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## **OPEN SOURCE LEARNING STREAMS IN SOCIAL MEDIA IN YEAR 11 MATH TEACHING**

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### **Abstract**

The students' use of social media during lessons and in group work is a general concern amongst teachers especially from secondary school and onwards. The blurred ecotones between private, social and academic life brought on by the always present online mobile technology makes utilization of social media in teaching a balancing act. On the one hand the teachers in this study welcome the possibilities for communicating, sharing and producing academically relevant products, and on the other hand they fear that the rhizomatic connection between what is academic and what is regarded as non-academic is disrupting the learning process. Hence, teachers take different measures in order for the ecotones to either separate or engage in fruitful synergy. In this study two very different approaches are taken within similar pedagogical designs in a highly comparable context. In theory the outcome of the pedagogic design should be the same but in practice the two teachers achieve very different results. The study utilizes the deleuzean notion of 'interest' and 'desire' and problematizes the common use of 'motivation' in pedagogy. The study analyzes what appears to be a conflict between the institutionalized 'interests' of the educational system and personal 'desires' of the student. In one case the institutionalized interest and the personal desire of the student share a significant intersection; whereas the other case shows a clash of 'interest' and 'desire'. The study also shows a clash between content driven teaching and learning driven teaching. Finally the study shows that if a pedagogic design is imposed upon a teacher without his acceptance or full understanding of the design then the outcome is questionable. The study suggests a different approach to motivation that acknowledges that the process of learning is a desire of 'becoming' not the 'pleasure' of satisfaction through entertaining activities.

### **Introduction**

At the school, where this study was carried out almost every student bring their own devices to class. For the most part the students live in a state of omnipotent onlineness where postponed replies in social media is considered impolite (Hansen, 2011) therefore controlled and restricted use of social media in particular and smartphone in general result in conflicts. The teachers at this school take different measures in the fight for getting the students attention; some teachers are very proactive, they collect smartphones in the beginning of classes and so forth, while other teachers resignate in inaction. But for the most part the teachers try to incorporate social media in the pedagogical design (blogs, Google drive,

socratic etc.). The incorporation of social media is done in many ways; one is to create intrinsic motivation (Ryan & Deci, 2000) through accommodating to the means of communication that the students use in their private lives, another is to try to move the academic tasks into social media. In both cases the use of technology is blurring the ecotones<sup>1</sup> (Paasch, Henningsen & Levinsen., 2014) between academic and non-academic life. The blurring of ecotones brought on by online, personal devices is a general concern in this study. Case 1 shows a teacher (referred to as teacher 1) who tries to utilize the academic affordances of social media, while case 2 (referred to as teacher 2) tries to maintain a well-defined ecotone between private and academic. In this study social media has the role of; hand-in folder, feedback channel and assignment distribution. It is merely a tool that is in everybody's shared repertoire (Goodyear, Casey & Kirk, 2014) and not so much an attempt to create extrinsic motivation through accommodation to youth culture.

### **Research design**

The epistemological point of departure in this study is critical realist (Bhaskar, 2008). Critical realism opens a convenient gateway between realist and interpretivist epistemology. It is convenient if you believe that what you investigate into is not entirely recognizable through quantitative data; but on the other hand it is not a completely socially constructed either. Critical realism offers a way of looking at complex human interaction without struggling with the shortcomings of naïve realism and the shortcomings of social constructionism. Critical realism makes the distinction between the intransitive and the transitive dimension. The intransitive dimension is ontologically given; it exists unheeded of our knowledge of it. The transitive dimension is defined by our epistemologically determined knowledge of it. The intransitive dimension constitutes itself through a layered ontology. This layered ontology is stratified into layers (atom, molecule, physics, biology etc.) that make an experienceable 'emergence' possible. The intransitive dimension is furthermore divided into three domains and an infinite number of layers according to the context (Elder-Vass, 2007). This study investigates and compares different mechanisms in the domain of the real that cause effect in the domain of the empirical that emerge for us to witness.

The method is action research, abductive intervention design and ethnographic observation. The action research cycle is initiated by a planning conference, where the teachers and the researches benefit from each other's knowledge and experience. During the planning conference we define the problem and design the intervention on the basis of a shared abstraction that lead to a concrete abduction. The success of the abduction is relying on the shared knowledge and experience of teachers, researchers and the students' ability to acknowledge and act with in the pedagogic design of the invention. The outcome of the planning conference is a syllabus for the series of lessons in question. In the period between the planning conference and the actual teaching, the syllabus is qualified further by the teachers and researchers. During the actual lessons the researcher observes the students

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<sup>1</sup> Ecotone: the border between two ecosystems, forest-field, river-brink. Used as a metaphor for the borders between academic life and private life. Technology that contains both ecosystems are prone to blur the ecotones (for good and bad).

interaction, interview students and collect other relevant data. After that the data is analyzed and the results are reported back to the teachers for the purpose of evaluation and developing the pedagogical design further. This study was done during the second action research cycle within the same context. Furthermore the intervention in this study is a part of a longitudinal research project funded by the Ministry of Education<sup>2</sup>.

The design utilizes prior knowledge of the ‘Open Source Learning Stream’ (Kjærgaard & Sorensen, 2014a) which indicates that learning in an open stream of learning instances is creating a shared sense of community and connectedness amongst learners (Siemens, 2014). The open source learning stream can manifest itself in various ways (Kjærgaard & Sorensen, 2014):

1. Synchronous or asynchronous individual learning log on smartphone;
2. Synchronous shared learning stream in a rhizomatic, digital network (twitter, facebook, edmodo);
3. Asynchronous shared learning stream in a rhizomatic, digital network (LMS discussion forum).

In this case the pedagogical design utilizes the second manifestation of an open source learning stream. The idea is that the shared, open learning stream in a secure learning environment would create a ‘desire’ to achieve ‘connectedness’ (Bliuc et al., 2011), take part and gain ‘positive’ identity in the learning stream. ‘Positive’ is identified as a student identity that is ‘connected’ to the learning stream and contributing to achieving the shared learning goals by either asking or answering questions or by expanding the path towards the shared learning goal.

### ***Interest and desire***

In our experience the term ‘motivation’ is somewhat problematic. Instead we introduce the philosophy of Deleuze and Guattari and their notion of ‘desire’ and ‘interest’ (Young, 2013). Interest and desire are related to what we in pedagogy would call motivation. ‘Interest’ is also closely related to the management idea of motivation through goal oriented, rational thinking (Styhre, 2001). Therefore we will discuss the pedagogical term ‘motivation’ in relation to the philosophical terms ‘desire’ and ‘interest’ in order to explain why we opt out the notion of ‘motivation’. In pedagogy we divide motivation into intrinsic motivation and extrinsic motivation (Ryan & Deci, 2000); intrinsic motivation being the student’s immanent drive towards something, extrinsic motivation being the outer actions taken to stimulate intrinsic motivation. In our experience the problem with the notion of motivation as a pedagogical term is that it removes focus for the academic tasks and points out things that the teachers must do or change to motivate students. Furthermore motivation theory externalizes the gauge for levels of motivation. Methods for determining levels of intrinsic motivation could

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<sup>2</sup> Link to The Ministry of Education’s description of the longitudinal project:  
<http://uvm.dk/~media/UVM/Filer/Udd/Folke/PDF13/Maj/130527%20Elevernes%20egenproduktion%20og%20elevinddragelse.pdf>

be: ‘free choice test’ (Ryan & Deci, 2000) where learners are presented with a set of choices one being the target task. The learner’s intrinsic motivation is then, somewhat crudely, measured by the amount of time he/she spends on the target task and by that the motivational quality of the task.

*“...intrinsically motivated activities were said to be ones for which the reward was in the activity itself.” (Ryan & Deci, 2000)*

In that sense intrinsically motivated activities cater for immediate learner needs often materialized through entertaining activities (edutainment etc.). Such activities are related to a form-oriented teacher (‘level 2’) (Biggs & Tang, 2011). A ‘level 2’ teacher is a teacher who is, according to Biggs, very interested in evoking intrinsic motivation through entertaining teaching activities. This teacher is very much into developing his or her own teaching techniques and methods, often through the means of technology. A ‘level 2’ teacher hasn’t yet asked himself; ‘who is learning what from these activities’, according to Biggs. In connection to the ‘level 2’ teacher is the ‘level 1’ teacher, who is focused on content and the ‘level 3’ teacher how is focused on learning. In that sense the progression goes from content-centred to form-centred to learning-centred teaching. The latter being a symbiosis of the two first. Intrinsic motivation is related to the ‘level 2’ teacher and to whether the student enjoys the teaching or not. This study tries to create a plateau for ‘level 3’ teaching activities that focus on learning processes and not on entertaining the students. Intrinsic motivation is often evaluated through self-report or satisfaction-surveys.

*“The other common approach to the measurement of intrinsic motivation is the use of self-reports of interest and enjoyment of the activity per se (e.g. Ryan, 1982; Harackiewicz, 1979)” (Ryan & Deci, 2000).*

This brings the student’s immediate enjoyment in focus and not his/her learning process. In motivation theory it is believed that enjoyment and learning outcome should go together but in our experience this line of thinking often leads to pedagogic designs that lean more towards entertainment than education and whilst the activities might be amusing the learning outcome is often minimal. The students in this study took part in another full day intervention where they should do math using LEGO mindstorms robots. Most of the students were motivated and had fun but they struggled to recognize the academic potential in the activities. After the teacher pinpointed the academic elements in the activity one student’s utterance encompassed most students’ experience:

*“we could have learned the math in 20 minutes, if it [LEGO mindstorm activity] was about math it would have been easier to learn through normal math tasks – but it was great for getting to know each other” (female student in year 11 class)*

In our experience the notion of both intrinsic and extrinsic motivation moves focus away from the academic task at hand. In some cases that is properly good but in the case of this study it is important for both teacher and students to have explicit math-oriented goals. So the challenge is to evoke the students' desire towards achieving the academic goal. In Deleuze and Guattaris' theories on desire and interest they claim that desire comes: *not from need or want but from plane of consistency* (Styhre, 2001). 'The plane of consistency' in a student (or any human being) is part all things unconscious, part individual identity and part resources (Deleuze & Guattari, 1987). It is from 'the plane of consistency' that ideas arise, feelings emerge and desires materialize in to actions or thoughts. The plane of consistency is the foundation for the students' 'unconscious drives':

*"...it [desire] does not refer to my conscious desires—to get rich, to get laid, to get a job—but rather to the state of the unconscious drives" (Smith, 2007)*

When desire is thought of as an unconscious drive it will be pure luck to evoke desire by constructing learning activities that learners evaluate positive and claim to enjoy according to the means of intrinsic motivation. Especially, in an educational system (the Danish) that have chased motivation (intrinsic and extrinsic) as a key factor for learning for decades. The struggle for learning is taken over by the fear of boredom. If learners already have pleasure as a given circumstance in the learning process, without struggle, then pleasure, needs and satisfaction loses its effects and meaning (Styhre, 2001). Pleasure and desire are to very different things according to Deleuze; pleasure is a satisfied 'being', where desire is 'becoming' (Young, 2013). Learning is in itself a process becoming. The main difference between intrinsic motivation and deleuzean desire is that desire comes from immanent resources (plane of consistency); the students experience, resourcefulness, identity, unconscious drives, recognition in group, while intrinsic motivation in Deci's interpretation is thought of as a rewarding emergence that comes from the activity itself. The philosophical notion in this study is that desire to learn comes from prior learning experiences and leads into new learning experiences, hence entertainment, satisfaction of needs, etc. in itself cannot evoke desire. We are not trying to accommodate to the students use of social media we are merely using Facebook because it is a convenient plateau for connectedness.

The other side of motivation, the extrinsic motivation, is just as problematic in pedagogy because the interest, in a deleuzean sense, that extrinsic motivation often holds is an external one; to get a better grade, to understand geometry, to get a job, to learn in general etc. All these 'goals' are goals that we as educators believe all students should strive for but in reality the students' desires might be totally different. In this study a disaffected student says: *'my mom and dad say that I won't need math later in life, so I don't bother to struggle with it'*. The interest that the teacher tries to impose on the student is challenged because her parents are offering another interest and the students desire to learn math is lost in a conflict of interests. The interest that her parents offered implied fewer struggles; hence that interest was more attractive because 'struggle' is regarded as both unnecessary and unpleasant according to this student.

*“The interest of a student is not build on his [or her] own will and desire but on the social formation of education.” (Smith, 2007)*

So in this study we tried to analyze; what is interest and what is desire and how can we work with desire within the given framework of external interest. On the basis of that the notion in this study is that desire comes for empowerment and empowerment comes from being able and knowledgeable, hence we strive to design lessons that empower the students to learn and through that gain desire to learn more – motivation becomes the ends not the means.

### **The Context**

The study was carried out in a school especially for year 11 students (10. Klasescenter<sup>3</sup>). The School is attended by 220 students; they are all in the same key stage, all at approximately the same age (16/17 years). The syllabus describes a series of math lessons (5-7 lessons) on geometry (Pythagoras and Heron) in which the students must use Geogebra<sup>4</sup>, smartphone and interaction platform (Facebook or Google). The task for the students is to take pictures of geometric shapes in their surroundings, upload the pictures to Geogebra, do calculations (circumference, area etc.). After they have done the calculations they must formulate a geometrical task for their classmates on the basis of their pictures. The task and pictures are then uploaded to the interaction platform. Each group must do at least their own task and one of their classmates' tasks. The technology didn't cause any problems. The students were familiar with Geogebra, to some extent, and they had no difficulties taking, uploading or sharing pictures. During the planning conference some of the teachers were reluctant to incorporate Facebook as an obligatory element because they thought that the 'legitimate' use of Facebook would trigger 'illegitimate' use of Facebook. Therefore we made the choice of Facebook as interaction platform optional.

### **Data analysis**

Since this study is a part of a longitudinal, ethnographical study of students as 'learning designers' (Levinsen & Sørensen, 2013) the main empiric data is primarily field notes from observation and semi-structured interviews with students. However the empiric data also include the stream in the student's math-Facebook group and the documents from the planning conference. The data in the Facebook group contains pictures of geometric figures from the Geogebra task and the corresponding classmate-tasks in the comment section. The field notes from the observation report from two very similar situations; two male math teachers, same number of years' experience, same number of students in class (18), students of same age and same key stage, same learning goals, similar classrooms, similar technology, observed in the same period (October 2014). However the observations in the two classes were rather different.

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<sup>3</sup> Year 11 is an optional addition to the mandatory schooling (GSCE) in the Danish school system. Year 11 focuses on preparing the students for vocational or 6th form education.

<sup>4</sup> Math tool: <http://www.geogebra.org>

Teacher 1 decided to use Facebook for the learning stream and for the distribution of classmate tasks. He decided that the students should pick a classmate-task of their own choice.

Teacher 2 decided to use a shared Google doc for distribution classmate-tasks and left it to the students to decide which service they would use for sending the pictures that went along with the classmate-task to the appointed opponent group. Teacher 2 had made a predefined distribution of classmate-tasks which meant that the students had no choice between the different classmate-tasks.

## **Research findings**

Even though the two series of lessons are seemingly alike what actually happened in the classroom turned out to be quite different. In teacher 1's class focus is on evoking desire through connectedness. In his class the students were inspired to engage in the activities. They quickly began their own part of the math task and shortly thereafter they posted pictures and classmate-tasks in the Facebook group. After one round of activities some of the students began to experiment with more difficult and complex geometric figures from their surroundings. All students were active because they could choose geometry tasks at their own level and create just slightly challenging tasks for their classmates. So all students could take part and all were challenged. Teacher 1 could follow the progression in the Facebook group on his smartphone and give feedback in the comment section or by 'liking' the task or the solving of a task.

In teacher 2's class the students were a little hesitant towards the tasks. They didn't really understand why they should take pictures and do math on something they might as well have drawn. They requested 'real math tasks' and when it came down to solving the classmate-tasks some of the tasks were too difficult for some opponent groups and some were too easy for other groups. So the predefined regulation of the task assignment didn't work. Some students were done too quickly and others couldn't solve their task at all. When we interviewed the students in teacher 2's class they said that they used Facebook to send the pictures to their classmates which means that they were on Facebook, no matter if the pedagogic design dictated it or not. The technology that teacher 2 put to use had no apparent purpose which the students reacted to as follows:

*"It is confusing to do math this way, it doesn't make sense to use google" (T2, Student 4, female)*

*"I could do the math easier with a pen and paper" (T2, Student 2, male)*

In teacher 1's class the students react a little differently, even though they also point out that they could do the actual math bit of the tasks quicker with pen and paper.

*"When I do math in Geogebra I have a feeling that I can easier use what I learn in other contexts" (T1, Student 1, male)*

*“It is nice that you decide which task you want to solve. It is more fun that solving tasks from a book” (T1, Student 2, female)*

The main function of technology in teacher 1’s case was to share classmate-tasks and the solving of classmate-tasks and try out new ways of feedback and decision-making. The main function of technology in teacher 2’s case was to control task distribution. So in that sense teacher 1 is addressing ‘desire’ and teacher 2 is addressing ‘interest’.

Teacher 2 was very specific about expressing the external interest of the assignment in the sense that teacher 2 used an upcoming evaluation as a motivational leverage to get the students to be more active. Teacher 2 spent quite a lot of time talking to about their lack of enthusiasm and that they would have to work harder or else the evaluation might not be as positive. Teacher 1 spent all his time talking about geometry and helping the students to create exiting tasks for their classmates.

### Discussion

The study is an example of Everett Rogers’ claim that you can implement technology without being innovative; however it is hard to be innovative without technology (Rogers, 2010). Teachers 1’s pedagogic design seemed to be more fruitful than teacher 2’s but the reasons for this lies properly not only in their application of technology. There may be many other reasons; the teacher’s connection to that specific class, the difference in class culture, the teacher’s understanding of and commitment to the common goal of the intervention in the longitudinal study. The reservations towards taking advantage of blurred ecotones in social media might have forced teacher 2 to compromise his own belief in the sense that his choice of technology might have been more a case of choosing the lesser of two evils rather than a proactive choice of his own. If a teacher doesn’t believe in the method or technique of teaching that is requested of him then the result is often not so good. The mere fact that the intervention design is imposing a design for teaching upon the teachers is a source for bias.

### Conclusion

The study shows that you can engage the students’ desire through connectedness by academic tasks. If the pedagogic design is allowing the student to make academic decisions on the basis of his or her abilities then it is desirable to take part in the activities. If you take advantage of blurred ecotones in social media, you can separate the affordances of the media that cater for academic tasks from all the other types of communication that social media makes possible. In this study Facebook was the mechanism that made the pedagogical idea of a learning stream possible. The study shows that; the learning stream, the selection of which tasks to do, the fast feedback mechanisms, the documentation of the process and the general feeling of connectedness wouldn’t have been possible without reflected use of social media. On the other hand the study also shows that you can easily incorporate technology for the wrong reasons. During the planning conferences it became evident that now all teachers condoned the initial description for the activities, therefore we created a window of choice of communication platform. The option to pick another platform lead to teacher 2 picking a platform that had



different affordances than the intervention needed, hence the technology was at best redundant and at worst a hindrance.

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