivated opening undermines this position and the teacher must find a new position. Not necessary weakened but more adequate with the new medium milieu as a facilitator, moderator, organiser that helps the students understand the different opinions in society. We asked the student what it would be if the SME-class had not had the contact to the external world:

Student: Yes then I believe, then it would be biased, the teachers' opinion would shine very much through. Now we get other's opinions, other's view on the things. This means that what the teacher says is not just the right, but that you then also can find information about: can this really be true? Why does she say that? And such things. So it makes us think in another way

Student interview 9 9/1-2013

Reflections

Spatiotemporally the educational community re-stabilised through written interaction is supplemented with external network resources, which are linked to through the porous membrane around the class. The attention that leaps out of the class is tried adjusted after the educational subject matter, which is found, investigated and analysed through a switch in and out of the membrane. The educational community, which already is extended spatiotemporally through homework assistance and organising like on field trips etc., now begins to be empowered to handle its environment and synchronise its definitions of situations up against and in comparison with and with assistance from the surroundings. This is to transcend the classrooms limited outlook and provincial modus and a transformation of what it means to *go to school*. The deconstruction of the school space, the home space and the world space means the emergence of a new virtual hybrid space, anchored physically variably. The transformer space is now completed. The constraints is the teachers resources, competencies and network connections, the students media literacy, network background and the class' organisation, including the teachers ability to architect the educationally interaction.

Factually, information, themes and topics in the teaching is potentially caught from and debated with the whole world. More concretely, there is interaction *with* real German speaking individuals, others who works with the same topic, the author who has written the pomes, or with all others watching the same program. Other places we have seen Skype debates with politicians and only fantasy and the teachers competencies set the boundaries.

Socially it means that the teacher do not lose its power anyhow. However the teacher loses power in the sense that the power the teacher has in the open classroom is not a power equal to the former one from the earlier media societies. Now the teacher becomes promoter for the educationally process without standing on the pedestal as the wisest who decides over true and false. In this way it becomes a relief because the teacher dose not anymore has to simulate to know every thing. The challenging task becomes to step one step back and help the students to learn in contact with the additional society. The teacher must use its attention to organize, improve, monitor, control, facilitate and ensure that the students work academically focused in contact with the surrounding world and help to establish the contact. *The teacher's role becomes to orchestrate learning cooperation with network resources in the surrounding world and to step a step back and help these resources flourish. The teacher must facilitate with network relations, search skills, source criticism, expression competencies and social competencies.*

The *meta-communicative* operations now rises from the purely instructive, directive and engaging and become reflection initiating in regard to not only how factual content are approached, but also in regard to forming, designing and link ability. With the introduction of the 'in and out' interaction the meta-communicative coordinate becomes pivotal, because the class if it shall manage to move out on the web must be reflected on a number of levels that are still not stabilized. Theses levels are attention, expression, social codes, and for instance, the technology itself, which seems to be permanently dynamic. The missing stabilizing means that the class constantly have to communicate about how it and its members behave – if a stabilizing ever will takes place we cannot say, it is blowing in the wind. The teacher must explicates its position and be able to step back from it and reflect over its

strengths and weaknesses in an open-minded and including manner in comparison with the educationally community's experiences. In joint discussions the class constantly must come together as an educational community and switch out through the porous membrane in a constantly convulsive movement.

The view on learning at this point in the analysis clearly is construction and appropriation. The class goes out into the world through its digital media and gathers information, opinions, texts, pictures, memes, theories and empirical data. It gathers again to process and reflect, perhaps in constant dialogue with resources outside the classroom while constructing its own tasks and assignments. The teacher must still take into account the different types of students where some need a more solid framework to fill out than others when constructing.

Conclusion

The paper has forwarded the theory of the three waves and made it probable through empirical findings. The theory claims that the digital medium revolution falls in three waves where the first wave undermines the old organization of the classroom and teaching method. In the second wave the school reacts by using the new media to re-stabilise the teaching – protecting it against disturbances from the web – but also in that movement the schools begin to make use of some of the possibilities for improving teaching provided by the new media. In the third wave the schools take full advantages of the new media structuring teaching in accordance with the new medium environment. Here we see resources from and cooperation with the whole world included in the teaching and students gaining digital literacy matching the current knowledge work described in newer research literature (Jenkins 2013; 2008; 2006; Bruns 2008). We build this theory on our empirical findings from the SME-experiment, where teachers worked with the use of and reflection over digital media together with their students within the educational practise. What we have observed other places and read about (fx Mathiasen 2014) mostly show signs of the first wave. In the international literature we see small projects where a single teacher tries to use, for instance, Twitter with good but

isolated results. The SME-experiment had a bigger scope and shows the contour about how things might develop, if schools and teachers take a few steps further.

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