Winking at Facebook: capturing digitally-mediated classroom learning

Owen Barden
Centre for Culture and Disability Studies
Liverpool Hope University, UK

Abstract

This article discusses the combination of methods used in a study of the use of Facebook as an educational resource by a class of five students at a Sixth Form College in north-west England. Through a project in which teacher-researcher and student-participants co-constructed a Facebook group page about the students' scaffolded research into dyslexia, the study examined the educational affordances of a digitally-mediated social network. Combining multiple data-collection methods including participant-observation, semi-structured interviews, video recordings, dynamic screen capture (Asselin & Moayeri 2010; Cox 2007), and protocol analysis (Ericsson & Simon 1993) helped to capture multiple perspectives on the learning that happened in the classroom over the five weeks of the research project's lifetime. Aggregating the resulting data permitted meticulous, comprehensive reconstruction and analysis of aspects of that learning. Crucially, insights were gained which would not have been afforded by a more orthodox approach. The article presents and analyses excerpts from the data which help to illustrate these insights. The discussion identifies potential benefits of employing these methods and also acknowledges factors which hampered fully effective joint implementation in this study. As well as suggesting improvements that could make the approach worth considering for any study exploring screen-mediated classroom learning, I hope to offer researchers investigating

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similar settings some insight into the potential, pitfalls and limitations of attempting to combine these methods.

Introduction

This article discusses the combination of data collection methods employed for a study of the use of Facebook as an educational resource by five dyslexic students at a Sixth Form College[1] in north-west England. Through a project in which teacher-researcher and student-participants co-constructed a Facebook group page about the students' scaffolded research into dyslexia, the study examined the educational affordances of a digitally-mediated social network. The combination of methods helped capture multiple perspectives on the learning that happened in the classroom over the five weeks of the Facebook project's lifetime. Despite imperfections in the project design and some practical issues in its implementation, the aggregated data produced was rich enough to enable meticulous, comprehensive reconstruction and analysis of that learning. Crucially, insights were gained which would not have been afforded by more a more orthodox approach. Advantages of combining the data sources are explored. Examples of data are discussed to illustrate how the methods enabled the construction of a credible, multifaceted account of the learning that happened in the classroom. Suggestions are also offered for improvements which could make the approach worth considering for other studies of computer-mediated classroom learning.

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[1] In the UK, sixth forms are important stepping stones between high school and university. They almost exclusively teach 16-19 year-olds on A-Level programmes. A-Levels have historically been regarded as the 'gold standard' of British education and are generally a prerequisite for university entry.

Background: dyslexia, literacy & social networks

The focus of this paper is methods, but some background to the study is offered here to help contextualise it and the approach taken. This study investigated learning through literacy in a digitally-mediated social network. Many students are prolific but unsophisticated users of social network sites (SNS) (Crook *et al,* 2008), yet evidence from the emerging body of research on pedagogical applications of SNS is both limited and mixed (Coates, 2007; Greenhow, Robelia & Hughes 2009), with the student voice largely absent from the literature (Prescott, Wilson & Becket, 2013). Against this background, this study sought to determine the pedagogical principles the participants' classroom use of Facebook evoked. In their preliminary interviews, the participants all said they felt that Facebook had educational potential which their College was ignoring (Selwyn, 2011). The College was unsure of its social media strategy but agreed that Facebook's ubiquity meant it could not sensibly be ignored, and that it could have some classroom utility. Digital media have been shown to increase student motivation towards research, writing, editing and presentation of work – precisely the areas where many students labelled with dyslexia struggle (Passey & Rogers 2004; Faux 2005). Other research suggests that digitally mediated social networks can have a role as collaborative online learning environments. For example, such environments have been demonstrated to improve student involvement, engagement, satisfaction and higher-order learning such as critical thinking and collaborative problem-solving (Badge, Saunders & Cann, 2012; Oncu & Cakir, 2010). The appeal of SNS, especially Facebook, has also been well documented (boyd, 2008a & 2008b; boyd & Ellison, 2007; Davies, 2012). Such sites are driven by reading and writing. Dyslexia is usually defined in terms of problems with reading and writing, which represent significant barriers to learning,

and so the apparent potential of SNS to motivate engagement with and through literacy warrants investigation.

Research aims

Since relatively few studies have yet explicitly considered potential pedagogic applications of digitally-mediated social networks (Greenhow, Robelia & Hughes, 2009), one task facing researchers is investigating and developing understanding of the educative practices employed in such networks (Greenhow & Robelia, 2009). The primary aim of this study was to examine the educational affordances of Facebook. Subsidiary concerns were the role of motivation and identity in learning through literacy in this context, and whether the participants' use of the SNS evoked any principles for pedagogy. The methods chosen therefore needed to capture faithfully both literacy events (observable activities) and literacy practices (the conceptions underpinning experiences of the events) (Street, 1984 & 2003). This is not easy, especially now that classrooms increasingly combine online and offline learning (Mercer, Littleton & Wegerif, 2004). To try and meet this challenge, the study utilised an unorthodox combination of familiar and emerging qualitative methods.

Methodology & design

Methodology

To develop pedagogy for digitally-mediated social networks, we first need to try to understand students' modes of thinking and learning in these contexts (Leander, 2008 & 2009). There is a thus a requirement to collect evidence of collaborative and emerging literacy and learning practices (Lankshear & Knobel, 2007). Yet uncertainty arises from newness and rates of change in new media. There are also cost concerns and practical and ethical barriers (Asselin & Moayeri, 2010). Nevertheless, there is a need to develop insights

into the role and meaning of such technologies in students' lives (Selwyn, 2011). The nature of these technologies and contemporary classrooms may render traditional methods inadequate by themselves. This highlights the need for a pragmatic approach when researching classroom settings which increasingly combine online and offline learning. Indeed, the binary online/offline distinction seems increasingly hard to sustain. Rather, young people weave complex tapestries of communication, combining multiple online and offline threads (Hulme, 2009; Facer, 2011). Methods must try to somehow capture the "connected complexities" (Davies, 2012; Leander & McKim, 2003) of such settings if any meaningful understanding of how learning happens in them is to be obtained. The selection of methods used in this study did capture much of the connected complexity of the classroom under study. It achieved this because it did not simply transfer old methods to new settings. Beneito-Montagut's (2011), 'expanded ethnography' for online settings, in fact relies on participant-observation and interviews, as we would expect any ethnography to. In contrast, this study adopted multiple methods including participant-observation, semi-structured interviews, whole-classroom video recordings, dynamic screen capture (Asselin & Moayeri, 2010; Cox, 2007), and protocol analysis (Ericsson & Simon, 1993). This combination of methods used gives a fuller, more multidimensional, emic account of events than Beneito-Montagut's. Using multiple methods enables researchers to move beyond triangulation or corroboration, and enhances our ability to develop an in-depth understanding of complex phenomena (Denzin & Lincoln, 2003): what Mason (2006: 12) calls the "heart and soul" of lived experience.

Despite some flaws, the approach reported here facilitated multidimensional reconstruction of the learning processes and principles at work in the classroom setting. It

combined whole-classroom participant-observation and video recordings with simultaneous single-student audiovisual recordings of those actions and events, together with subsequent participant and researcher reflection, analysis and interpretation. It thereby rendered a relatively full picture of on- and offline activity in the classroom. This helped to capture and analyse a variety of perspectives, with different levels of focus and detail, on the students' interactions with each other and with Facebook as they contributed to the group and co-constructed their Facebook page.

Study design

As teacher-researcher, I employed a strategy of "scaffolded co-construction" (Lankshear & Knobel, 2003: 80), using ICT to complete a negotiated educational task with my participants. The participants chose to construct a group Facebook page, recording their largely self-directed research into their freely chosen topic, dyslexia. They constructed the page over five 90-minute weekly sessions, with the page emerging as a sort of collaborative blog consisting of a variety of multimodal texts the students had produced and interacted with, as well as hyperlinks to other artefacts. Scaffolding consisted of instigating and guiding the early activities, including suggesting the group developed their own ground-rules, posting some links to help start the page, and offering a choice of research questions for the students to investigate. Subsequently my role was as participant-observer, documenting activity, acting as a knowledge and information source when requested, and monitoring the participants' activities. Lankshear & Knobel (2003) hoped to "foment a pedagogical logic" that could be transferred to other educational settings. This study had a similar ultimate objective, and I therefore adopted a similar multi-method approach.

Mindful of the danger of invoking traditional power dynamics via colonising 'their' Facebook space and co-opting their practices, (Lankshear, 2003) I piloted the project using the closed social network site Ning. But the students were unanimous in wanting to use Facebook for their research. They made a collective decision to research dyslexia and agreed their own aims for the project, which suggested that they envisaged working to co-construct some sort of collective agreement about dyslexia via the group page (Dede, 2008; Kress, 2010). Their choice of dyslexia as a topic reflected their desire to learn more about it, themselves, and then share that understanding with friends and family. They also felt it

could be used to evidence their learning and hence influence College policy on social network sites.

Recruitment, sampling & ethics

At the time of the study I was an established specialist dyslexia tutor at the College, and gained approval from the Senior Management Team for the project. The five participants were a sample of convenience: had I not been doing this research, I would have been teaching them study- and literacy skills anyway. The participants professed interest in the project, and expressed a range of experiences, attitudes towards and purposes for online social networking. A major ethical principle was that the students' preferences and curriculum demands had to take precedence. This significantly influenced the timing of the project and some opportunities for data collection and analysis. For example, at points in the term coursework, revision and exams had to take priority; I had to respect their position and I support them in this rather than pressing ahead with further data collection.

Some students participating were under 18 years old. All were legally classified as disabled. Both these factors mark them out as potentially vulnerable and high-risk. Although I thought that participating was something they would enjoy and benefit from, before starting I warned them that people might post hostile comments on their Facebook page. They were still unanimous in wanting to use the project as a vehicle for promoting better understanding of dyslexia amongst their peers, and so were willing to accept the risk. All students gave informed consent for confidential audio and video recordings to be made. I used a dedicated Facebook profile for myself, isolated from my personal one, to maintain my professional identity. The students used their existing personal profiles, and this did precipitate one significant ethical issue. By signing up to the Facebook group, the students

gave me access to their personal Facebook pages and profiles by default. Had I chosen to, I would have been able to look at status updates, photographs etc which were unrelated to the project. I warned the participants of this. I had to make sure to only access the group page and not participants' individual ones. This access to 'incidental data' (Leander, 2008) is a recognised ethical concern which other researchers in similar contexts would also need to address.

Methods of data collection

Observation & video recording

Participant-observation is a standard qualitative procedure well documented in methodological texts. It is recognised as a useful method in exactly the kind of teacher-researcher, small-group study I conducted (Burton & Bartlett, 2005; Tedlock, 2003). A significant advantage of the method is that reactivity effects may be reduced, particularly if the participants are familiar with the researcher. As students are familiar with their teachers, the behaviours observed by teacher-researchers are likely to be fairly natural (Lankshear & Knobel, 2004). The data are therefore relatively "strong on reality" (Cohen, Manion & Morrison, 2007: 405). I had taught the group for six weeks before beginning the project, and they were therefore familiar with me. I do recognise that as a teacher I was in a position of authority, and that this may have influenced the data. However, the students' set their own research aims and there was no formal assessment of the work they did. Their self-determined measure of success was the impact of their work on friends, family and College policy. This was alluded to by one of the participants, Josh, who commented to another independent researcher visiting the College: "*he went out on a limb to trust us with the use of Facebook….. gave us no real limitations in this*." This comment suggests that Josh at least felt free to pursue his own agenda, and that his observed behaviour would reflect this.

I augmented my classroom observation and contemporaneous fieldnotes with video recordings of the project sessions. There is an increasing realisation that visual methodologies have so far been neglected in educational research. Bourne & Jewitt, (2003) contend that data capture and analysis need to take account of the fact that classroom communication and learning are multimodal, including speech, movement, gesture as well

as reading and writing. Pahl (2007) argues that by capturing evidence of the practices and events that informed texts, teachers can understand them better and then extend and explore that understanding in the classroom; visual methods were therefore pertinent to this investigation of social literacy practices and any pedagogical principles they might evoke.

With the informed consent of the participants, I made video recordings of all five of the 90-minute sessions during which they were actively engaged in research for the project. Using video enabled me to record events in much more detail, and then review, transcribe and analyse them meticulously. The camera was always unobtrusively positioned in the corner of the classroom. This had the advantage of keeping all the students within the field of view and range of the microphone at almost all times. In addition, unobtrusive recording over a period of several weeks, combined with researcher-participant (i.e. teacher-student) familiarity helped minimise reactivity effects.

Dynamic screen capture

One major limitation of video when studying screen-mediated learning is the level of focus. Videos capture settings and people well; multiple computer screens in a classroom much less so. As such, it is not ideal for analysing and interpreting a crucial component of contemporary classroom learning. Clearly, this has implications for the credibility of any analysis and subsequent theorising. This drawback may be addressed by using screen-capture software to record on-screen behaviour and activity (Asselin & Moayeri, 2010). I therefore obtained data using screen-capture software, recording the students' on-screen actions during two of the project sessions. Cox (2007) points out that recorded learner-computer interactions (which might include switches between programmes, responses to presented problems and so on) can be readily captured and analysed to reveal the fine

detail of an individual's learning trajectory, as well as differences between learners. These qualities made such data suitable for this study, where a high level of detail regarding individuals' learning was required. Screen capture has further distinct advantages: requiring no camera means it is less intrusive than video; it can be used in naturalistic settings and for authentic learning tasks; and it may be combined with data from other sources, including think-aloud protocols, to help build a strongly emic account of cognitive and affective dimensions of learning (Asselin & Moayeri, 2010). Given that the students were working in the relatively 'naturalistic' setting of their regular classroom, on a largely self-determined and hence 'authentic' learning task, and that the study needed to combine multiple data sources, screen capture seemed like a promising data source.

In this study, I obtained dynamic screen capture data using *Wink™* software. Wink™ records whatever is showing on a user's screen. It then renders Adobe™ Flash™ movies which can be replayed on a computer- in Internet Explorer, for example - for analysis. This method therefore has the potential to overcome some of the limitations of classroom video recordings outlined above. Combining the two with observation is a way of responding to the challenge of "capturing the way things unfold in real time" (Heller, 2011: 40).

As I was making lengthy recordings – sometimes over an hour – I set the capture rate to one frame every fifteen seconds. Approximately an hour's worth of activity was thus rendered as a few minutes of video. This was partly to keep the file sizes manageable, and partly to enable the participants to give a retrospective verbal report summarising their actions quickly and efficiently. The fact that Wink can operate almost invisibly to the student means reactivity effects are inhibited: like the classroom video recordings, the data are again "strong on reality." I used two recordings per student as the basis for "protocol analysis"

with the participants, as well including all the recordings in my own comprehensive grounded theory analysis (Charmaz, 2006) of the dataset.

Protocol analysis

Protocol analysis is a method of obtaining data on cognitive processes (Ericsson & Simon 1993). It involves eliciting verbal reports of participants' thought processes as or after they complete tasks. As I was trying to gain insight into the processes underlying my participants' literacy practices, it seemed reasonable to attempt to incorporate protocol analysis. A further justification is that protocol analysis can be used to generate models of how "experts" in a given field perform specific tasks. As teenagers are often positioned as expert users of online social networks, the method again seemed to offer potential insights for this study. Lewis & Fabos (2005) employed protocol analysis to obtain rich, complex data on young people's cognitive processes relating to literacy practices and identity in their use of online Instant Messaging. Similarly, Asselin & Moayeri (2010) used a combination of screen-capture and think-aloud to investigate behaviours and their underlying cognitive processes and affective dimensions in their study of homework-related adolescent online literacy practices. Both these studies focused on individual learners in the home setting: neither extended their data collection into the classroom as this study did.

Lewis & Fabos (2005) attempted to circumvent the ethical-surveillance issues inherent in using visual methods for protocol analysis by pointing a video-camera at screens rather than faces, and then getting the students to explain their actions and choices. Their approach provided useful insights into the participants' thought processes, but a significant disadvantage was that sitting with the participants had considerable impact on the observed

activity: *"The sessions sometimes felt more like interviews that involved demonstration than they did authentic Instant Messaging sessions"* (Lewis & Fabos, 2005: 479). In this study, reactivity effects were reduced by recording the events and then asking for the explanations afterwards, so that the students could work more naturally without having to explain their choices and actions at the same time.

To obtain retrospective verbal reports from the students on their thought processes and actions I used a script modified slightly from the one provided by Ericsson and Simon (1993: 378) to better take account of the research context. I played the Wink™ recordings back to each participant, and used the script and prompts to obtain their verbal reports.   I made and transcribed audio recordings of the reports. An example is presented in the next section, accompanied by screenshots of the relevant Wink™ video and my interpretation. As mentioned earlier, several factors influenced the timing of the data collection and analysis. Time was needed at the start of the academic year to recruit the participants and prepare the project. Project sessions thus began in the last week of November and finished on the final day of term before Christmas. As a lone teacher-researcher, it was not possible to simultaneously conduct protocol analysis with five students as they carried out tasks or immediately after each session ended. The students' timetable demands, my own as full-time teacher, plus the ethical requirement to let the students have control over when and how they participated and when to focus on their normal curriculum study, meant that it was not possible to ask the students to complete their protocol analyses immediately after the session. As the project progressed, the students increasingly felt the pressure of impending January exams, and I had to respect their wishes to focus on revision. Thus, because the participants' accounts had to be given individually, and because of the

Christmas holidays and January exams, I had to obtain the verbal reports about six weeks after the events they describe. I acknowledge that this represents a significant flaw in the implementation of the research design, and exacerbates the limitations of accuracy, completeness and bias inherent in retrospective verbal reports.

Nevertheless, despite these limitations, retrospective verbal reports can provide unique information about knowledge and experience which cannot easily be accessed by more traditional observation methods. Collecting the reports retrospectively also had the advantage of maintaining authenticity in the behaviours and setting, which can be offset against losses generated through the enforced delay. Whilst collecting the verbal reports immediately after the project sessions would probably have produced richer data, more tightly coupled to the events recorded via screen capture, the contingencies of the setting precluded this approach. However, aggregating the protocol analysis and screen capture data with that from other sources ameliorated its deficiencies. The data that was successfully produced in this study suggests that combining protocol analysis with dynamic screen capture in the classroom, as well as with the more traditional methods of observation, fieldnotes and interviews, holds promise as an approach for researching screen-mediated learning. The next section offers some data which illustrates the potential of this combined approach.

Aggregating & analysing the data
The combination of methods used meant that the project generated a considerable quantity and variety of data, summarised in Table 1.

The data generated was sufficient to capture much of classroom the classroom online and offline activity over the five-week lifespan of the project. Aggregating data from multiple sources had several major benefits. One significant benefit is that I was able to trace classroom spoken conversational threads over the weeks. I could thus detect how the re-emergence of a thread might be prompted by a student reacting to something on their screen, or even another student's screen (Hulme, 2009; Facer, 2011). For example, Charlotte reported in her protocol analysis that she was inspired to start making a Powerpoint movie in response to a video link Chloe had posted to the group Facebook page. Charlotte's response was not evident in any of the other data. It would have remained inaccessible without the protocol analysis, because Charlotte ultimately decided not to add her movie to the Facebook page. Significantly, Charlotte had never made a Powerpoint movie before. In her protocol analysis and post-project interview she omitted to say that she also observed another student, Josh, making his own Powerpoint movie in response to Chloe's post. This event was thus captured by the video camera, but not any other data source. Following Josh's inadvertent prompt, Charlotte began to teach herself how to make a Powerpoint movie to communicate the visual distortions of text she experiences as part of her dyslexia, as this edited excerpt from her protocol analysis transcript shows (Author, 2013):

> I was logging into Facebook and then I went to the website our little page...and then I was watching Chloe's video on how dyslexia works for other people. I thought I could do a little PowerPoint on the dyslexic…but then I needed to figure out how to do it… and then I put into PowerPoint like "This is what it looks like when I'm reading a book" and then I put it into a little thing because what happens is the middle of the page disappears...and then I had to make the middle of the writing white and then I think I

made it grey afterwards because it didn't work properly because I wanted it to like the flash up and like on and off…

This example illustrates how combining classroom video, screen capture and protocol analysis has the potential to reveal learning processes that would otherwise have gone unnoticed. Through combining data sources and meticulous analysis I was thus able to see how students followed links and were prompted to discuss, create, and share - or not share - a range of texts in response to resources their classmates had posted, sometimes a week or two earlier. I was able to observe how a student might watch a YouTube video several times if they were interested in it, and how they might then engage with a challenging text tactically (Williams, 2011) after first gaining an understanding of the topic via video.

In short, I had access to multiple perspectives on the same event, in terms of different timescales, level of focus, and different people and their interpretations. Such a wealth of data has clear advantages in terms of completeness, detail and nuance. But it does demand systematic, comprehensive, rigorous application of strategies for the collection and analysis of data. Accordingly, I analysed my data using the rigorous reflexive methods advocated for constructing grounded theory (Charmaz, 2006). This entails multiple iterations of coding and continual, ipsative analysis of the entire dataset.

Data presentation and discussion

In this section I present a sample of the data gained through Wink™ and protocol analysis. It combines screenshots from the movie rendered through Wink™ dynamic screen capture software on the classroom PC one the participants, Chloe, used one day, together with a verbatim transcript of her retrospective protocol analysis of the recording. It shows how Chloe located some information about the visual distortions she and many others identified as dyslexic perceive when reading. It then shows how she corroborated this new information before using it in two different ways: sharing it via the group Facebook page and acting on it a personal way that she felt would be beneficial to her learning. The third column of the table shows my interpretation of the events depicted, and the subsequent discussion explains how the aggregated data, together with my interpretation, offered unique insights into Chloe's learning.

The Wink™ data alone provides a record of Chloe's on-screen actions and hence behaviours. Her activity during the lesson can be seen to be characterised by a period of 'settling down', reinforcing her social ties as she looks for messages from her friends and mother (Ellison, Steinfeld & Lampe, 2007), and checks whether a payment has gone into her bank account. This settling down is followed by some research into dyslexia. After watching part of a documentary about the dyslexic actress Kara Tointon, we can see that Chloe began to investigate a particular aspect of dyslexia. She came across a video on a website I had linked to on the group Facebook page. The video was of Professor John Stein of Oxford University, talking about the beneficial effects of fish oils on the brain and hence learning. Stein is a leading proponent of the magnocellular deficit theory of dyslexia (Stein, 2001). Magnocellular theory attempts to explain why some dyslexic people perceive visual

distortions when they read, as Chloe does[2]. In the video, Stein suggests inclusion of fish oils in the diet to complement the use of coloured backgrounds or other similar adjustments and thereby help reduce visual stress for those dyslexics who experience it. My captured video data and Wink™ recording confirmed that in one session, Chloe watched the 7-minute video twice. This gives an indication of motivation, significance of the topic, and perhaps a learning preference: watching before reading. The Wink™ data shows that she then read some of the comments on the page Stein's video was embedded in, and then looked at some other reputable dyslexia research and information websites to corroborate what Stein had said. It revealed that within the space of 45 minutes, Chloe was able to find relevant information quickly, accessing expert knowledge on a topic of great personal interest and significance (from an academic who normally publishes in text books and academic journals, and whose knowledge would therefore usually be inaccessible to a dyslexic A-Level student). She was also able to find additional information quickly to help her triangulate and corroborate that knowledge.

Chloe's protocol analysis transcript further substantiates the visual data. In it, she confirms that she was interested in researching the possibility that fish oils might help with some of the reading problems associated with dyslexia; validating the claim made for fish oils by reading the comments; performing a Google search and further reading to triangulate the claim; and then sharing the findings via Facebook once she was satisfied that they were reliable. Yet more of Chloe's learning trajectory is rendered when interview data is added to the picture. As evidenced in her Wink™ movie and protocol analysis, Chloe knew, having checked when she first logged onto Facebook for the session, that her Mum

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[2] Magnocellular deficits are contested as cause of dyslexia, but neither phonological deficits nor working memory deficits, currently the two most favoured neuropsychological explanations, can account for the visual distortions of text frequently associated with dyslexia.

was also logged on to the site. This might seem incidental or even quaint, given that in her protocol analysis she only says that she *"asked what was for tea."* However, Chloe's Mum being online transpired to have a much greater significance. In Chloe's post-project interview, she told me that once she was satisfied that the information on fish oils was accurate, she direct-messaged her mum through Facebook, asking her to buy some fish-oil supplements. This fact was not evident anywhere else in the data. But it is significant. Chloe clearly feels that the reading problems dyslexia creates for her are serious enough for her to want to take action to reduce them. The interview comments, take in aggregate with the data presented above, also hint at Chloe's developing sense of agency and reach and role of Facebook in her life. Facebook's ubiquity meant that her mum was online and that Chloe was able to act immediately to get something done which she felt would help make her a better reader and hence learner (it is perhaps worth noting that although Omega-3 supplements are controversial, it has been argued that some clinical trial data supports targeted use with students identified as dyslexic [Cyhlarova *et al,* 2007]). Whilst we may question the wisdom of acting hastily on the basis of information gleaned from the internet, it is worth remembering the steps Chloe took to validate the initial information and hence strengthen her own learning. The significant feature here is that the combined data sources make visible each of these steps and associated actions when some would have otherwise remained invisible and inaccessible for analysis.

The aggregated data also illuminates Chloe's attempt to take greater control of her dyslexia and learning (thereby hinting at the problems she faces), and her developing sense of agency as a learner. The latter is evident from comparison of her pre- and post-project interviews, which reveal contrasting attitudes towards reading. In her pre-project interview,

she talked of the *"pressure"* and *"feeling down and defeatist"* to the point where *"I may as well just not bother"* when confronted with the reading necessary for AS Biology. In contrast, in her post-project interview, Chloe said that she was happy to *"get really nerdy"* and engage with texts relating to dyslexia and reading that she would otherwise have dismissed as *"too sciencey."* This claim is corroborated by the visual and protocol analysis data, where we see Chloe engaging in quite technical reading on the Dyslexia Research Trust website.

This incident illustrates the layered understanding of the processes, influences on and impact of Chloe's learning about dyslexia this multi-method approach afforded. Richardson (2006, cited in Davies & Merchant, 2009 p88) argues that blogging involves learning in an important and distinctive way: *"read-write-think-and-link"*; Chloe appears to be learning this way. Furthermore, the methods showed how Chloe's action of posting a video link to the group Facebook page prompted self-directed learning activity for two other members of the group, Charlotte and Josh, as outlined above. Classroom video from the penultimate project session showed how Chloe was later able to contribute the knowledge she gained through her research into magnocellular deficits to a video the group decided to make to summarise what they had learnt from the project. The multiple methods used in this study afforded multiple influences and perspectives on Chloe's learning in this session, and subsequent events that flowed from it. They thus revealed some of the "connected complexities" (Davies, 2012; Leander & McKim, 2003) of the participants' learning in the classroom that would otherwise have remained invisible. Making visible these steps, and the relationships between events, would seem to be a reasonable way of gaining the insight into how students think and learn in social networks called for by Leander (2008 & 2009) in order

to decide how or whether to incorporate them in the classroom (Greenhow & Hughes, 2009; Greenhow, Robelia & Hughes, 2009).

Conclusions

Despite flaws in the implementation of the research design, combining data from the multiple methods discussed here enabled construction of a credible multifaceted picture of the learning the happened over a five-week period, in a classroom, mediated by Facebook. Through making visible interwoven strands of communication and learning (Hulme, 2009; Facer, 2011) the methods enabled the study to meet its aims, by showing that Facebook provided the participants with an arena for active, critical learning about and through literacy (Author, 2012). The data showed that the students were highly motivated to learn through literacy, contrary to what much of the dyslexia discourse suggests. Motivation came partly through the social nature of Facebook literacy practices, partly through the students' sense of dyslexic identity, and partly through the large degree of control and self-determination they had over the project. These findings evoke a number of pedagogical principles: affording students choice and control over their learning; fostering communities of discovery (Coffield, 2008; Coffield & Williamson 2011) and real-life problem-solving (Mortimore, 2003) within them; encouraging play and experimentation with new tools; fostering critical digital literacy (Facer, 2011); and considering the role of student identity in motivating learning through literacy (Gee, 2005).

This success suggests that other studies investigating digitally-mediated learning could fruitfully combine dynamic screen capture and protocol analysis with more established classroom methods to produce rich data tightly coupled to participants' learning trajectories. This could render considerable depth and detail and hence provide valuable

insights into learning. For this to happen, researchers would need to minimise the lag

between capturing video and capturing the accompanying audio. Increasing the level of

detail in the screen-capture recordings would also be helpful.

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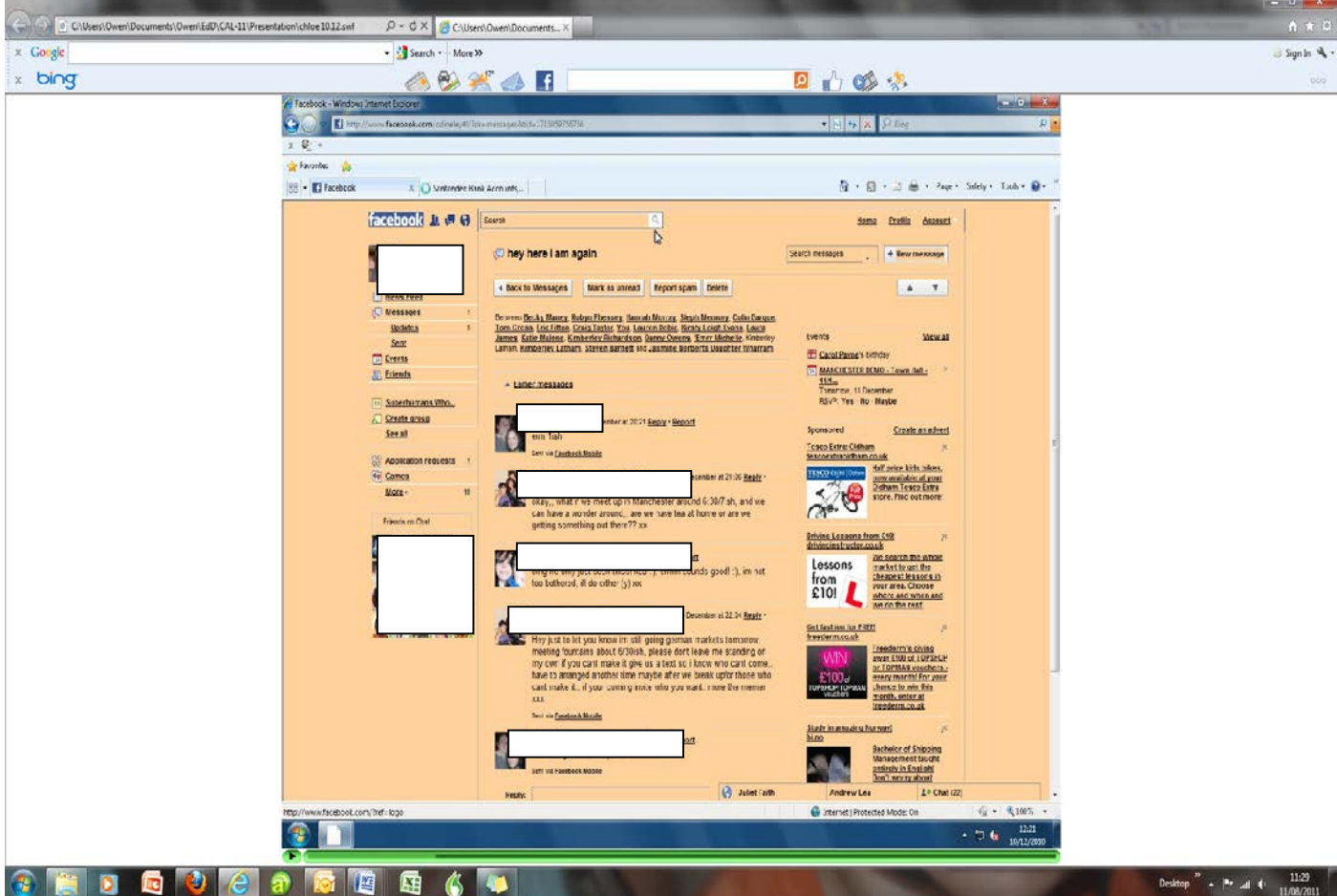Pollak, D. (2005). *Dyslexia, the Self and Higher Education.* Stoke on Trent: Trentham.

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Table 1: Types and Volume of Data Generated

Data Type	Number of Instances	Volume of Data	
		Duration (mins)	Words
Baseline Interviews	5	130	19722
Follow-up interviews	5	104	16615
Observation notes[3]	5	n/a	11055
Video recordings	5	356	n/a
Video transcripts	10	n/a	11687
Wink recordings	10	20	n/a
Protocol analysis	7	n/a	1155
Total		**610**	**60234**

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[3] This refers to contemporaneous fieldnotes later augmented by video observation.

Table II Chloe's Wink Movie & Protocol Analysis

| Screenshot from Wink movie	Transcript	Interpretation
	Right I think I was going on Facebook and I was trying to login. Then I checked my messages cos me friend had e-mailed me about something.. Then I checked to see if my Mum was online to ask her what was for tea... then I had a nosy to see what had happened....	**Staying Connected**: As soon as she logs in, Chloe feels the imperative to connect with members of three affinity groups (Gee 2005, 2007): two set of friends and her family. She checks a message from a friend as well as "what has happened" on the group's Facebook page. She also connects with her Mum.
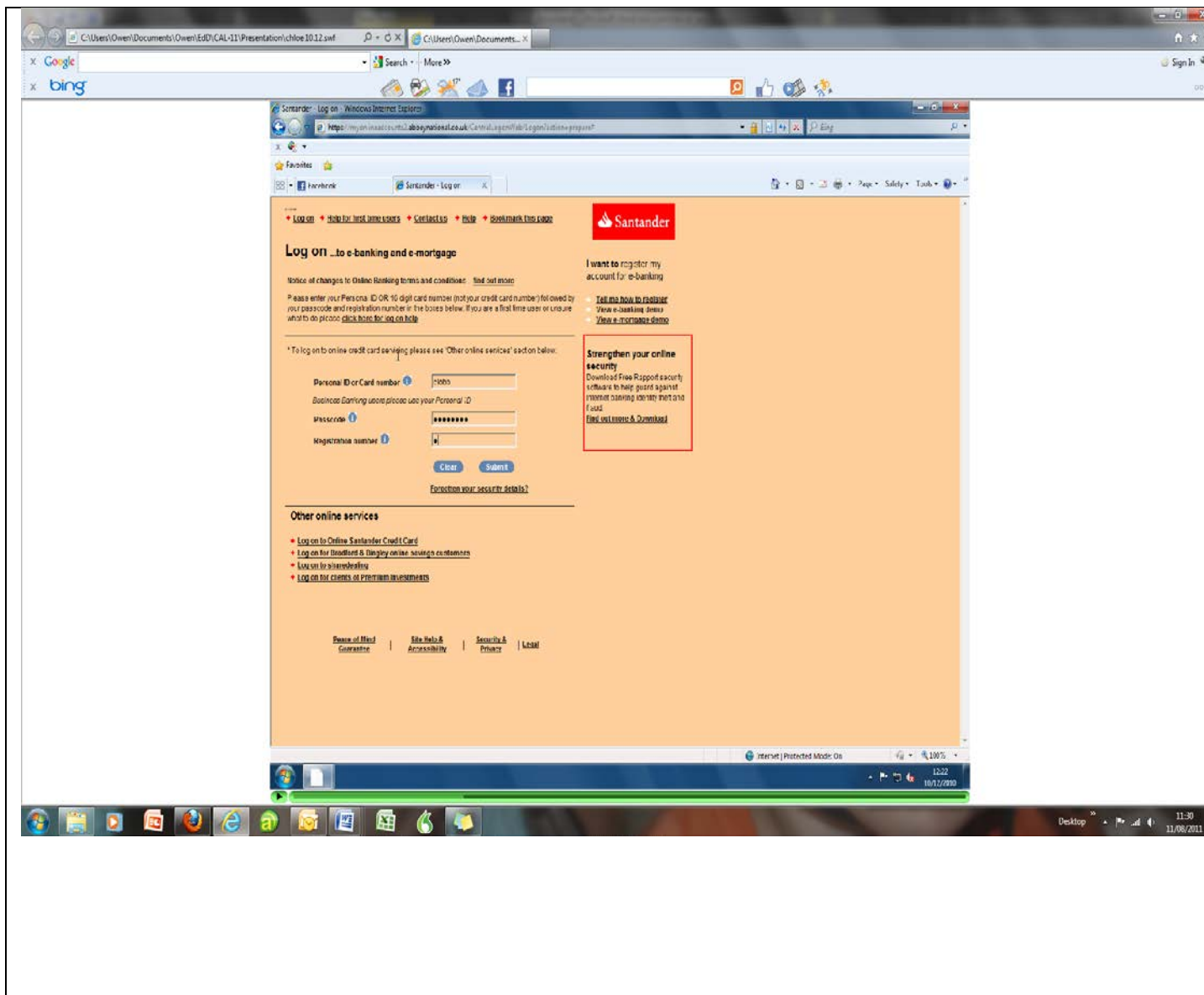
... then I checked my bank in to see if my EMA had gone in...

Working online enables quick, efficient communication and information finding on topics that matter to the students.

Identity Work:

The students were able to position themselves as responsible young researchers engaged in "a more grown-up way of working." This way of working is characterised by skilful patterns of cross-domain work similar to the way adults work, yet usually proscribed in the classroom (Davies & Pahl, 2007). The first two screenshots show Chloe crossing the domains of College, friendship, family and finance, much as an adult might while working
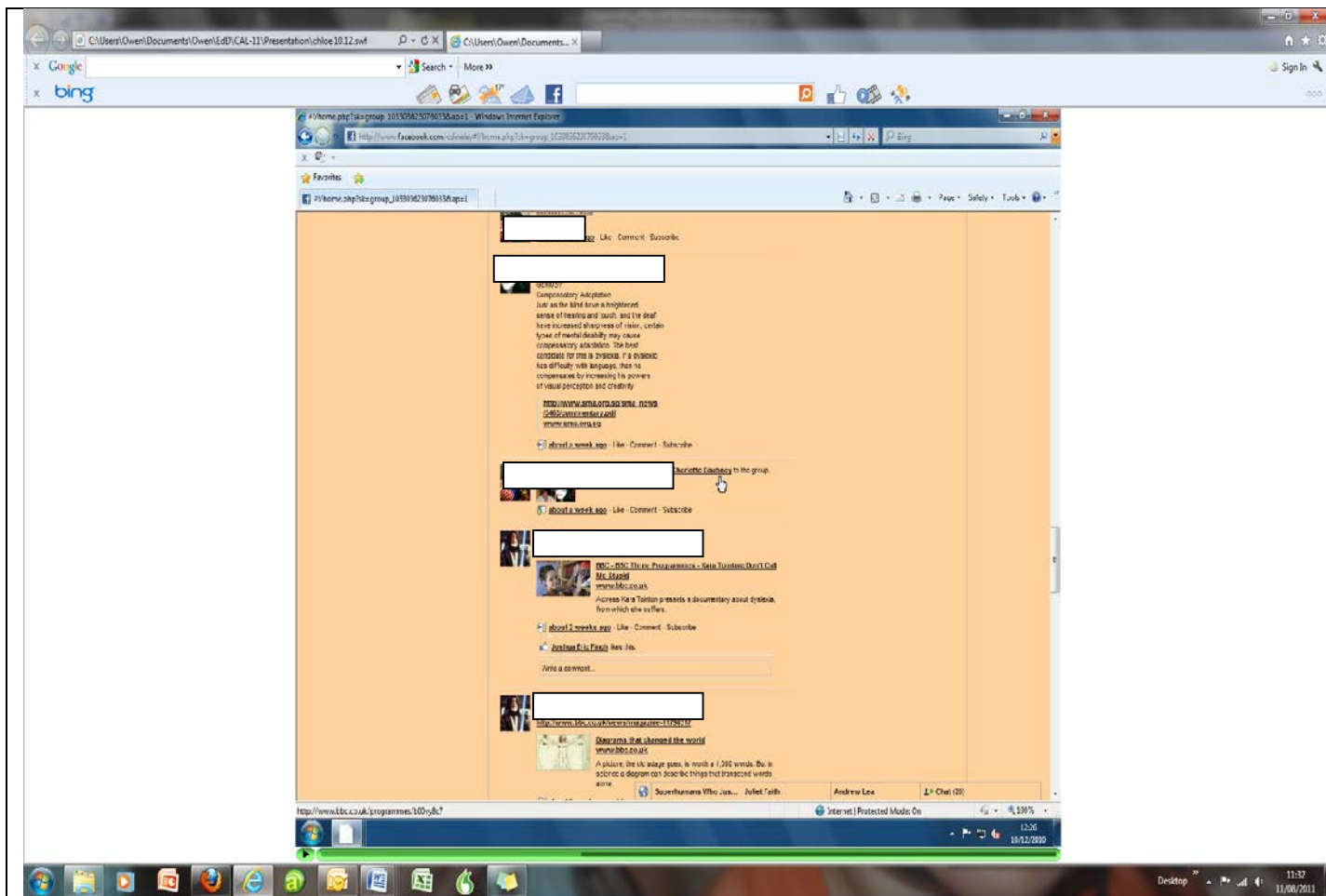
...and then I finally went on the dyslexia thing and I was looking at the videos that other people had put up and watching the Kara Tointon programme I think... then... I don't know what I was doing there oh I was trying to find a website that didn't exist any more...

Co-constructing knowledge:

Chloe co-constructs knowledge of dyslexia, with Facebook as a pedagogical resource. She learns indirectly from peers, via videos they post to the Facebook page. She learns indirectly from the teacher, via a video he has posted. This learning informs Chloe's subsequent contributions to the page, through which she teaches her peers, family and teacher

...then I found a link to a bloke who was talking about the possibility of fish oils helping with dyslexia...

Levelling the Playing Field:

Perceiving visual distortions when reading is often associated with dyslexia. Here Chloe accesses a video in which an academic expert, Professor John Stein, recommends the use of fish-oil supplements as another way of reducing this 'visual stress' for people with dyslexia. Reducing visual stress enables comfortable reading of texts that may otherwise be inaccessible to someone with dyslexia, hence in the students' term, 'levelling the playing field'.
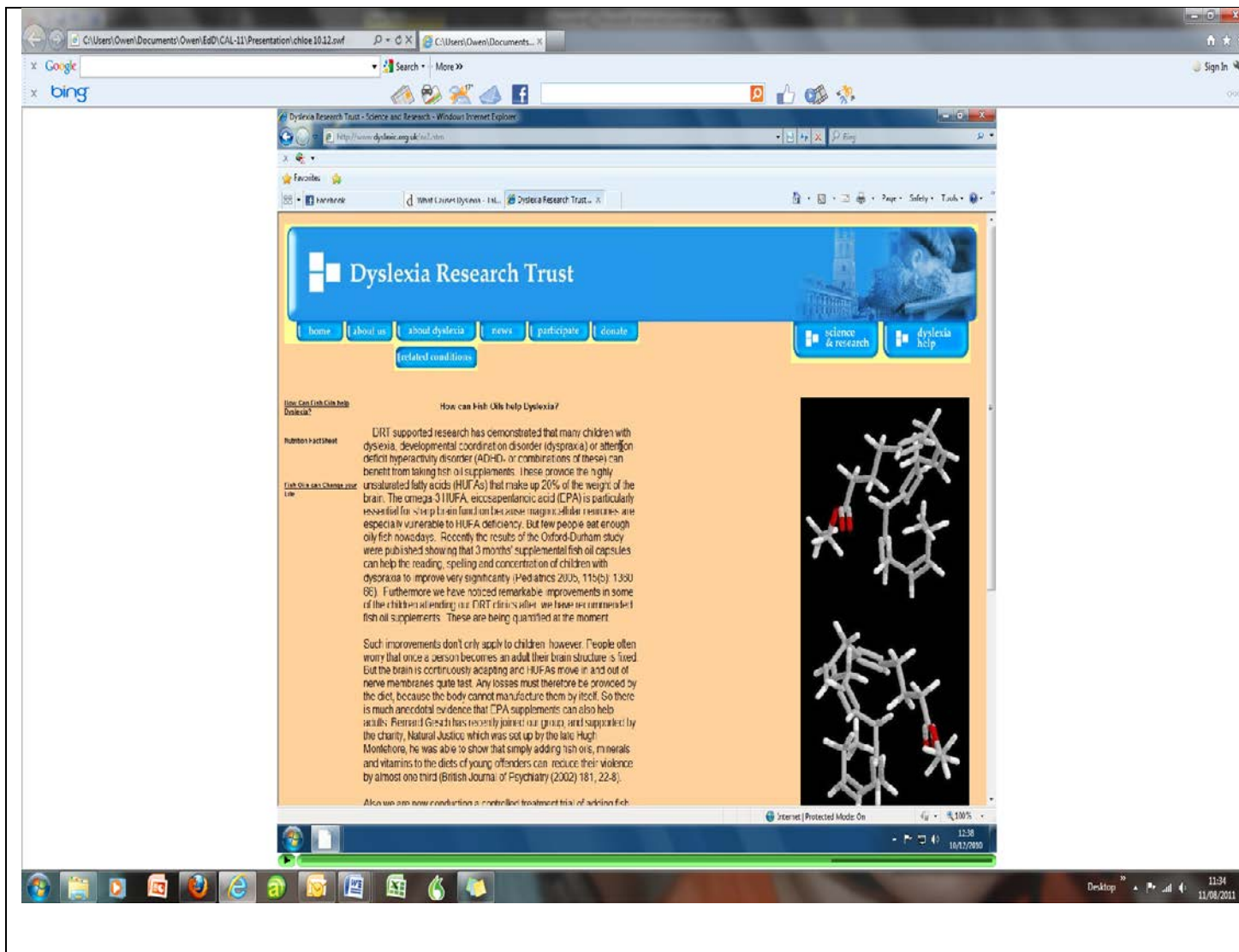
...which I then tried to research more that after watching all the video and... and what else did I do... oh I also read the comments on the top to see what other people had thought... then I Googled fish oils...I was looking for other pages to see if they agreed...

Motivation to Engage with Literacy Events:

Motivated by her sense of identity as a dyslexic person, and by what she has just learnt from the video, Chloe sets about reading comments on the site hosting the video, and content from other sites, to corroborate the claims made in the video. This motivation influences her to sustain engagement in reading texts she might otherwise find, in her words, "too sciencey"
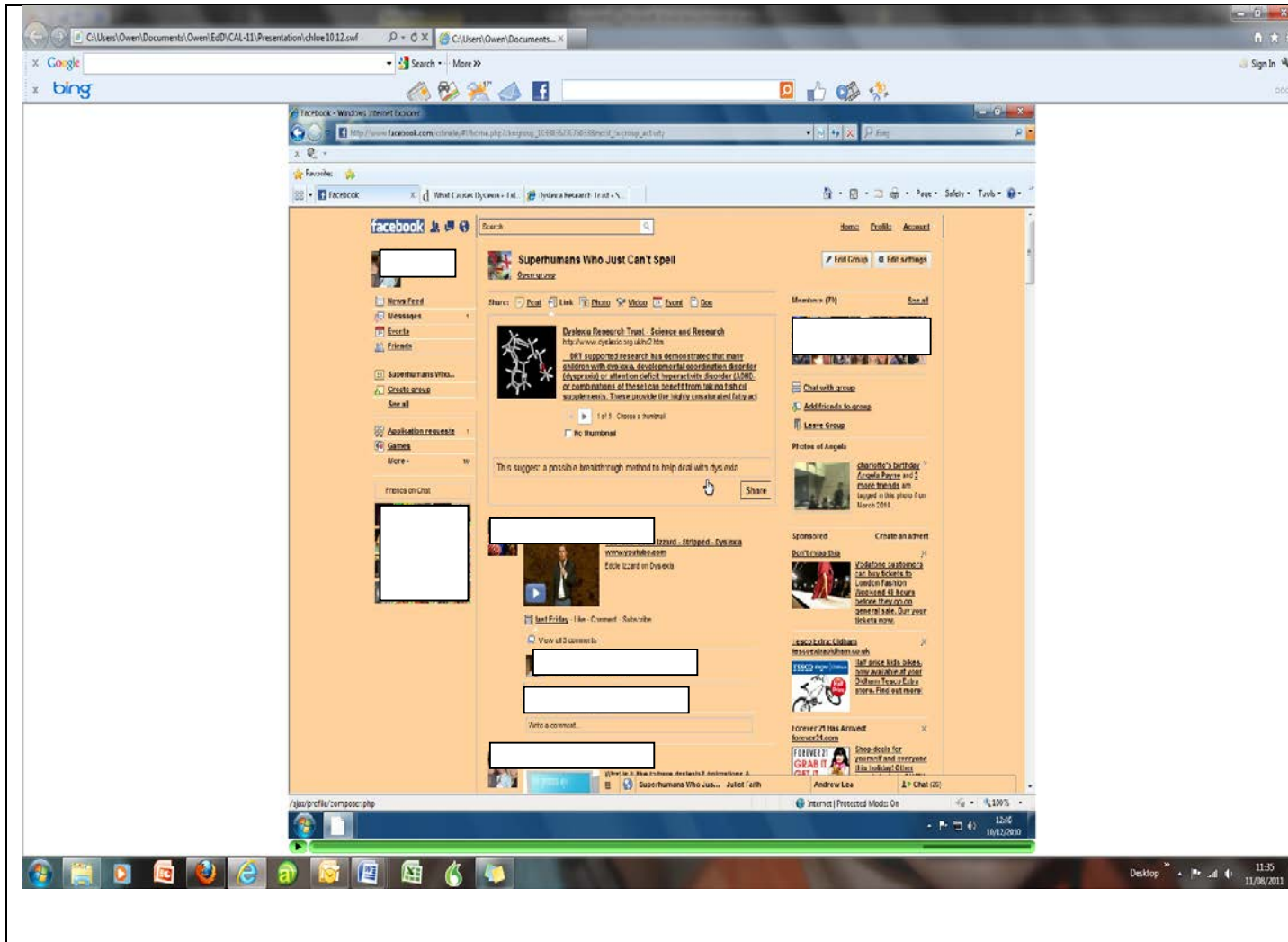
...and then I posted it on the page and then what else did I do… then I'm not sure what I was doing and then I logged out of Facebook because it was the end of the lesson.

Making Things That Work:

Chloe posts a link to her findings on the Facebook page. In doing so she contributes to a communal, multimodal resource that works to inform audiences about dyslexia and the group's knowledge, experiences and perceptions of it.