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Limits and potentials of social networking in academia: Case study of the evolution of a mathematics Facebook community

John Goodband[a], Yvette Solomon[b*], Peter Samuels[a], Duncan Lawson[a] and Roy Bhakta[a]

[a] *sigma Centre for Excellence in University-Wide Mathematics Support, Coventry University, UK;*
[b] *The Education & Social Research Institute, Manchester Metropolitan University, Manchester, UK*

*Corresponding author: e-mail y.solomon@mmu.ac.uk

Limits and potentials of social networking in academia: Case study of the evolution of a mathematics Facebook community

The use of social networking services has rapidly increased in recent years, especially by university students. Some authors assert that they have educational potential in terms of promoting collaborative learning practices among undergraduate students which enhance engagement and understanding. This possibility is particularly relevant to mathematics learning, because university communities are frequently experienced as isolating and performance-oriented. This case study reports on the use of Facebook to support mathematical communication and more participative learning identities within a UK university mathematics department. It describes how the reactive formation of a student-led Facebook community became a source of conflict within the wider academic social community and how this conflict was eventually resolved. While it raises questions about the extent to which Facebook can encourage open collaborative learning within the wider context of student aspirations in a competitive climate, it notes its potential for fostering cross-cohort student support in a subject which frequently induces anxiety in its students.

Keywords: Facebook; undergraduate mathematics; communities of practice; learning environment; university climate

Introduction

The development of social networking technologies has been met with considerable enthusiasm by educators seeking to exploit the potential of their interactive qualities for supporting and enhancing collaborative and engaged learning. However, as Hughes (2009, 2010) has pointed out, the complex nature of learner identities and the knowledge and assessment structures of higher education mean that the realisation of this potential is far from straightforward. This paper explores a particular case of the use of Facebook within a mathematics undergraduate community which had already evolved collaborative practices of face-to-face group work, with resultant changes in learner identities towards perceptions of greater inclusion and participation in the mathematics community. While staff hopes that the Facebook group would build on this prior collaboration to stimulate and develop intrinsic interest and engagement in mathematics were not fulfilled, an unanticipated outcome was that it did support a novel bringing together of student year cohorts. The paper argues that the potential of Facebook is not only dependent on the issues of identity and belonging identified by Hughes, but also on the wider context of student aspirations in a competitive climate.

We begin by situating our case study in the context of research on university students' experiences of mathematics degree programmes. One notable fact about this group of students is the change in their learning experiences in the transition from pre-university to university study; many encounter difficulty for the first time, with consequent high rates of demotivation and disengagement. The events reported here took place within a larger on-going study of mathematics undergraduate experience indicating the importance of physical space in fostering collaborative work, and the impact of such space in developing identities of belonging and engagement (Wenger, 1998), particularly among women (Solomon, Lawson & Croft, in press). On the back of these developments, the students' request for a Facebook group to support their learning led us to suppose that the availability of virtual space would have similar

effects, opening up new opportunities for discussion about mathematics. In this paper we relate what actually did happen and our own part in it; we conclude that the final outcome of the use of Facebook to organise cross-cohort face-to-face support meetings rather than to discuss mathematics itself is largely influenced by the assessment structure. The intrinsic interest that we had observed in earlier research was not a factor. However, the possibility that cross-cohort support may alleviate some of the anxieties associated with degree-level mathematics study and thus open the way to greater engagement and intrinsic interest is raised and discussed.

Mathematics learning and social engagement

Recent research into undergraduate mathematics learning indicates that participation in the learning community is crucial to success for many students. Brown and Macrae (2005) found that sharing ideas in a mathematical community can lead to more positive attitudes to study, while Seymour and Hewitt (1997) report that peer tutoring and mutual support can act as a buffer against drop-out. Such peer support appears to be particularly crucial for mathematics undergraduates since many risk de-motivation as they move from finding the subject relatively 'easy' before university to encountering newfound difficulties and demands (Brown & Macrae 2005) which may challenge previous identities of being 'good at maths'.

The centrality of learner identities in sustaining a positive attitude to mathematics study is usefully theorised by Wenger's communities of practice model (1998), which characterises identity as the experience of a common enterprise, with shared values, assumptions, purpose and rules of engagement and communication. In this model, individuals can be seen as taking up various positions within a practice, perhaps on the margins, or more centrally located as a member of the community. When applied to learners, the concept of 'legitimate peripheral participation' (Lave & Wenger 1991) is useful in conceptualising how the novice is positioned by others and by themselves as someone who is moving towards a more central role in the practice with accompanying potential to contribute to its rules of engagement and communication. However, as Solomon (2007) found, undergraduate mathematics students operate within multiple communities of practice which may be in conflict with each other. For example, while some students act as 'legitimate peripheral participants' in the community of mathematicians with a focus on exploration and understanding, they are at the same time members of a student community of practice which includes an emphasis on short-term performance goals with less priority for understanding as opposed to achieving good marks in tests. The roots of these performance and assessment concerns can be found in schooling, where 'teaching to the test' is pervasive (Ofsted, 2008); thus students enter university mathematics with a shared experience of competitive individual achievement which can lead to the marginalisation of those students (often women, as Solomon (2007, 2008) and others, eg Boaler 2002, have found) who instead prioritise understanding and ultimate participation as a mathematician.

The theoretical focus afforded by the concept of engagement in a community of practice suggests ways in which such engagement may be enhanced so that learners take ownership of mathematical knowledge, thus moving towards a position of legitimate peripheral participant in the mathematics community and away from pure performance orientations within undergraduate communities. Our earlier research in the same university context from which the current case study is drawn (Solomon, Croft & Lawson, 2010), demonstrated that such ownership is fostered by the

provision of dedicated physical social learning spaces. Students across all undergraduate year groups were shown to be engaging in spontaneous out of class collaborative activities which included a focus on understanding as opposed to simply gaining correct solutions to set problems. For some students, this way of working involved greater inclusivity and recognition that all contributions to discussion had value; these benefits of social space appear to be particularly appreciated by women (Solomon, Lawson & Croft, in press). In this same body of work, there were also indications that students' new ownership extended to their use of university-provided virtual learning spaces, although we did not study this directly. Elsewhere, research focussing on the NRICH mathematics support programme has shown that students' use of virtual spaces can support the development of new participative identities in mathematics (Smith, 2006), and the development of an identity of mathematician in discussion boards (Back & Pratt, 2007). Thus exploring the potential of virtual communities to achieve a similar effect to that observed in the physical space was an obvious next step, particularly with this group of students given their already established ways of working.

Educational uses of Social Networking Services (SNSs)

SNS use is widespread, particularly within the age-group that we are concerned with: Ipsos MORI (2008) found that over 90% of UK university students maintain a SNS profile. Given the widespread and extensive use of SNS, especially Facebook (http://www.facebook.com/), by students, it is natural for educational institutions to seek to exploit SNSs to enhance learning. Pedagogically speaking, Maloney (2007) argued that the design of SNSs share many of the qualities of good educational technology in terms of facilitating peer feedback and matching the social context of learning, aligning with contemporary models of good practice in learning which encourage collaboration and active participation. As Selwyn and Grant (2009, p.80) point out, social software apparently has the potential to make the shift to 'knowledge as constructed actively by the learner within communal social settings of people and objects where knowledge can be created and supported'.

Research has uncovered limits to Facebook's potential, however. Of particular relevance to our concern with learner identity and a communities of practice framework is Hughes' (2009, 2010) examination of the extent to which learners feel that they belong in social learning groups. She conceptualises identity congruence in terms of three dimensions: social [ie personal identification, for example, as a member of a group of confident regular posters], operational [ie involvement in the group practices such as technology use, for example, as a discussion group member who posts early and gets responses] and knowledge-related [ie the status of one's knowledge, for example as a member of a group who share knowledge/make academic contributions]. When learners experience incongruity, they are more likely to 'hover on the margins with limited engagement' (2009, p.296). The extent to which Web 2.0 technologies support the development of congruent identities and hence collaboration and engagement is questionable: Hughes argues that the presence of technology will not enable learners who are already marginalised to fully engage with learning communities, particularly since Web 2.0 groups are not immune to the construction of exclusive sub-groups, nor do they necessarily support the construction of new knowledge given the ambiguity of the status of personal knowledge contributions (a particular issue in mathematics). Thus she suggests that 'while social software encourages dissemination of learner-generated content, it does not

necessarily facilitate the challenging and reconstruction of that content and the identification with new forms of knowledge' (2009 p.301). These issues will persist, she argues, as long as (a) conservative assessment structures persist which divide learners into 'weak' and 'strong' and (b) ambiguities exist concerning the status of different forms of knowledge and their role in academic learning.

The impact of a general conservatism in university climates, particularly with respect to the status of different knowledges and an assumption of tutor authority, is observed in a range of studies. Crook and Cluley (2009) note that new arrivals at university might well expect more of a Web 2.0 participatory ethos, but this is an ethos which does not in fact sit well with embedded university cultures. Comparing the more impersonal and directive speech register of established virtual learning environments (VLEs) with SNSs, they suggest that while it may not be necessary to reproduce exactly the social style of SNSs, educators do need to work towards 'capturing just the underlying *mood* of this popular social networking; perhaps adopting a more informal disposition towards interacting' (p. 202). The issue of institutional expectations is taken up by Baran (2010), who concludes on the basis of her research in a Turkish context that 'if the aim of using tools such as Facebook was to contribute to altering the patterns of teaching and learning, time and attention need to be given to defining and encouraging the new, different roles of the learners and teachers and the kinds of communications and collaborations expected' (E148). Similar conclusions are reached by Oradini and Saunders (2008) in their evaluation of a university-based Facebook 'substitute' set up to support social networking across a widespread London campus. They found that although some communities emerged which were set up as study support, these were 'only a small minority', and tended not to survive in the long term (p.7). These authors also conclude that new roles for tutors and learners need to be developed for SNSs to function well as supports for learning. Even de Villiers's (2010) report of successful use of Facebook to support academic participation on a postgraduate distance learning course is tempered by the observation that although many students embraced the constructivist, learner-controlled approach, some were anxious about its participative ethos and expressed conservatism regarding tutor-student relationships and a desire for a 'more controlled, instructor-led forum' (p.188).

There are, then, tensions between expectations of social networking and of networking for knowledge building. Thus it may not be surprising that Gray, Annabell and Kennedy (2010) found that although one quarter of the Australian medical students they surveyed used Facebook for study purposes, and another half said that they would be willing to do so, they were nevertheless 'very conservative' in their use of Facebook as support for learning. While groups operated more or less successfully in terms of general peer support, frequently on the basis of pre-existing groups, the authors found no evidence of transformation 'from passive and disengaged to active and participatory learners' (p.975). As Hughes argues, a high level of social congruence is an insufficient condition for knowledge building: 'Friendship and social support may be invaluable for belonging to wider institutional communities in the university, but social identity congruence does not necessarily facilitate knowledge-related identity congruence' (2010, p.60). Indeed, as Selwyn (2009) reports, Facebook groups appear to serve a dominant social congruence function which revolves around the 'identity politics' of being a student rather than reflecting engagement with formal studies. In so far as students in his study did use Facebook in relation to education, this was most likely to involve 'the *post-hoc* critiquing of learning experiences and events, the exchange of logistical or factual information

about teaching and assessment requirements, instances of supplication and moral support with regards to assessment or learning, or the promotion of oneself as academically incompetent and/or disengaged' (p.170). Similarly, Madge and others (2009) found that Facebook primarily operated as 'social glue'; although it was sometimes used for informal learning, only 10% of students made use of the site to discuss academic work with other students and just 1% to contact staff. Indeed, few students in their study felt that Facebook was an appropriate forum for staff, with just a minority of students observing that tutor presence on Facebook has a benefit in fostering good relationships with tutors, with benefits for face to face teaching. This finding is reinforced by Jones and others (2010) who report that many students want to maintain a clear divide between learning and studying on the one hand and social life on the other. This discomfort with the blending of social and study life is arguably fostered by the performance-oriented approach which is often found in mathematics and which positions studying as something to be 'got through'.

Nevertheless, we should not dismiss Facebook as totally irrelevant to pedagogic concerns. While concluding that Facebook may simply support a visible means of building and maintaining an identity of 'doing university', Selwyn (2009 p. 170) acknowledges that it is 'a valuable means of exchange … with their peers on the course. Indeed, in terms of education-related interaction, *Facebook* was used primarily for *maintaining* strong links between people already in relatively tight-knit, emotionally close offline relationships'. Questions remain with respect to the role of Facebook in a situation such as the one reported here, where the undergraduate community was showing significant identity shifts away from the presentation of self as disengaged and towards congruent knowledge-related and social identities. Can Facebook function as an inclusive open space for knowledge construction in these circumstances?

The case study

Against this background of the need to understand the role, if any, of new technology in education and the specific issues in mathematics learning identified above, we present a case study of the use of Facebook within a UK university (henceforth referred to as The University). As we have already indicated, the particular context in which the case study occurred was one in which students were involved in a high level of collaborative supportive learning practices which centred on the availability of a dedicated physical space for their use. We detail first the history of the four Facebook groups which have been associated with The University Mathematics Department and the cohorts which were instrumental in their creation. We integrate this with reflections on events as provided by the participant observation of two of the authors, one a staff member in the department (henceforth SM) and the other a postgraduate student (henceforth PS). To clarify their role methodologically, both SM and PS had initial roles as participants in nearly all of the Facebook groups, and also took particular roles in the surrounding events. In what follows their accounts of the on-line communities and their involvement in them are drawn from retrospective discussion with another of the authors. We also report on a focus group conducted with six undergraduate students who were key players in the development and running of two of the Facebook groups. Five of these students, from Cohort C (at this time 2nd years), had been initiators of the Alternative Group, and were now responsible for the University Society of Maths (USM) and its associated Facebook group (see below for details of cohorts and groups). The sixth student, from cohort D, was in the first year and active in the USM. The students were invited to talk about

their experiences of participation in Facebook as a support for mathematics learning in general, and in this group in particular.

A history of Facebook groups at The University

During the period from May 2007 to April 2010, four Facebook Groups associated with the Mathematics Department of The University developed, involving several cohorts of students. To provide a consistent way of referring to student cohorts the following labelling system is used:

Cohort A : 2nd year students in 2006/7; 3rd year in 2007/8

Cohort B : 1st year students in 2006/7; 2nd year in 2007/8; 3rd year in 2008/9

Cohort C : 1st year students in 2007/8; 2nd year in 2008/9; 3rd year in 2009/10

Cohort D : 1st year students in 2008/9; 2nd year in 2009/10

Cohort E : 1st year students in 2009/10

The initial impetus for the creation of a Facebook group came – importantly in our view – in May 2007 from two 2nd year mathematics undergraduates (i.e. from Cohort A), who asked SM to create a University Maths (UM) Facebook group. These students were among those already engaged in collaborative learning activities, and as SM comments this seemed significant:

> The newly refurbished maths centre had made a big difference to the way the maths undergraduates socialised. There was a small core group of about six students and they acted as a nucleus pulling other students into the group. This group contained some very strong personalities and they had lots of influence on other 2nd years.

SM records that he inferred from their request that the students, and in particular the core group of six, were keen to use Facebook to discuss mathematics. However, his expectation proved incorrect - he notes that he was 'surprised … the students didn't even use the UM Group to discuss revision for the exams'. Early membership of the group came from within Cohorts A and B, and increased during the summer months so that by September 2007 it had reached 32 members (see Table 1).

Table 1 about here

In October 2007, during their induction lectures, the new intake of mathematics students (Cohort C) were informed of the existence of the UM Facebook group and invited to join. After one week, only one new student had joined the group. During the same week, five Cohort C students formed their own Facebook group, (henceforth referred to as the Alternative Group). The actual name of the Facebook group utilised the name of the University to create an offensive acronym. By the end of April 2008 the membership of the 2 groups was as illustrated in Table 2.

Table 2 about here

The figures for membership of the Alternative Group are boosted by the addition of 31 members who were not actually associated with The University mathematics community but were friends of Cohort C students. Several students from Cohorts A and B joined the Alternative Group, but only one member of staff joined (SM; PS was also a member). The total numbers of students in each cohort in April 2008 were: Cohort A: 37, Cohort B: 36, and Cohort C: 33.

The UM group had, by this time, posted 9 discussion topics. In addition, there were 109 posts on the UM wall. These included students posting links to mathematics web-sites and staff arranging convenient times for focus groups. The Alternative Group had, in the period from October 2007 to April 2008, posted 26 discussion topics. These ranged from football talk to lecture quotes, with no serious discussion of mathematics problems. SM also observed that two new developments were taking place on the Alternative Group site: it was being used to organise face-to-face interaction between different year groups, a phenomenon which had not existed in previous years; and members were using the forum to express opinions about lecturing staff. Away from the public site itself, some students [in the Alternative Group] began sending private messages within Facebook to SM asking mathematical questions, beginning in late October 2007. These exchanges featured both broad mathematical discussions and narrowly focused directly course-related questions.

In April 2008, in view of the offensive nature of the acronym used by the Alternative Group and the involvement of the University's name, the University authorities intervened to insist the group be closed. PS acted as mediator, later reflecting that there were a number of legitimate reasons for the closure, including a lack of inclusivity:

> The [Alternative Group] wasn't suitable for being the main University Maths students Facebook group for lots of reasons ... it was cliquey … the group wasn't promoted to everyone and not everyone was made to feel welcome … it wasn't an official student society but it used the university name and so there was bound to be a conflict ... particularly because the [group] name was rude.

At the same time it was suggested that the students establish an official university based mathematics society, and PS pointed out the benefits to its members of creating an official student society. There was a financial incentive to such a course of action, since as an official society they would be entitled to receive some funding for their activities. In fact, the students had known about this already, as PS notes:

> When they set up the [Alternative Group], they knew about official student societies but they probably didn't want to be bothered with all that stuff … it's so much easier just to set up a Facebook group.

PS recalls that immediately prior to the closing of the Alternative Group there seemed to be a strong level of opposition towards both the closure of the group and the creation of an all-inclusive 'official' society from within Cohort A. He felt that the Cohort C students appeared to be heavily influenced by some strong personalities in Cohort A. These students openly resisted the closure of the Alternative Group and opposed the establishment of an official university society. Nevertheless the Alternative Group was closed down in May 2008 and, at the same time, procedures were set in place to start up the University Society of Maths (USM). Due to a certain amount of reluctance on the part of the undergraduates to get involved, most of the initial work required to create the USM was carried out by PS and the other

postgraduate who had been a member of the Alternative Group, acting as president and vice president respectively. At this point, the USM did not have a Facebook presence. Immediately following the establishment of the USM, the core group of 5 Cohort C students who had initiated the Alternative Group set up a 'secret' Facebook group (henceforth called the Underground Group). Membership of this group was by invitation only; it gained 15 members and was active between May and July 2008. SM was invited to join the Underground Group as a member, but not as one of the owners. Reflecting afterwards SM records his perception that 'setting up this Group gave the students a sense of self-confidence … that they were still in control, that they could set up their own Group if they wanted to no matter what had happened to the Alternative Group'. PS, on the other hand, was not invited to join; he also explains this in terms of ownership and control:

> I think the students saw me as part of the establishment so they didn't invite me to join the [Underground Group] ... the University Maths Group had become stagnant, but the Alternative Group, because it was owned by students, had more freedom.

The summer vacation created a quietus in USM activities. On return to the University in October 2008, the two Postgraduates, together with some Cohort C students, now in their 2nd year, decided to both create a USM Facebook group as the virtual presence of the society and establish a weekly evening meeting. Several new (Cohort D) students participated. A group of Cohort B and Cohort C members set up a module support service, whereby students in lower years could contact them if they needed assistance in specific subject areas. This was advertised via the Facebook group discussion board.

During the year, more Cohort D students joined. By April 2010, six Cohort E students had also joined. Membership at this point is illustrated in Table 3.

Table 3 about here

The UM Facebook group was now effectively dormant, as it had been superseded by the USM. The last update to any discussion topic on UM was made in May 2008. The position in April 2010 is illustrated in Table 4:

Table 4 about here

The Alternative Group and the USM: core members' perceptions

The focus group took place in December 2008, seven months after the Alternative Group was closed down, with a main aim of gaining the students' own account of the history of the Alternative Group and their perception of the value of the USM Facebook group. It was conducted by one of the authors, who was not a member of the University and was not previously known to the students. The discussion was audio-recorded and analysed thematically with particular focus on approaches to learning mathematics, learning relationships within the user group and with tutors, and the social functions and running of the groups.

A dominant theme in the students' account of their use of Facebook was its social aspect; they described the origins of the Alternative Group as 'more jokey than anything', as 'not really mathematical'. While it had been started by a group of mathematics students and referred to mathematics in its name, its main purpose was to socialise, and its success was measured by the students in terms of numbers of members – which included friends who were not mathematics students. Socialising was felt to be important because of the size of the university mathematics community and of the overall University community in comparison to school. Indeed, the students commented on how they would never have joined an official mathematics society in their own induction week, and they gave as their reason for not contributing to SM's original Facebook group that 'it was a completely different interest'. In their account of the closing down of the Alternative Group they tended to play down the University's involvement, telling a non-acrimonious story of how it was suggested by SM and PS that they form a 'proper' mathematics society with financial backing from the university, with little to be lost through the closing of the group, which 'had run its course anyway - it wasn't expanding and it wasn't providing anything and the joke had pretty much worn off'.

However, despite its emphasis on socialising, the Alternative Group did have some mathematical focus according to the group:

> [*So you started it up for a laugh?]* It was to start with … some of the original posts might have been fairly interesting [*sarcasm – i.e. frivolous*] … but as we went along there was more serious points towards it – some people were actually asking maths questions and it was having maths related things … there was the occasional course-related thing but mostly it was just general.

The predominant nature of later contributions about mathematics appeared to be requests for help with coursework as opposed to discussion of mathematics *per se*. One student remarked that the Alternative Group had been largely social because 'we'd help each other out in class anyway'. However, as SM has noted, the Alternative Group was acting as a means of bringing students together across cohorts, and this function was described by the focus group as formalised in the USM Facebook Group: a primary aim was to help first year students through the organisation of face to face meetings with Year 2 students, and book lending. Again, discussion of mathematics itself on the site was not on the agenda.

The students' involvement in the Facebook site and in the University Society of Mathematics thus evolved a formal focus as a means of bringing people together for face to face discussions about mathematics coursework. Discussing this kind of mathematics on-line was seen as problematic:

> If you explain it face to face with somebody they can agree on the steps you're doing rather than you just listing them all ... [on line] you can't explain every point, you're just telling them what to do rather than helping them understand it.

While these comments make sense, and suggest that the students had a thriving off-line community engagement, their avoidance of on-line discussion – also observed by SM – can be seen as a persisting legacy of a performance orientation in mathematics teaching (see for example Boaler, 2002) which makes it difficult to be publicly wrong in a community which values 'right answers' so highly. One student's explanation of why he did not contribute to the UM group indicated a strong need to avoid a loss of self esteem in this community:

> … the University Maths group didn't seem to have much point because I wasn't prepared
> to put a question into something where everyone would think I was stupid.

In fact, only one student from this year group posed general, rather than course related, mathematics questions within the UM group, and this behaviour was described as undesirably 'geeky' – where students did engage in general mathematics-related discussion, this was limited to private discussion with SM, as indicated above. The students suggested that they could not see the point of discussion areas - 'if you want discussion you might as well e-mail the lecturer'. Indeed, they went on to say that they were not very sure that they wanted lecturers to be involved in the Facebook groups as a body at all:

> *[Do you actually want all the staff to be involved?]*
> Not all the staff because then it is just University Maths …. except you got to pay two quid
> We've got to keep an element of fun

> *[Do you think people will be put off because all the lecturers are in it?]* Maybe because for starters if you look at that and all the lecturers are in it who do you think is running it?
> Part of our appeal is that we're run by students, that's a big part of it.
> The society is full of students, run by the students.

Thus the focus group findings suggest that, far from Facebook providing an opportunity for participative learning and engagement in the wider mathematics community of practice as we had expected, students used it primarily for social purposes and for purely instrumental support for their studies.

Discussion

First, we must acknowledge the limitations of this study. Clearly, our data are limited to the authors' observations of the general history of the student community and the particular insider version of the events as experienced by SM and PS, together with the focus group discussion with core members of the Alternative Group. We have not asked the students to comment on their specific Facebook posts, nor have we interviewed other students who used the sites. Clearly, the case study we report is highly specific in terms of its context and history. However, it can nevertheless be argued that our data are significant in that they uncover some of the limitations and also the unforeseen potential of Facebook in an important area of university mathematics – the need for social support in a subject which is experienced as difficult and frequently individualistic, leading to high drop-out rates (see Brown & Macrae 2005). Additionally, the case study details a complex history which illustrates some of the issues of power and control involved in the dynamics of using SNSs for educational purposes, including data collected from key players in the groups.

Overall, this case study has found that the emergence of Facebook can contribute to some changes in the experience of mathematics undergraduates, but that, in common with observations in Ravenscroft (2009), the situation is more complex and ambiguous than might be anticipated. Facebook is only one means by which students communicate with each other, and this was clearly the case in our experience of the overall undergraduate student community at The University – as the focus group students observed, they helped each other out in class anyway. Furthermore,

Facebook appears primarily to strengthen and solidify pre-existing bonds between offline friendship groups (as in the Underground and Alternative groups). We also note, with Selwyn (2009), that the Facebook groups provided students with a public medium for a discourse of resistance to authority in general (one interpretation of the Alternative Group acronym) and for general grumbles about lectures and lecturers – as Selwyn says, this is 'doing university'. In essence, it is an open forum discussion that supplements offline relationships between students.

This use of SNSs potentially leads to a clash between students' use of Web 2.0 (O'Reilly, 2005) tools and academic staff usage of the same tools if their online social spaces overlap. What was once an isolated forum for "disruptive non-constructive" discussion (i.e. as a private area to voice opinions and to generally "blow off steam") is no longer isolated and private if there is a collapsing of boundaries between academic and personal virtual spaces. As Hemmi, Bayne, and Land (2009, p.29) point out, 'the volatile modes of online interaction enabled by the new social media perhaps sit uncomfortably within existing higher education practice'. Certainly, our experience of the evolution of the Facebook groups is illustrative of the issues of power and control which an eager staff take-up of Facebook can uncover; the focus group students confirmed again how they wanted to maintain control of the groups and their membership.

Our case study also demonstrates that students' experiences and perceptions of university study – specifically mathematics here - are highly relevant to the success of social networking as a means of fostering new teaching and learning relationships. Unlike Selwyn's (2009) study, in which the predominantly female social science student users frequently described themselves as not understanding their work, we found that students were reluctant to pose questions online for fear of appearing either to be stupid or a geek. Gray, Annabell and Kennedy (2010) also suggest that students' under-reporting of Facebook usage for learning in their survey (indicated by the numbers of students contributing to the Facebook groups in their case studies) is due to 'being stigmatised as 'nerds' or 'swots' for making academic use of a social tool' (p.973). Elsewhere (Solomon, Lawson & Croft, in press) we have noted that female students, including those at this university, strongly favour group work, but are very unlikely to ask questions in public, partly because of the dominance of a male culture which emphasises 'effortless' performance. In this context, taking advantage of the potential of Facebook to question and discuss becomes even more difficult. In terms of the framework suggested by Hughes (2010), a high level social identity congruence does not, as she argues, lead automatically to collaborative work. This is particularly so within traditional assessment contexts and in discipline contexts such as mathematics where the status of student knowledge claims are highly contestable. Indeed, the students in this study appear to have a strong focus on meeting assessment requirements, and have made use of Facebook to facilitate these rather narrower aims while maintaining the social networking side of Facebook in order to 'keep an element of fun', in line with the findings of Selwyn (2008). These findings, and their fit within Hughes' framework, suggest that further investigation of student perceptions and close analysis of posts within different discipline contexts is crucial to understanding the value of Facebook as a learning tool.

However, one positive, and unanticipated, development did arise from the Facebook groups: this was a new channel of communication between the student year cohorts. Although the initial impetus was an instrumental demand for help with difficult modules, the students described at length how their new USM manifestation

on Facebook left their earlier Alternative Group behind as 'just a legend', to be replaced by a formally established system managed and coordinated, rather than performed, through Facebook:

> There wasn't much of a support structure last year but now because we're in the 2nd year and there's people below us it's a lot easier for us to actually provide some sort of help to people….. I went through all the modules in years 1 and 2 and took it to a meeting and got [third years] to sign their name down for modules they wouldn't mind helping with. I've already set up a library and module assistance if anyone needs it.

In the context of mathematics learning a student-initiated support system such as this may have considerable benefits for engagement in terms of staying the course. As we have already noted, peer support and peer tutoring in university mathematics is crucial, and may make the difference in terms of helping struggling students through real or perceived conceptual barriers. While Facebook did not turn out to be a site for discussion, our students evolved a new way of using it to organise their studies.

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Tables

Table 1: UM Membership immediately before new intake in September 2007

Classification	Staff	Postgraduate	Cohort A	Cohort B	Total
Number	5	2	15	10	32

Table 2: University Maths and Alternative Group memberships April 2008

Classification	Staff	Postgraduate	Cohort A	Cohort B	Cohort C	Non-maths	Total
Number UM	8	5	15	10	10	0	48
Number AG	1	2	11	5	19	31	69

Table 3: USM Facebook group membership, April 2010

Classi-fication	Staff	Post-graduate	Cohort A	Cohort B	Cohort C	Cohort D	Cohort E	Non-maths	Total
Number	3	2	1	3	17	9	6	9	50

Table 4: Details of The University's Mathematics Department Facebook groups from May 2007 to April 2010

Facebook group name	UM	Alternative	Underground	USM
Period open	May 2007 – present	October 2007 – May 2008	May – July 2008	October 2008 - present
Current status	Inactive	Closed	Inactive	Active
Owner(s)	SM + PS	5 Cohort B students	5 Cohort B students	1 Cohort C student + 5 Cohort B students
Form of membership filtering	University members only	None	Closed, invitation only	None
Main forms of dialogue	Discussion topics / online chat	Online chat	N/A	Discussion topics / event organisation / online chat