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YOUTUBING: CHALLENGING TRADITIONAL LITERACIES AND ENCOURAGING SELF-ORGANISATION AND CONNECTING IN A CONNECTIVIST APPROACH TO LEARNING IN THE K-12 SYSTEM

Halvdan Haugsbakken and Inger Langseth

Abstract

This article argues that a new research trajectory in the Connectivism debate should be open to the K-12 system, and that education should consider the Web 2.0 application YouTube as a pedagogical tool in learning. We aim to show that YouTube facilitates students' self-organised learning in informal and formal education. YouTube is potentially a meaningful tool that teachers can use to enhance students' competences and digitalise classroom practices. This relates foremost to how YouTube content has the potential to trigger social dynamics that activate students' capacity to connect sources of user-generated content to cognitive awareness on a given concept. When given the opportunity, students can use this competence in formal educational contexts. This ability, we argue, is partially self-regulated by digitally skilled students, and teachers can direct the students in an academic direction when scaffolding the literacies involved. The article is based upon research carried out in a vocational class in English at secondary level in Norway.

Keywords: YouTube, youtuber, to youtube, language learning, audio-visual literacy, connecting strategies, engagement, participation, and self-organised learning

Siemens' (2005) *Connectivism: Learning as Network Creation* and Downes' (2005) *An Introduction to Connective Knowledge*, have received considerable attention among scholars interested in the relationship between learning and new technologies in higher education. The works have introduced a new learning theory for the digital age, sparked an interest for MOOCs, and initiated the emergence of a new research discipline, Learning Analytics. Connectivism is also met with criticism, claiming that it is not different from older theoretical approaches. Critics also argue that the theory is - under-theorised and lacks empirical research.

We call for a new direction, due to the fact that Connectivism has mainly been discussed in the MOOC hemisphere. Connectivism should open a new research trajectory in educational systems at the *lower levels, where most learning takes place today*. New social media user patterns among students also take place there, not only on turf known at universities. We are interested in applying two concepts related to Connectivism: *self-organisation* and *learning as connections*, which we frame as our connectivist approach. We analyse these concepts in relation to the social media platform YouTube and new emerging user patterns among students, who use YouTube on an everyday basis.

In this regard, the main goal of this article is to link aspects of Connectivism to educational research on YouTube, and we believe that this can add new insight to the debate on digital learning. We will show that YouTube videos can facilitate (1) students' self-organised learning, (2) students' connection between sources of informal and formal content, and (3) that there is a need to link the predominantly text-based approach to literacy to audio-visual literacy. Our objective is to exemplify this in a case study, showing how a class of Norwegian 18 years old vocational students, studying to become carpenters, uses YouTube content outside school contexts to learn about social practices that interest them, and how this connects to formal learning settings¹.

First, we account for the theoretical framework. We present important definitions and stress that a connectivist approach is needed in current educational research on YouTube. Second, we account for the use of our methods and data samples. Third, we present our data analysis, which establishes that YouTube use is a new social media user pattern among adolescents. In the analysis of student user stories, we show how students use YouTube content in informal learning contexts, as well as a vehicle for formal learning as part of a classroom setting.ⁱⁱ Fourth, we discuss the implications of our research, and see this in relation to addressing audio-visual literacy as a new competence in teaching and learning. Finally, we make some concluding remarks.

Theoretical framework – A connectivist approach to YouTube

Our theoretical approach is inspired by Connectivism. For the purpose of clarification and delimitation, we define some key concepts. Connectivism is defined as “the integration of principles explored by chaos, network, and complexity and self-organisations theories” (Siemens, 2004:4). The premise of *chaos* is that meaning exists and learners must discover connections and patterns of meaning in order to learn. Chaos recognises the *network* theory principle that everything is connected to everything (Siemens, 2005). As Downes (2006) argues: “to 'know' something is to be organised in a certain way, to exhibit patterns of connectivity. To 'learn' is to acquire certain patterns” (ibid.:2). Siemens (2004) theorizes that learning consists of connecting *nodes*, and that learning *is* the existence of nodes. The premise of *complexity* is that nodes exist both in the individual and as distributed knowledge online (Siemens, 2005).

The connectivist approach, as we see it, is that *learning as connections* happens when pre-established connections between nodes are activated - sending, receiving or forwarding information - in a short space of time, involving technical skills and critical thinking to judge the quality of the work process. Siemens defines *self-organization* as “the capacity to form connections between sources of information, and thereby create useful information patterns” from random initial conditions (2004:3). Siemen argues that self-organization is vital to the learning process. The premise of self-organisation is that nodes can take on a variety of modes of literacy. Connectivism includes certain interesting features in *self-organisation*: curiosity, creativity and randomness, and *connections*: concept learning and modes of literacy, which seem to explain aspects of social media use among students.

Connectivism evokes debate in different research streams. One trajectory forms around *MOOC scholarship*. Ebben and Murphy (2014) argue in their review that MOOC scholarship is characterised by different themes. Early research from 2008 to 2012 investigated the cMOOCs and argued that Connectivism was characterized by experimentation, innovation, and investigation of learning effectiveness. Canadian scholars fronted the work. From 2012 to 2013, Ebben and Murphy (2014) suggested a shift to behaviourist pedagogy with the deployment of xMOOCs, a work developed by

U.S. based elite universities and start-ups. This era generated the discipline of Learning Analytics. MOOCs raise many organisational questions relating to university matters.

Another trajectory relates to the theoretical foundation of Connectivism. Early criticism maintained that it was no different from older learning theories (Kop & Hill, 2008). One main disagreement, which resides in fundamental epistemological approaches to learning, relates to what extent learning happens in the *mind* of the human and whether it can be attributed to the connecting of pieces of information embedded and transpiring from social structures like social networks outside the human mind. In recent criticism, Clarà and Barberà (2014) maintain that Connectivism has psychological and epistemological challenges. They (Clarà & Barberà, 2014) argue that it does not adequately conceptualise the role of agency, oversimplifies the meaning of social interactional approaches, and does not offer any framework that can explain learners' concept development and how to apply the methodology in education.

We argue that an unexplored trajectory is how Connectivism can be applied in the context of secondary education. It is important to explore this territory, as connectivist orientated scholars are still locked in the domain of higher education. We pinpoint this aspect, due to the fact that schools across national educational systems are developing into IT networked organisations. This is attributed to social processes influencing educational systems; the increase in students' private social media consumption and that educational authorities foster laptop and iPads as part of educational policies to increase students' digital competence. Consequently, classrooms develop into material IT networks that rearrange the social situation in which most teaching takes place. This signals the need to push Connectivism in a new direction.

We argue for a connectivist approach to educational YouTube use and practices in K-12 systems, especially the exploration of concepts like *self-organisation* and *learning as connections*. Use and research on YouTube is growing. A content analysis in 2010 listed 188 referred articles and conference papers on YouTube (Snelson, Rice & Wyzard, 2012:120). International experts concur that more studies on how users interact, and how to explore "the manner in which YouTube intertwines with societal, ethical, political and commercial interests" (ibid.:129) is needed, as well as the need to uncover "the nature and quality of video content" (ibid.:129). The earliest research on YouTube connected to education dates back to 2007 (cf. Burden & Atkinson, 2007). From that year onwards, the number of studies increases. Certain studies are characterised by what we call "critical pedagogy". They have a theoretical approach and contain analyses of YouTube as a learning tool in relation to media activism (Kellner & Kim, 2010), intertextuality (Adami, 2012) and globalisation (Kenway & Fahey, 2011). Researchers have explored how YouTube can be part of learning regimes to foster learner autonomy (Hafner & Miller, 2011), and language learning (Ghasemi, et al., 2011).

Studies demonstrate how YouTube can activate students' engagement (Callow & Zammit, 2012) and learning strategies. Studies show that exposure to video-content enables students to better retain a course syllabus (Chtouki, et al., 2012), fosters learner autonomy (Hafner & Miller, 2011), facilitates the retrieval of web content (Hrastinski & Aghaee, 2012), encourages music teaching and learning (Kruse & Veblen, 2012) and uploading and video sharing (Mohamad Ali, et al., 2011). YouTube has been connected to "multimodality", showing that students watch and discuss video files just like any other text used in education (Callow & Zammit, 2012; Chun, 2012). Research also stresses the potential benefits and pitfalls in education. Researchers also argue that YouTube can be used in social studies and is a positive teaching resource in elementary classrooms (Jones & Cuthrell, 2011). Moreover, YouTube is found to have the potential to create mental models (Krauskopf, et al., 2012), to be a resource in open education as videos in the classrooms (Tan & Pearce, 2011) and to have a great potential in foreign

language teaching (Terantino, 2011). We also find research that has identified new user patterns among students. Such studies have emphasised how YouTube videos can be remixed to learn about civic action (Dubisar & Palmeri, 2010) and can be used in large classes to personalise learning and improve conceptual understanding in chemistry (Franz, 2012). We also found studies that explored how YouTube has been used to create student motivation (Lee & Lehto, 2013), and as a tool in music education (Kruse & Veblen, 2012; Waldron, 2012, 2013; Webb, 2010).

Methods and data sample

We base our analysis on qualitative methods anchored in a social scientific research tradition. The data sample builds on one English class of 15 students in their second year of vocational studies at a secondary school in Trondheim, Norway. The students' motivation in English, which is obligatory, is generally low, even though they are at level B1/B2 (COE, 2001).

The data was collected from August 2011 to May 2012. We used different qualitative methods in triangulation: (1) semi-structured interviews with the students, (2) passive observations in classrooms, (3) teacher's logs, and (4) student produced texts in formal contexts. We interviewed 11 of the 15 students. Six interviews were completed between the researcherⁱⁱⁱ and the students, five in pairs, while one was done individually. The interviews lasted from 30-60 minutes. All interviews were taped and transcribed.

The observations took place every week for 90 minutes following the school's calendar, and the researcher took notes from the lessons. The teacher wrote a log that was made available to the researcher. The students' texts were collected through the school's LMS. The students, the teacher, and the school administration signed a letter of consent to participate. After the data gathering, all data was coded using the constant comparative method (Strauss & Corbin, 1990; 1998). This method of analysis is used to code and categorise data in order to identify local concepts, principles, structures and processes.

Data analysis – results and findings

In this part, we will explore the concepts of *self-organisation* and *learning as connections* in a connective approach to learning and give detailed empirical examples. The following data analysis will show that short YouTube videos can be used to trigger self-organising and connecting activities, both in informal and formal learning situations. The first part establishes YouTube as a digital space that the students regularly visit when online. We illustrate this by showing a collection of nodes of information drawn by the students themselves. The second part focuses on how the same students use YouTube to self-organize their learning in informal learning situations. User stories show how the students use YouTube to learn to play a musical instrument and to play games. The third part argues that YouTube videos can be applied as a vehicle for formal learning. This part demonstrates how the students in the English class retrieved YouTube videos and applied the content in a self-organised social setting in order to learn more about extreme sports in the English-speaking world, as part of a curriculum based and goal-driven activity initiated by their teacher.

Part I: The students' network of nodes

In one of the English lessons, the teacher asked the students about their online networks and their digital user patterns. The aim was to detect areas of interest to be used in future lesson designs. The teacher instructed the students to draw the websites

they visited every day as nodes in a network and to describe the usefulness of websites in a few key words. She also asked them to rank the nodes, on a scale from the most to the least important ones. We used this task as a method to capture students' digital user patterns: which web sites they interacted with and why. The students' networks show that they have a narrow set of nodes, often ranging from 3 to 7 web sites that they visit every day. Some sites are recurring. Norwegian newspaper sites, e-mail systems, and common social media sites, like Facebook. Other sites like the school's LMS and digital sources related to subjects or their vocational training, are absent in the data. Also, we see that YouTube and gaming sites are prominent features, and they are to a large extent in English. Seven of the fifteen students rank YouTube as an important site that they visit every day. We present three examples of students' network of nodes.

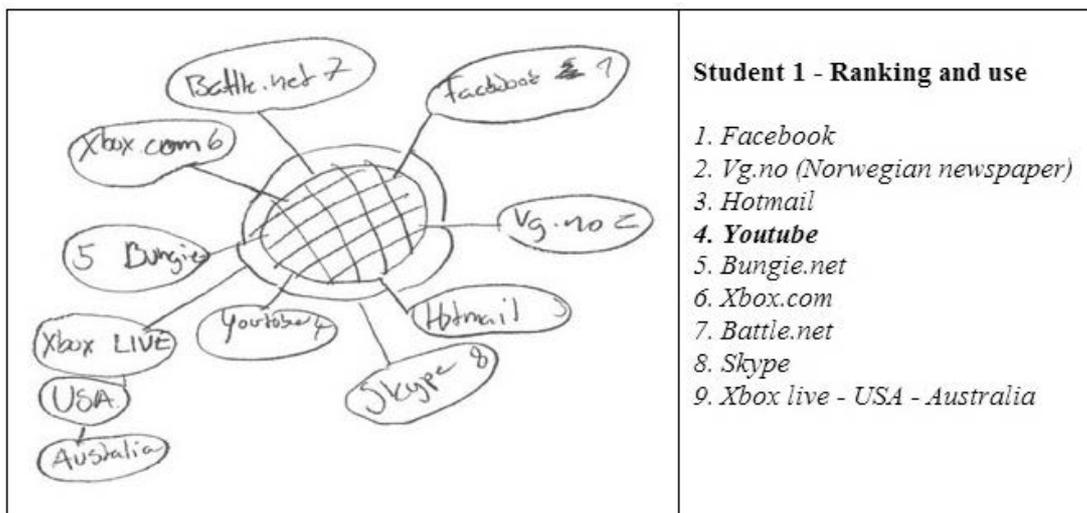


Figure 1. Example of student network of nodes

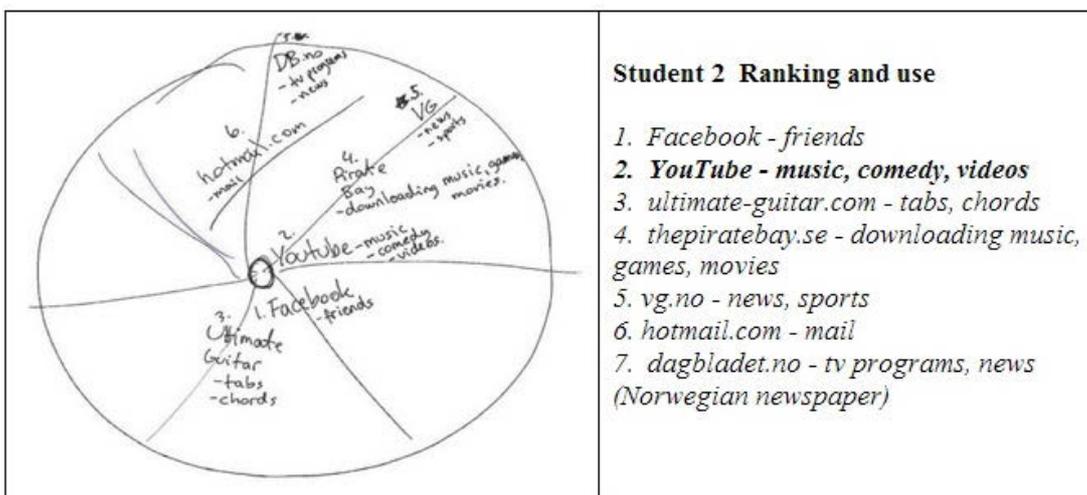


Figure 2. Example of student 2 network of nodes.

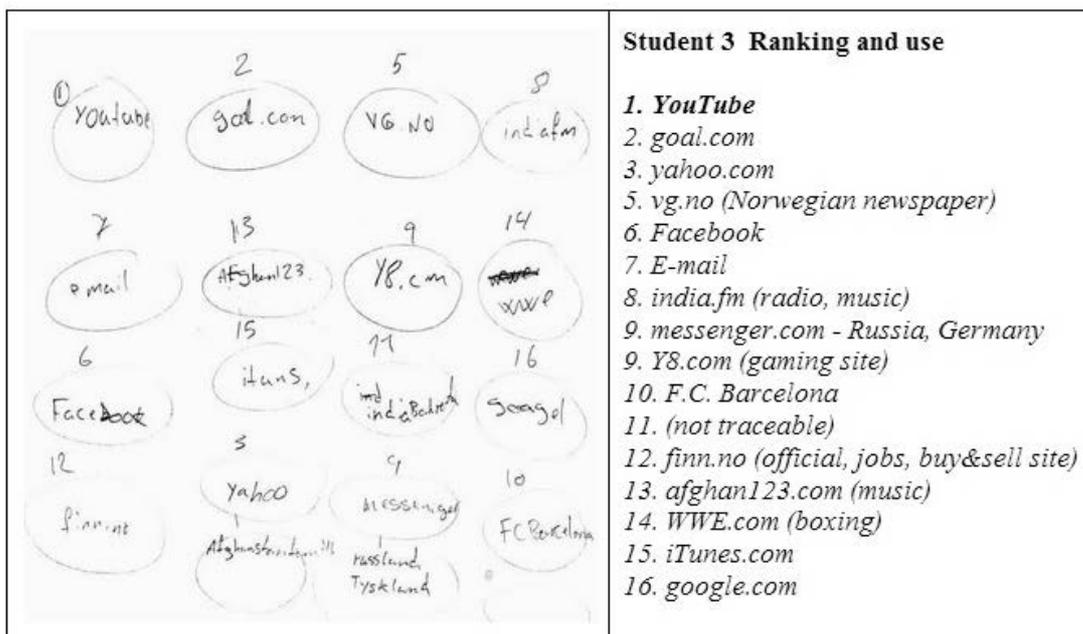


Figure 3. Example of student 3 network of nodes.

Part II: The students' network of nodes in informal learning

Since YouTube opened in 2005, a variety of internal subgenres have emerged. These appear as suggestions when you type in a search word in the search tool bar. One subgenre is “YouTube tutorials”, a kind of do-it-yourself (DiY) instruction, which is based on traditional apprenticeship. The common feature is that a “master”, claiming expertise in a field, shares a video containing a step-by-step instruction about how to carry out an activity, with an anonymous online “apprentice”. The up-loaded tutorials are short and behaviouristic, covering a range of topics. Many videos last from two to five minutes, and they can be both easy and difficult to make. Among other devices, YouTube’s own system for video-production can be used. The videos are often produced as screen casts with a voice-over, or videos are recorded at a location where some sort of activity is going on. The tutorials take place in an informal and socially networked context, and they represent an emerging peer-to-peer-sharing “educational” network, which is scarcely described in the research literature on YouTube. The majority of tutorials are in English.

YouTube offers a range of small music lessons made by amateurs, semi-professionals and professional music instructors. In the videos, they explain and show some of the basic skills, like how to play a cover song, different types of finger-picking techniques, chord progression, etc. As music theory is transformed into practice, the tutorials offer guitar playing for those who do not know how to read notes. The audio-visual tutorials contain a graphic display of the guitar tablature, the chords used in a song, and suggestions for a musical arrangement. Videos also allow learners to replay instructions. Songs are deconstructed and arrangements are visualised in very small details with accompanying explanations (audio), making it easier to learn to play a musical instrument. In an interview, one male student explained how he used two nodes – Ultimate Guitar and YouTube - in his network to learn how to play the guitar:

“I’m on Facebook, for example, I find some videos on YouTube. I want to learn a song. I go to Ultimate Guitar, learn the song. I only go to a web page, so you can download the tabs or the chords. You can find everything. All kind of music you can find on that page.”

Three other students used YouTube tutorials to improve their online gaming, one of their favourite hobbies. In the interviews, they revealed how they extensively consumed YouTube tutorials in order to learn to play World of Warcraft, Halo and Counter Strike. There is a good reason for employing tutorials. Gaming is a massive undertaking, more than just a random pastime activity. The students can play for hours. It is also a complex social practice, which involves a long learning process and a steep learning curve to improve. Amazingly, YouTube tutorials are a web 2.0 service the students use to close the gap between their actual level and the level they want to achieve in the game. Experienced gamers record and show off their great triumphs, nice moves, and how they uncovered a game's secret level in YouTube tutorials. Less experienced gamers employ these tutorials to learn or copy the tactics or tacit strategies of a particular game in order to ease the learning curve of a game. Some students referred to YouTube tutorials as "guides".

Compared to learning the rules, tactics and strategies on your own during the gaming activity, YouTube tutorials offer shortcuts to the mastery of a game. YouTube tutorials reveal a cultural value system among gamers, which is centred on aesthetics, personal taste and a sense of humour. This seems to serve a learning purpose.

- Student: *I use it very often. Every time I am at my PC, its YouTube, Twitter and Facebook.*
- Researcher: *What's so great about YouTube?*
- Student: *They post a lot of funny videos, like famous people. I play PlayStation. There are many who make "commentaries".*
- Researcher: *What is that?*
- Student: *They play and comment, find errors in games, and they make fun of it. If a FIFA player has only one foot. They forget sometimes to make a foot of a person.*
- Researcher: *They point out errors?*
- Student: *Yes, they find errors in all games.*
- Researcher: *And then they make a gag out of it?*
- Student: *They make it so that it is funny, while they comment on it.*

This student indicates that he is using what experienced gamers publish in order to uncover design flaws, thus providing hints to the existence of an aesthetic value system, not dissimilar to the aesthetic belief system seen in the hacker culture. Hacking is often about finding technical flaws in computer systems, something that the student points out in his consumption of YouTube tutorials. Flaws in the system, refers to quality, the rating of someone's work.

Another student revealed a personal value system underlying this production of YouTube tutorials. He uploads YouTube videos to show off to his friends, and not primarily for educational purposes. He evaluates his videos according to some inherent standards of content creativity, curiosity and quality, in order to decide whether to share them online:

- Student: *I did it very much before, when I gamed. For example, if I did something crazy, I edited them and posted them on YouTube. It was a simple way of sending and showing them to my buddies.*
- Researcher: *What did you make?*
- Student: *You know what CS is?*
- Researcher: *No.*

- Student: *It is Counter Strike. It is an army, shooting type of game. You play in teams. For example, we are five buddies, who team up against five other buddies. If you are alone, killing all five of them, it is very good. Then you could take the video, which shows how you killed all five of them. If you kill them in a good way, you can post videos of that. And you add the happy music.*
- Researcher: *So, you created a video-collage?*
- Student: *Yes.*

The last transcript from our interviews, demonstrates how YouTube tutorials are used in social networks in a larger socio-cultural context, involving more than just one person:

- Student: *Most times when new games are out, all my mates meet to find out more about it. We often sit and look on YouTube to see new things. It happens when we have to learn that and that, and that's the way to do it. It's really that way we use YouTube.*
- Researcher: *So you're sitting around and talking together?*
- Student: *Yes, we are discussing.*
- Researcher: *It seems to very useful? It teaches you a lot?*
- Student: *I learn a lot from it. I think that I couldn't have been able to play, if it wasn't for YouTube.*

Part III: The students' use of YouTube nodes in formal learning

In a later English lesson, the teacher introduced the students to the concept of “crossing boundaries” using “extreme sports” as a prompt. The aim of the lesson was to develop the students’ knowledge of the English-speaking world in line with the curriculum plan for English in the Knowledge Promotion (Utdanningsdirektoratet, 2012). She used three short informative texts about zorbing, heli-skiing and bungee jumping in a jigsaw reading. The students were divided into groups of three and instructed to read one part each, and then share their knowledge. The content seemed to spark an interest, since, for once, they all read their texts in silence.

In the following classroom discussion, the students to reflect upon *where*, *when* and *why* such activities take place, and *who* would engage in such sports. The questions created a rather lively debate in Norwegian and English, and gradually, the students “owned” the discussion, in the sense that the debate went on among the students without the teacher’s intervention. In this process, first one, then several students made use of their laptops, which are constantly available to all students on their desks. They opened YouTube on their own initiative, ran a quick search, selected a video and then invited other students sitting next to them to watch the videos with them. They also opened other websites that they connected to the topic, where for example accidents were described. These videos are represented by Figures 4 and 5.

They discussed and reflected upon the questions that were initially posed by the teacher in groups in front of the laptops. The students were divided about whether to risk trying these extreme sports, and they localised different sports to different locations and cultures all over the English-speaking world.

The first feature in this case is concerned with connectivity. The students used their existing network of connecting nodes to retrieve information that served as input in the discussion in the classroom. When the students connected the concept of “crossing boundaries” in written text to audio-visual texts retrieved from YouTube, they showed the capacity to form connections between text-based and audio-visual information in useful information patterns. In texts (meta texts) retrieved from the class’s LMS, several

students emphasised their preference for audio-visual over written text. One student wrote: “YouTube is easier than reading” and he goes on to explain this phenomenon: “On YouTube you can see pictures and movie clips and at the same time you learn. It can be a lot easier to search on YouTube than in an old book. I think YouTube makes working with the subjects much easier and a lot more fun.”

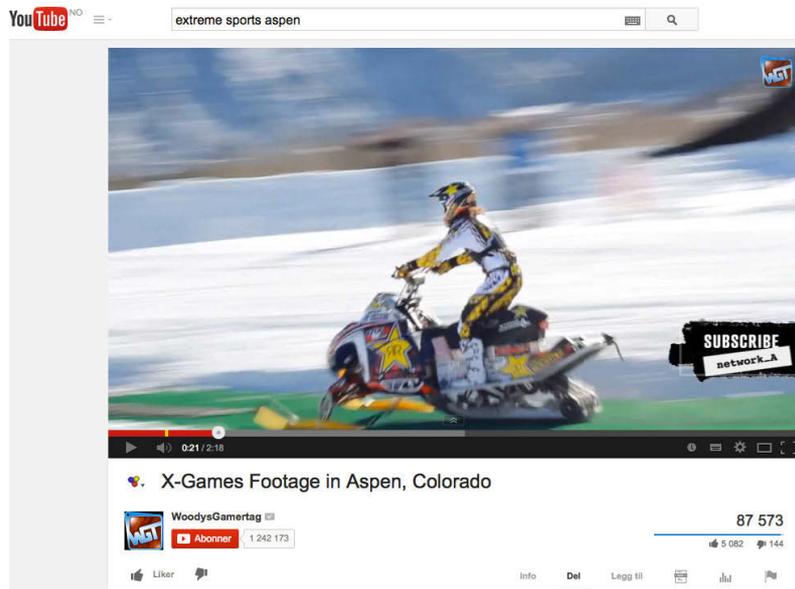


Figure 4. Students' selection of YouTube videos used to inform other students.



Figure 5. Students' selection of YouTube videos used to inform other students.

Another student writes: “When I’m working at school, I can use YouTube to search for things I haven’t done before, and learn some things from a movie on YouTube”. Yet another student writes: “The videos on YouTube can be based on drama, sketches, music, movies, knowledge, and so on that we read about at school”. These quotes indicate that students have developed cognitive connecting strategies for content-based learning, that they have developed patterns of connectivity between textual and audio-visual contexts and that they are bridging informal and formal learning. Our data suggests that YouTube has the potential to function as an agent for *connectivity* in concept based learning in formal education.

The second feature concerns students' self-organisation. At one point, the researcher observed four reorganised groups of students engaged in watching videos and discussing the prompt that they had received. The teacher joined the groups on equal terms with the students, and worked as an encourager in the sense that she asked higher order questions. The students activated their self-organising strategies when they made use of YouTube in order to add additional information in a different mode of literacy. They searched for information in videos that had the potential to broaden and deepen the understanding of the concept that they had been introduced to in written texts (cf. figure 4 and 5). They demonstrated their capacity to reorganise heterogeneous and pedagogical group settings in groups based on curiosity, creativity and personal interest, much in the same way as they described doing in informal learning.

Students also demonstrated self-organizing skills when they narrowed their search down to videos that were relevant and acceptable in the educational context. One student wrote the following in his meta-text: "At school I use YouTube to get information related to things we are doing, to get a better comprehension of what the subject is all about". Other students wrote:

"When you are at home you can search for whatever you want, but as long as you are at school or work, you can't search for videos that are not suitable for the situation. (...) When I'm at school, I often search for what the theme is at school."

"I think YouTube is a great website to learn from. If I wonder about something, I just search on YouTube, and I will find out of that. I use YouTube at school to learn. I like better to see something."

These quotes suggest that students are *self-organised*, that they are highly aware of YouTube as a tool for learning, that they make use of YouTube regularly in school and that they are conscious about forms of use in educational contexts.

A fourth trait in this case is concerned with critical literacy. Students are aware of the nature of the user-generated content that they are exposed to. One student wrote:

"There are not all the videos on YouTube that are great. Some videos might be fake, horrible or incorrect/wrong. You should have a basic knowledge of how to use YouTube. If not, you might end up watching a midget getting beating when you were trying to find a video with an interview of Barack Obama."

Another student wrote: "I can use YouTube in my work if I need to, but I can't be sure that what I see is right, so you need to watch at your own risk". Yet another student wrote:

"There are people taking videos where they are bullying other people, this is a problem YouTube is trying to solve. People can report videos they think are offensive to others. This is one big negative effect of YouTube."

These quotes indicate that students have developed a conceptual understanding of critical literacy from experience with YouTube videos. They reflect upon the validity and value of the information they retrieve and the harm it may cause, maybe more so, we are tempted to say, than when they are presented with information in textbooks in educational contexts.

After some fifteen minutes of self-organised activities in reorganised groups, three students wanted to present one video to the whole class on the projector. The students

connected their laptop to the Smart Board and reported on a fatal zorbing accident that had happened the previous week. All students were involved in watching the video. Going from chaos to classroom discussion, the teacher gave the lesson a clear direction through reflective questioning about students attitude to “crossing borders”: risk taking in terms of adrenaline kicks, lethal danger, courage, bravery etc. in different contexts. The discussion also included social situations, cultures and customs in the English-speaking world. All students were involved and eleven students contributed willingly to the classroom conversation in English.

The fourth trait in this case is connected to *social learning*. The students shared and discussed their digitally retrieved videos in small self-organised groups and as a class. The teacher cannot plan such student-initiated activities beforehand, and handing over authority to students can be experienced as losing control over the class (Sandvik et al., 2012). Chaos is, however, a necessary and fruitful stage in learning processes associated with connectivism (Siemens, 2010), as long as there is a clear direction. Collective self-organisation was initiated when one group of students shared their video with the whole class. In connectivist theory, this is described as sharing new information after having created new “nodes” of information (Siemens, 2004). The students handed back some formal authority to the teacher in the following classroom discussion. She could then ask follow-up questions in order to challenge her students at higher cognitive levels. This is also in line with connectivist theory, which stresses formative feedback on new nodes presented by the participants in a network. If these processes are repeated, they might form patterns of self-organization in formal educational settings, based on written and audio-visual information in a mix of teacher and self-organised learning. Some schools in Norway have closed down social websites in order to reduce complexity in formal education, thereby missing out on students’ self-organisation, curiosity, creativity and engagement.

In the last sequence, the class evaluated the lesson, with reference to “crossing borders”. Was there a conceptual understanding, and did they have enough background knowledge to write a text? The students were then given a writing task, where they discussed their attitude to “crossing borders” in the English-speaking world, using extreme sports as one example.

The last trait is connected to *sense making* and *engagement*. In this case study, the students demonstrated engagement with text when they partially self-organised the learning process that provided them with background knowledge for the written text production. In their short essays that followed, the students demonstrated, to a certain extent, sense making and concept understanding as well as emotions in written English. Below are some short excerpts from their essays:

On the running of the bulls in Pamplona: *“People over 18 participate to show their courage at their own risk. These people have to outrun a pack of angry bulls behind them (...). Personally, I have respect for these people, but I also think they are stupid sometimes. It is what makes them happy, but in the end it might be what kills them”.*

On zorbing: *“They get you into the ball and they roll you down a hill. (...) This sport is something I want to try during my lifetime. I love getting an adrenaline kick, so these sports are perfect for me”.*

On zorbing: *“Heli-skiing and bungee jumping: I think these sports are fun to watch and read about, but I will not try it myself”.*

These excerpts demonstrate students’ sense making and engagement with text production. We argue that the combination of reading and audio-visual text in a partly

self-organised context contributed to their essay production, which is not always the case in these classes. In connectivist theory, sense making and engagement go hand in hand and constitute a driving force behind learning in Internet based surroundings. Lack of data tracks, as in no text production, suggests the loss of engagement and it needs, according to Siemens, to be followed up by the teacher (Siemens, 2004; 2010).

Discussion

In the beginning of our paper, we contextualised Connectivism in *higher education* and discussions of MOOCs, and pointed to the impact of social media on teaching at the *lower levels* in educational systems. We argued that the connectivist approach should open a trajectory towards secondary education. We stress this point, due to the fact that our findings raise important questions about how future teachers should approach, integrate, and design the connecting and self-organising aspects of network-based technologies. We argue that this competence is a literacy that teachers need. This is primarily related to our research findings; we have demonstrated that a group of Norwegian vocational students are partially self-organised. In informal contexts, they develop knowledge and skills to search for and retrieve information from YouTube, and they develop their competences when using this literacy in order to solve self-chosen tasks. Under the right circumstances, that is when teachers design lessons that empower students, students transfer this competence, their social networked practices, to formal learning situations. Consequently, we have validated and provided empirical research on two aspects of Siemens' (2004, 2005, 2010) Connectivism - *self-organisation* and *learning as connections*, which implies a contribution to, as well as an extension of, this new approach to learning in the digital age. Our research suggests that students enjoy taking responsibility for their own learning when they can connect nodes of information retrieved from audio-visual media such as YouTube to their academic competences in reading and writing. The pedagogical question that remains, is how future educators can make use of this resource and more importantly, how teachers can make their social network practice congruent with their students' in order to develop students' literacy in academic subjects.

However, this is a difficult and complex endeavour, and we do not claim to have found the correct answers. But, we observe that much of the disagreement between scholars in the "connectivist debate", revolves around learning and whether the construction of knowledge happens in the *human mind* or whether it is distributed and can be attributed to the connecting of pieces of information embedded and transpiring from social structures like social networks in the extension of the human brain. This scholarly disagreement generates ambiguity about how learning takes place in social dynamics that connect different types of nodes in a network. One way out of this scholarly disagreement is, for example, to acknowledge that learning manifests itself in social interaction embedded in social contexts characterised by the use of digital technologies and cognition, and to focus on the social dynamics manifest in the connections that are made. One way to address students' YouTube knowledge and skills, and the academic resources it represents, could be to bridge informal and formal learning spheres. We suggest a connectivist approach to lesson design that we will discuss in the following.

Our first point is that the connectivist approach to *self-organisation* contributes to a digitally inclusive understanding of the term, and to the empowerment of students in the learning process. In pedagogy, self-organisation is generally described as being able to set goals, plan, monitor and assess learning and is now often associated with *assessment for learning*, feedback and learning analytics (Wiliam, 2010). Self-organisation in the

connectivist approach is for example the act of *spontaneously* retrieving information from YouTube to get a deeper understanding of a concept or an idea that also connects to other sources of information in a pattern that is meaningful to the user. In the connectivist approach, learning feeds on inner motivation, curiosity and creativity, rather than pre-set goals and pre-designed learning paths that easily lend themselves to valid testing. In formal education, this demands a shift from teacher controlled instruction to learner centred self-organisation in contexts characterised by rich and open learning tasks with a high degree of authenticity (de Jong et al., 2008). It also involves a shift from information provided by the teacher alone (cf. textbooks, reading lists) to a shared provision of information by students and teachers alike. In practice, learning processes in the classroom are still mainly designed and lead by the teacher and the textbook, not by students (Sandvik et al., 2012). Recent studies on attention such as multitasking and parallel processing, focusing on how to be mindful of attention when operating in hyperlinked and social media, suggest that self-organisation is particularly important in digital learning contexts (Rheingold, 2012). We suggest that teachers apply such research-based concepts to make students aware of their digital user patterns and the consequences of their choices, rather than just telling students to get off the Internet. In digital classrooms, students' access to information on the Internet, may well result in information overload, and management of complexities, with the aim of complexity reduction, must be part of the educational construct (Biesta, 2004). The development of students' self-organisation contributes to lifelong learning (Bartolomé et al., 2011; Rheingold, 2012).

The other point is that the connectivist approach to *learning as connections* between nodes, broadens the scope of connections available for the student to learn from, and that this raises the question of content in educational systems that prepare for the 21st Century. Such permutations have several consequences, like recognising that informal learning must be ascribed more value in formal educational contexts, and that retrieving information and ascertaining its true value, as well as acting upon it, is ever more critical for any learner and educator (Siemens, 2004). First, to meet some of the criticism that learning as connections has met (Clará & Barberá, 2014), we would like to add a distinction between two kinds of nodes to the theory: *nodes of information* and *nodes of knowledge*, where the former relates to distributed knowledge or skills residing in other humans or various types of texts, and the latter relates to information that has been processed, understood and retained in the brain of the individual as either knowledge or skills. In other words, one person's knowledge, be it tacit or explicit, becomes another person's access to information and vice versa, when networked. Exhibiting *competence* in a subject demands the ability to solve a task by means of existing knowledge and information patterns. In this perspective, we follow the connectivist argument that learning happens inside the human brain, when connections exist between nodes of knowledge (cf. neurons and astrocytes) and outside the human brain, when connections exist among nodes of information in a social network (cf. YouTube, Facebook, Wikipedia, Twitter), and that when connected, these two systems render the discovery of patterns within a field possible. Patterns can for example be displayed in concept maps, skills or in various types of texts.

The pedagogical consequences of this line of thought are that educators should include a networked environment in their classrooms. In our study, we have demonstrated how students self-organise their informal learning on YouTube. We see this user pattern as an argument in the current debate on flipped classrooms, and we suggest that formal education make use of expandable nodes residing in students' digital network. We also see that students have developed digital networks that can be activated when needed in order to solve a task, which we see as an argument against

spending too much time on presenting knowledge and testing reproduction of knowledge in school. Also, the fact that information is accessible at the fingertips with mobile technology, renders knowing where to find nodes of information, equally important as spending time and effort on gaining knowledge from within a limited set of nodes of information. Our data shows that if school takes students' informal learning seriously, teachers must develop students' existing connecting skills through reflection and discussions, using higher order thinking, problem solving and critical thinking in meaningful tasks. We see this finding in the light of the debate on what literacies secondary school should offer to prepare students for the 21st Century.

The last point that we want to make is related to the conception of *literacy pedagogy* in a connectivist approach to learning. Reading and writing literacies in educational contexts give advantages to those who acquire the necessary skills. It has an impact on cognition and shapes the way we think (OECD, 2009). While linguistic literacy has played a dominant role in defining teaching for centuries (Cazden et al, 1996), patterns of YouTube use among socially oriented, digitally skilled and interest-driven high school students suggest a wider scope. We argue that the inclusion of audio-visual literacy in education has far reaching consequences for pedagogical practice. There is a clear motivation for claiming this; there is no single research based definition of the pedagogical nature of technology. As a result, the terms "multiliteracy", (New London Group, 1996), and "digital literacy" (Martin, 2006) are only two of several concepts used with in the intent to disclose what technology implies in learning. Digital literacy can for example be understood as:

The awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesise digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process. (Martin, 2006:156)

This is an example of a wide and inherently complex definition, which is difficult to transform into educational practices and may therefore run the risk of being overlooked. We argue that education in the digital age would profit from a conceptual framework of literacies that supports students' strategic and metacognitive learning in a set of more "teachable" technological contexts. The concept of nodes of information in the connectivist approach to learning displays the need for connecting strategies between various types of digital literacies, and for a better understanding of the bridging between old and new literacies (Rheingold, 2012), where for example the connection between audio-visual YouTube use and written text production can be explored.

Bawden (2008) presents one literacy of possible interest to the connectivist approach to learning: *information literacy*, which we modify to actively seek, find, store and curate information. The literacy connects nodes of information to nodes of knowledge through curation, which means to make quality knowledge systematically available to others as information in a network and describes the existence of a network of quality nodes and the competence it takes to keep it readily available and updated (cf. Wikipedia, Scoop.it). Another literacy of interest is *audio-visual literacy* that we, for pedagogical reasons and in line with the separation of reading from writing, would like to separate into two entities related to: audio-visual consumption (input) and audio-visual production (output). The former is what we chose to call "*watching*" literacy, which describes the process where nodes of audio-visual mimetic information are connected to nodes of knowledge in a learning process that feeds on watching literacy. The process

can for example be described as learning from watching a YouTube video and bears some similarities with the reading process. The latter is a more complex entity, meaning that there are several possible subject fields and literacies involved in the output of video consumption. We can think of three: *oral literacy*, where students talk about a topic they have watched using academic and subject related concepts (cf. cognitive apprenticeship), *video production literacy*, where students produce their own videos using occupational concepts and technology (cf. media production), and “*Do-it-yourself*” (*DIY*) *literacy*, where students literally imitate what they have watched using implicit knowledge and skills (cf. apprenticeship). We have primarily been concerned with the former, watching literacy, which we define as:

the awareness, willingness and ability of individuals to watch videos in order to construct new knowledge, form ideas, understand concepts, form concept patterns and engage with audio-visual text, participate in oral conversations or fulfil tasks in constructive social actions; and to reflect upon this process and the transfer to other literacies (domains.)

In our analysis, we discussed why there is a clear reason for adding audio-visual literacy to linguistic literacies taught in schools. YouTube content easily creates engagement across informal as well as formal learning contexts. YouTube mobilises students across ages, sexes, institutions and social backgrounds, and bears similar characteristics to engagement with written text as described in the assessment of reading in PISA:

the motivation to read, and is comprised of a cluster of affective and behavioural characteristics that include interest in and enjoyment of reading, a sense of control over what one reads, involvement in the social dimension of reading, and diverse and frequent reading practices (OECD, 2009:24).

Most of these characteristics are present in students’ consumption of YouTube content in our data. Using students’ self-organisation, connecting strategies and their ability to share user-generated YouTube content, has, as we have demonstrated, the potential to create student engagement and participation in formal educational contexts. We see a clear parallel between engaged readers and video watchers in the definition above. We believe that further research on these literacies may contribute to the “teachability” of technology in educational contexts, something that is supported by the growing use of YouTube and video in both formal and informal contexts (Dubisar & Palmeri, 2010).

Stating this argument, we dear postulate that learning through audio-visual literacy over the Internet contributes to a paradigm shift in learning, and calls for a broader understanding of how ideas, concepts and concept frameworks can be formed. In line with Treadwell (2011; 2013) we argue that since the printing press was invented and information became available other than through word of mouth, educational systems have succeeded in developing a high level of reading and writing literacies in most populations. The future in education does not solely lie in an effort to further develop these literacies. We believe, the future lies in embracing the learner’s capacity to form ideas, concepts and concept patterns from audio-visuals under circumstances akin to those of our forefathers before the invention of reading and writing. In this sense, we agree with Mizuko Ito and her research team (Ito et al., 2013), that if students can use their social, interactive and online media skills for academic learning and opportunity in the classroom, inequity in education can be diminished.

Conclusion

We have demonstrated that a connectivist approach to learning contributes to possible new research insight in formal education. Moreover, we have argued that the connectivist approach is valid in the lower levels of an education system, a factor calling for a new direction in the debate on Connectivism and digital learning. This is foremost related to the fact that aspects of YouTube use among adolescents show that self-organisation is developed in informal contexts outside school, and that under the right circumstances; students are willing to engage with academic subject matter using self-organisation and connecting strategies in formal learning situations. Students make connections between sources of informal and formal content; they bond and bridge information and knowledge in order to construct new meaning in sense making activities significant for them, like oral discussions, writing and skills development. We have also established a need to connect the predominantly text-based approach to literacy in education to audio-visual literacy in students' digital networks. In sum, the main intention with this article has been to cast light upon a subject matter we consider to be important; to enhance our knowledge on YouTube use and to connect it to Connectivism. We therefore hope that future researchers will continue the trail we have opened, and provide new insight, research and ideas.

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ⁱ We would like to acknowledge our students, who volunteered to be informants.

ⁱⁱ In the classroom context, we are making a distinction between the researcher, who observed the lessons and interviewed the students, and the teacher, who taught the class and wrote the logs. Otherwise, when using the term “we” in the text, we are referring to the two as researchers and authors of this article.