Microblogs in Higher Education – A chance to facilitate informal and process-oriented learning?

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A R T I C L E   I N F O

A B S T R A C T

Microblogging is one of the latest Web 2.0 technologies. The key elements are online communication using 140 characters and the fact that it involves "following" anyone. There has been a great deal of excitement about this in recent months. This paper reports on a research study that was carried out on the use of a microblogging platform for process-oriented learning in Higher Education. Students of the University of Applied Sciences of Upper Austria used the tool throughout their course. All postings were carefully tracked, examined and analyzed in order to explore the possibilities offered by microblogging in education. It can be concluded that microblogging should be seen as a completely new form of communication that can support informal learning beyond classrooms.

1. Introduction

Since Tim O'Reilly gave his famous talk about a new form of human behaviour related to working with the Web in 2004 (O'Reilly, 2005), Web 2.0 has turned into an amazing success story. Driven by user-generated content, the use of weblogs, wikis and podcasts has increased dramatically. Social media, social networks and social communities all represent a new form of collaboration and communication. In a short space of time, the World Wide Web has been transformed from a static information medium into a worldwide communication platform.

Web 2.0 technologies are also of great interest, given that the use of the internet for educational purposes, known as e-learning or Technology Enhanced Learning, is a very important future stakeholder for education. Stephen Downes (2005) introduced a new term, "e-Learning 2.0", and thus coined a name for the use of wikis, weblogs and podcasts in educational settings. Since then, much research work has been done and many publications (Augar, Raitman, & Zhou, 2005; Caddick, 2006; Evans, 2007; Towned, 2005; Raitman, Augar, & Zhou, 2005; Ebner, 2007) and scientific reports have pointed out how these new technological possibilities can be used in the context of our social environments. Collaboration and communication by means of weblogs and wikis enhance traditional education in a new and exciting way.

As this paper addresses microblogging, we wish to concentrate here on weblogs and microblogs as important representatives of Web 2.0 technologies. Walker (2003) defined a weblog as a frequently updated website consisting of data entries in reverse chronological order, whose content is created mostly by one person. Previously, without HTML knowledge, users could not have written subjective reports, statements, or anything else in the World Wide Web; neither could they have shared their thoughts, work or knowledge with the entire world. Nowadays both private and cooperative weblogs are clearly established and widely accepted.

In 2007 a new form of blogging came on the scene, known as microblogging. The first platform, Twitter, now also the best known, won the South by Southwest Web Award.[1] The online world became aware of a new and simply idea – communication via the web by writing short messages restricted to 140 characters. McFedries (2007) provided the following definition: "A microblog can be seen as a weblog that is restricted to 140 characters per post but is enhanced with social networking facilities". Since then a discussion has taken place as to whether

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[1] http://2007.sxsw.com/interactive/web_awards/winners/ (last visited: July 2009).

writing a 140 character statement should be understand as a form of weblog, or whether it indeed represents a new form of communication. Furthermore, social networking facilities are characterized by the possibility to follow other people, to be followed by others, to reply or to send messages directly to them. Twitter[2] started with the famous question "What are you doing?" and other applications followed, like Jaiku,[3] Pownce,[4] Plurk[5] and the open-source product laconica.[6] But regardless of the tool chosen, updated postings, ideas, opinions, or quick notifications are leading to a new way of mobile working, with today's prime example being Mobile 2.0 (Griswold, 2007). Perhaps the most powerful aspect of microblog platforms is their mobility. Microblogs can be written or read via web interfaces, mobile phones with special free applications, short message services (SMS) or even instant messaging tools (IM). Participation from anywhere in the world made the famous expression A[3] (anytime, anywhere, anybody) increasingly true. One of the first scientific studies (Java, Song, Finin, & Tseng, 2007), addresses the question as to "how people are using the platform" and points out that microblogging facilities can be used in three ways: information sharing, information seeking, and friendship-wide relationships. Ebner and Schiefner (2008) state that the use of microblogging for fast exchange between people with similar interests is highly valuable. Furthermore, first live experiments have been started by using Twitter in conferences (Reinhardt, Ebner, Beham, & Costa, 2009). It can be summarized that with the help of the mobile web the use of microblogging enhances communication between people with the same interests.

Based on the three factors of Java et al. (2007), information sharing, information seeking and friendship-wide relationships – the authors of this paper aimed to investigate the use of microblogs in Higher Education. The following research questions are addressed:

- How are students using microblogging in the context of their course?
- Can public and individual timelines using microblogging be used for documentation in the sense of "process tracking by timeline" (process-oriented learning)?
- Does microblogging foster informal learning?

We report on how we carried out research into a real life setting at the University of Applied Sciences of Upper Austria. Statistical data was available that made it possible to track students during their course and provide answers to these questions. The next chapter gives an overview of their informal learning as well as their process-oriented learning. We then go onto explain the setting and present the results.

2. Theoretical background

In recent years there have been mainly two reasons for the increasing attention given to process-oriented approaches in didactics. The first can be traced back to the development of a constructivist approach to learning. In this context the process of knowledge construction, the person's own learning process, leads to the application of process-oriented learning. As a result, more attention is given to the matter of the learner's own attitude as well as the opinions of others.

From this perspective, learning processes cannot be tightly structured and the results of learning are almost unpredictable. In addition, the relevance of process knowledge is increasing as the time factor plays a less important role. Process orientation does not refer to a tight structuring of the learning process, but rather to the possibility of trying out a range of learning strategies and reflecting on these.

Against this background the role of the teacher changes from that of a knowledge distributor to a facilitator of self-directed learning. Therefore the instructional design (and the use of media) should concentrate on facilitating the learning process. This can be ensured primarily by creating favourable learning conditions (Kyndt, Dochy, & Nijs, 2009). With regard to communication, a basic openness is needed and the possibility to contribute one's opinions and discuss different views.

We wish to show that microblogging can foster process-oriented learning due to the fact that it can allow continuous and transparent communication between students and lecturers. Additionally, because of the openness of the tool in general, it can be expected that informal communication will arise (Dunlap & Lowenthal, 2009; Zhao & Rosson, 2009).

Informal learning can be seen as an important component of new learning environments and process-oriented learning. Despite, or even due to the mass of publications about informal learning, the term is being absorbed into different pedagogical contexts and is becoming more and more unclear.

While informal learning was originally defined in contrast to formal learning environments like schools (Dewey, 1966) for long time, a change has occurred over the last 20 years: more and more criteria are needed to define informal learning throughout different environments (e.g. work, school, social work, media, pedagogy). A continuum of understanding of formal and informal learning has become accepted (Stern & Sommerlad, 1999). Crucial criteria for the distinction between formal and informal learning are dimensions such as the environment, motivation and pedagogical influence. However, most forms of learning are mixtures of formal and informal learning. According to this understanding, informal learning can also take place in education institutions, when motivation is focused on solving (real) problems with little pedagogical guidance.

Informal learning cannot be formalised (Wenger & Snyder, 2000); only conditions for informal learning can be provided. While the media used play an important role in this, it does not depend on the kind of media whether informal learning will be supported or not. The determining factor is the modality of the media used. Didactic methods like self-directed learning, explorative or research-based learning offer particular potential for informal learning because of the low influence of teachers and the fact that learning is not primarily aligned to teaching. However, if there is too much pedagogical guidance, informal learning will not occur and the motivation to learn may decrease.

There has been increasing research on the use of microblogging in learning scenarios in recent months (Borau et al., 2009; Ebner & Schiefner, 2008; Gaonkar, Li, Choudhury, & Cox, 2008; Ramsden, 2008).

As Selwyn notes, "Despite the immediate appeal of applications such as Facebook and Second Life it is necessary for educators to take time to reflect carefully upon the nature of these Web 2.0 applications as online learning environments and question the learning

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[2] http://twitter.com (last visited: June 2009).
[3] http://www.jaiku.com (last visited: June 2009).
[4] http://pownce.com (last visited: June 2009).
[5] http://www.plurk.com (last visited: June 2009).
[6] http://laconi.ca (last visited: June 2009).

affordances they offer in practice." (2008, p. 6). This is also valid for the use of microblogging. First we have to ask ourselves: Which general possibilities does microblogging offer?

The application types mentioned above by Java et al. (2007) can be supplemented by the following: "A medium optimized for social connections, microblogging can also be used to continue a conversation outside the classroom walls or provide an easy way to update students on course logistics. Numerous widgets exist for cross-posting updates (a single statement entered through one service can appear on many others automatically) and for following the updates of others. The ease of online publishing, especially blogging, gives students a place to voice their opinions, ideas, and research." (Johnson, Levine, & Smith, 2009, p. 20). Grosseck & Holotescu (2008) and Ebner and Maurer (2008) expand on the possibilities of using microblogging in educational contexts. It is important to differentiate between communication between students and communication between students and teachers. A list of basic functions can be pointed out:

- – asking questions,
- – giving opinions,
- – changing ideas,
- – sharing resources and
- – reflection.

The advantage of microblogging consists mainly in the possibility of giving immediate feedback, as well as in the documentation of processes. The latter feature is relevant in two different ways: firstly, learning contributions can be consulted to obtain a summative account of learning activities and learning progress, and secondly, microblogging offers the possibility to monitor learning processes and to respond to peer activity during the process (information awareness). However, certain disadvantages are evident. The same aspects that can be evaluated positively can be evaluated negatively. For example, the limitation of 140 characters forces the learner to focus on the topic, but does not allow him or her to express complex thoughts. In addition, the possibility for private conversation may serve to bridge the gap between formal and informal learning or it may invite the learner to focus only on private exchange and/or to miss the separation between educational/vocational and private use. In its favour, microblogging can foster media literacy.

3. Experimental setting – case study

3.1. General description

In 2007 the University of Applied Sciences of Upper Austria launched the Masters programme "SCM – Supply Chain Management," focusing on both Economics and Management. This professional degree programme is offered both full-time and part-time (to students working in industry) and takes a holistic approach to the education of specialists to hold managerial, staff and line management positions as project managers or consultants. Students are trained to structure, plan and evaluate innovative concepts in all kinds of businesses and business networks from an economic point of view. They learn to make decisions and ensure their accepted implementation, drawing on their in-depth understanding of all elements of the network. The main focus is on general management, leadership and expertise in implementing change, with e-business and logistics as elective subjects. The Masters programme lasts 2 years (four semesters) and is awarded 120 credit points (ECTS).

In order to achieve a unique selling proposition within a market of comparable programmes, a special didactic approach has been developed. A core element of this approach is the "KEU Method." KEU is an acronym of the German terms for creativity (Kreativität), decision (Entscheidung) and implementation (Umsetzung). These build a sequence in applying solution-oriented practical approaches to addressing managerial challenges. Along this predefined sequence the students work with a set of methods. They gain a competitive advantage as they develop their competencies in choosing and applying the appropriate methods, identifying problems, working out specific approaches to solutions and implementing solutions to business cases.

KEU courses are divided up into three blocks of attendance which consist of two units each lasting 2–3 weeks, involving individual or group work. The part-time students have about 25% less attendance time than the full-time students, but work on the same business cases and are evaluated on the same basis. They have to manage their studies alongside their full-time job.

The lecturers give subject-specific input within the first of the three attendance blocks. In the second attendance block, the input may be more detailed, and is complemented according to the relevant phase of KEU. This happens while discussing and evaluating the presentations within the second and third attendance block. The first of the student presentations has to give information on the diagnosis of key problems in a given business case. It also has to outline feasible solutions and present a convincing argument for the decision made regarding the solution that is chosen. The challenge of the second student presentation during the third attendance block is to show how the decision was implemented and discuss the resulting operational consequences.

3.2. The course subject "New Media and Multi-Channel Management"

The course subject we took as a basis for our study is called "New Media and Multi-Channel Management" (NMC). It was held during the winter semester 2008/2009 and was an elective subject for students in their third semester. In the winter semester the students have a heavy workload as they take up to five parallel KEU course subjects with different lecturers and involving different business cases.

With regard to the content, students were not only expected to use the new media for the business cases, but also to gain practice in using them for communication, collaboration and documentation during the course. The standard approach at the university was to use the e-learning platform ILIAS for communication and word processing software for documentation. This alternative approach was intended to stimulate more intensive engagement with at least two new media: microblogging and wiki. For microblogging the open-source platform Indenti.ca was chosen. The software was installed and set up on a server at the Graz University of Technology (TU Graz) and was supported by Graz University throughout the course. The microblog was named "MBlog." MediaWiki served as a wiki platform.

In addition, another basic focus was established by taking a different approach. The use of microblogging and wiki enabled us to closely track the students' progress. Regular and frequent use of MBlog and MediaWiki were obligatory from the start. This created a greatly

increased workload for both the students and the lecturers. Working routines were broken up to enable the flexible adaptation and integration of alternative collaboration instruments. From the students' point of view, this, the process orientation and the new set of instruments for working and documenting ran counter to their usual pragmatic approach to optimizing their learning efforts.

In addition, to support the requirement for more flexibility and process orientation, the students had to change the way they arranged their working groups. Half way through the course, the groups were rearranged. Previously, the forming of groups had been a matter for the students to decide, and these had remained stable throughout the KEU courses.

As a result of this, more emphasis was placed on the grading of the process, and less on the presentations that were made. The evaluation reflected this. Two-thirds of the credit points achieved were gained for process. The process analysis was conducted at weekly intervals. Overall, six weekly evaluations were made. The evaluations considered both frequency and relevance. MBlog and MediaWiki were evaluated separately. However, average points were communicated to the students every week. Because of misunderstandings, the students requested that one of the evaluations should not be counted, and this was granted. This request was made by a student and was supported by all the others. All students then made use of this agreement.

MBlog and MediaWiki were introduced in the very first lecture, but not explained in detail. The students were expected to try out the microblogging platform and learn to manage all its features, in order to develop their own strategies for effective and efficient use. Twenty-first full-time students and 13 part-time students were organized into eight study groups and were fed one MBlog. They also had to use the same MediaWiki. Unexpectedly this caused irritations. The part-time students in particular seemed to be stressed by this, because their familiar group dynamics were broken up. They were forced to abandon their usual routines and found themselves in competition with the full-time students.

Although all students used the same MBlog and the same MediaWiki, the behaviour of full-time and part-time students needs to be evaluated and compared separately, to ascertain whether there are any differences.

4. Results

4.1. Overall overview

The case study took place in the winter term 2008/2009 at the University of Applied Sciences of Upper Austria, at the Steyr campus. Altogether 34 students and two lectures worked with the microblogging facility for 6 weeks. As mentioned before, there were 21 full-time and 13 part-time students. Below, full-time students are referred to as FT, part-time students as PT and teachers as TE.

The observation time lasted 6 weeks or 70 days. During this time, 11,214 posts were tracked and analyzed on the microblogging platform. In order to distinguish between the relevance of the posts to the learning process, different categories were introduced. Each post is analyzed and categorized as to whether:

- ... it includes a hyperlink (hyperlink – hy),
- ... it includes a tag (marked with #) (tag),
- ... it can be stated as a reply to another post by using @ (reply post – rp),
- ... the content contains a private message (private message – pm),
- ... the content contains administrative entries concerning the course subject in general (administrative message lecture – aml),
- ... the content contains administrative entries concerning group work (administrative message group – amg),
- ... the content reflects a discussion about the topics of the course subject (discussion message – dm) and
- ... the content reports relevant work for the course subject (report message – rm).

All 11,214 entries were tracked carefully and assigned to the appropriate category. Table 1 gives on overview of all analyzed entries. It must be pointed out that each message was categorized into pm, aml, amg, dm and rm, but may also contain a hyperlink, a tag or a reply. All posts were examined personally to guarantee that there was no misunderstanding concerning the content.

4.2. How are students using microblogging in the context of a course?

The first research question deals with the characteristics and process over time of all posts. It should be noted whether the particular content of the messages is constantly changing over time or not, for instance, whether hyperlinks are decreasing due to the fact that studying literature is mainly a task which takes place at the beginning of a course.

Fig. 1 shows the number of total postings on average made by one participant along the observation period on the left side (bold black line). Each category is represented with its own trend line. On the right side the number of single postings distinguished by each category is

Table 1
Overview of all entries.

|	Summary	PT/all	PT/individual	FT/all	FT/individual	Students/all	Students/individual	Students/individual/week (%)	Students/individual/week (absolute)	Students/individual/day (absolute)	TE
Hyperlink	1160	464	36	627	30	1091		10.2	5	0.5	69
Tag	2024	613	47	1380	66	1993	5	18.5	10	0.8	31
Reply post	6740	2038	157	4385	209	6423	189	59.8	31	2.7	317
Private message	4024	1108	85	2769	132	3877	114	36.1	19	1.6	147
Adm. lecture	332	123	9	121	6	244	7	2.3	1	0.1	88
Adm. group	1772	564	43	1179	56	1743	51	16.2	9	0.7	29
Discussion m.	3448	1044	80	1162	55	2206	65	20.5	11	0.9	196
Report message	1638	461	35	2208	105	2669	79	24.8	13	1.1	15
All posts	11,214	3300	254	7439	354	10,739	316		53	4.5	475
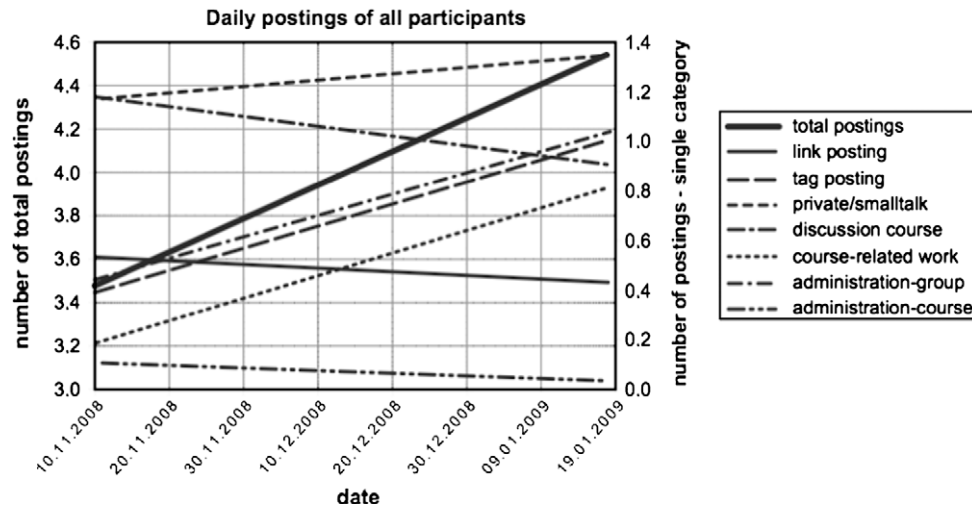
Fig. 1. Daily postings.
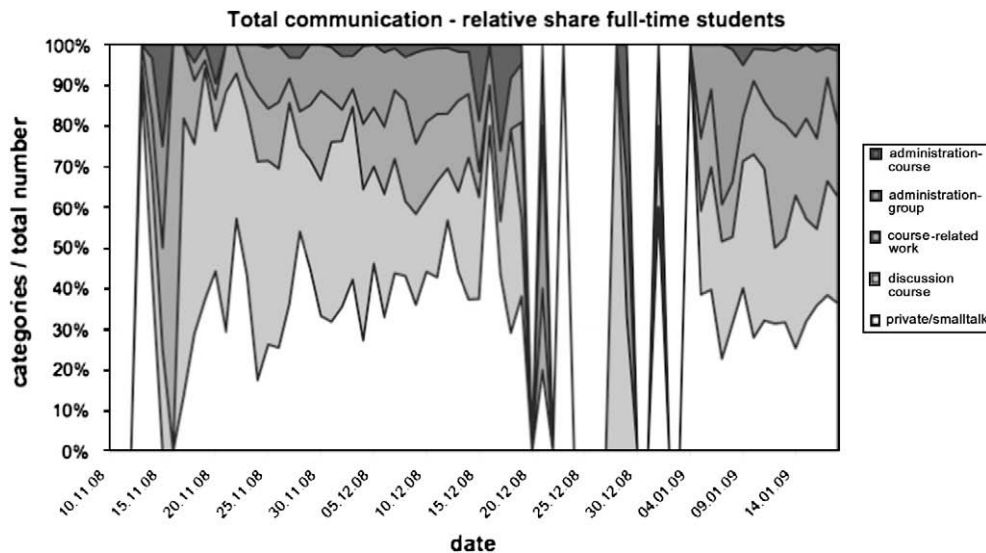
Fig. 2. Communication by categories.

shown. It can be stated that the daily number of postings made by each participant increased from an average of 3.5 per day to about 5.5 per day. Moreover, the posting rate of all 36 participants was on average about 160 entries per day.

Fig. 1 shows that only three categories decreased over time: posts containing hyperlinks, posts about administrative entries concerning the lecture in general and posts discussing the topic of the lecture.

4.3. Can microblogging be used for documentation and facilitating of daily/weekly learning steps using process tracking by timelines (process-oriented learning)?

Table 1 shows a surprisingly high number of posts on the microblogging platform. On average each student wrote 315 posts. Over a period of 70 days this resulted in around 4.5 posts each calendar day. If the observation time is reduced by holidays (42 days) the number increases to 7.5 posts/each working day.

The most used type of post is of the type "reply post" (rm – about 60%) which shows intensive communication between students or students and teachers. More than one-third of the messages are simply of a private nature (pm – about 36%) and about 19% are related to administrative content.

Taking a closer look at the number of posts, each student posted about 53 posts each working week and 13 of them are closely related to the learning and teaching results.

From a simple quantitative point of view, these numbers are evidence of a high number of communicative or documentary activities with great potential for process-oriented learning. It is highly probable that learning took place, and that the process helped students to understand the content of their subject in more depth. Our next step was to examine the quality of each post to confirm our theory.

4.4. Does microblogging foster informal learning?

The third and last research question addressed the question of whether microblogging supports informal learning among students. As communication is a main aspect of informal learning, the analysis of formal and informal communication between students enables statements to be made about informal learning.

.. From a research point of view it is of great interest to establish whether collaboration took place not only within the eight groups but also more generally between the full-time and part-time students. With this in mind, every reply message was analyzed.

The students were not required to use the microblogging tool for any task other than the documentation of their learning process. Our analysis shows that the tool was used for the purpose it was designed for. The participants had to describe their learning process, but there was no restriction on any other activities. We stated at the beginning of this paper that the nature of microblogging is communication and we now take a closer look at the communication aspects. Fig. 2 displays all posts, subdivided by the defined categories as well as the communication process along the given time period.[7] Of particular interest is the particularly high percentage of private messages that can be described as small talk between students. During our analysis we marked all messages as private that cannot be categorized by any other type.

This high volume of communication mainly between students leads us to conclude that there is great potential for informal learning – learning through communicating on different topics. Informal learning will only occur if there is an opportunity to talk with each other without any constraints. As private messages also have an informal character and are not meaningless, they are of great interest. This leads to the statement that students did learn informally through microblogging. Furthermore, the discussions occurred within a course or a didactic context, but in the absence of lecturers. They were based on a completely free exchange, not driven by specific learning goals. This would also suggest that informal learning took place.

Fig. 1 also points out that the volume of private messages increased during the observation time. This may indicate that students recognised the possibility and strength of private messages and used microblogging for their informal communication.

A further interesting fact is that the amount of discussion about the course topics decreased slightly. It seems that the groups achieved the "performing" phase of group work (Tuckman, 1965) and their communication was much more goal-oriented. Accordingly, informal messages decreased marginally (Fig. 1).

5. Further outcomes

5.1. Establishing a process-oriented learning environment

A main task of the whole setting was to create a microblogging learning environment with a minimum of extrinsic input or coercion. It should be noted that there was great scepticism at the outset, in particular after the short introduction to the general use of the microblogging application. Students argued that they did not know what to write about and that such tools were of less interest because they would never report any private matters. For this reason, the starting position communicated to the students was to". . . just use the tool to document your learning activities and monitoring your personal learning process."

Table 1 shows the very surprising result of 11,214 posts within about 42 days (observation period) which amounts to an average of 267 posts per day. Each student therefore wrote an average of 7.5 posts per day. If this posting rate is compared with usual social networking platforms such as Twitter or Friendfeed, a posting rate of 7.5 per day can be considered as a high daily posting rate. It can therefore be concluded that a microblogging learning environment with a systemic dynamic was established and that the results are stable, comparable and significant.

A further detail of great interest is the constantly increasing number of posts over the time period. Fig. 1 shows that the daily postings average (also including the holidays) increased from 3.5 to 4.5 posts. Although the students had completed the documentation of their learning process and did not obtain any additional benefits in terms of their grade, the application was still increasingly used. Looking at Fig. 2, the characteristics of posts did not significantly change over time – the percentage in each category appears fairly stable.

At the same time, the use of the media was non-reflective. There was no attempt to make the medium itself an object of consideration or discussion. Most of the students used the medium naively. They did not explore the potential of microblogging in general or of the deployed system in particular in order to enhance their performance or improve their effectiveness. Their activities were neither playful nor experiment oriented. They used microblogging as an alternative medium because it was mandatory. There was no evidence of more sophisticated engagement with the medium. They did not reflect their own process by monitoring and evaluating either their own or their colleagues' timelines. Neither did they consider the impact of their way of using the offered informal learning environment by microblogging on the outcome of their group work. No attention was paid to McLuhan's focus on "The Medium is the Message" (1992).

Although the volume of posts increased due to the obligatory use of the application, students appeared to be "playing the game" rather than using the tool for their own purposes.

5.2. Information versus communication

More than 60% of all posts contained the sign @, which means that someone was replying to or addressing someone else. Posts are adjusted to a specific person. Because only people who are following both the sender and receiver of the messages are able to read theses messages in their overview; it can be stated that the purpose of this message is simply communication and exchange.

Furthermore, Table 1 also shows that 7472 messages out of 11,214 are of a communicative nature (pm and dm). Again, looking at the results, it can be stated that about two-thirds of all messages aim at communication and one-third are pure information.

In summary, only a small percentage (about 15%) of all postings reflected the learning and working process of the students. Messages reporting on their daily activities were labelled report messages.

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[7] Between 20.12.2008 and 04.01.2009 the lecture did not take place because of Christmas holidays.
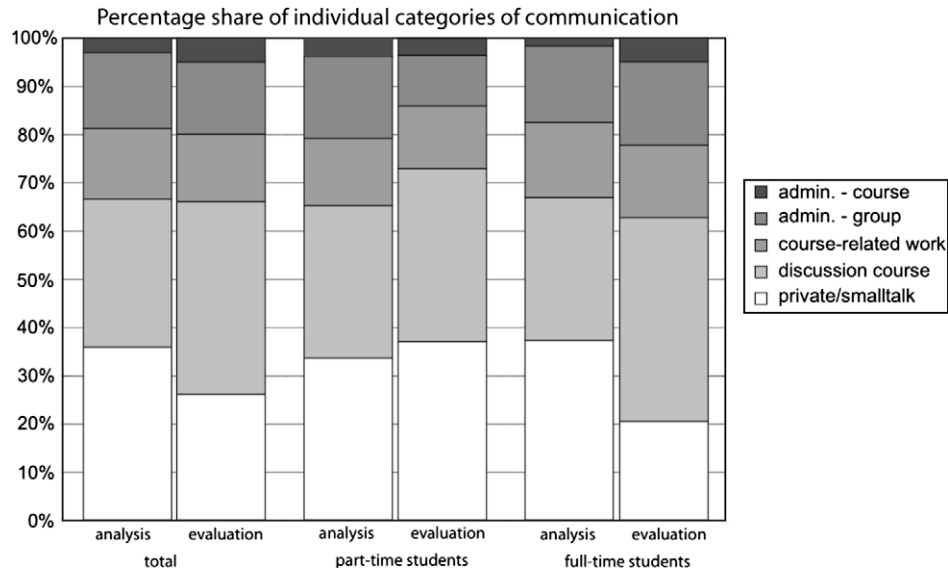
Fig. 3. Comparison between students' self estimation and analyses.

The exchange of information within 140 characters requires competency and the ability to focus and express oneself clearly. In addition, the ability to trace information exchange throughout several micropostings presents a challenge.

5.3. Murmuring in the background or the continuous partial presence

Microblogging is based on the principle of friends and followers – anyone can be following anyone and all friends' updates (new posts) are displayed in an endless stream. It is easy imaginable that an increasing number of friends makes it almost impossible to read the huge number of posts. Consequently many users unfamiliar with microblogging systems report an unwieldy information flow, known as information overload. Otherwise this kind of information stream can be described as constant murmuring in the background.

The function of communication by this understanding is exclusively social – an exchange of trivial information. Malinowski (1922) referred to this as a "phatic function." It serves to keep in contact with others and as an assurance of group identity.

Students and teachers alike are living in a continuous partial presence with different roles. Especially when they send a post, nobody knows whether anyone will respond, or even read it. In the face of this uncertainty, communication by means of these applications is arbitrary. Posts are read by other participants and this therefore is a strong indication of informal learning.

5.4. Evaluation results

At the end of the course a paper-based survey of 32 students was carried out to ask the student's opinion on the use of microblogging for process-oriented learning in general. The survey also addresses how the students estimating the proportion of time spent on each category.

Fig. 3 shows how the students (of both groups together, part-time students only, and full-time student only) thought what they were doing on the microblogging platform. With reference to the categories defined in Section 4.1, learners were asked to provide their personal opinions about their activities during the previous weeks. The result is compared with our analysis.

The full-time students estimated the proportion of private communication as decidedly lower and the proportion of discussion as higher than was demonstrated in our analyzed results. This could be a result of social expectancy. The differences among the student groups are not significant.

It can be shown that in general learners were able to estimate the usage quite well. If the categories pm and dm are summarized, the result is nearly the same. This leads to the assumption that the students subsequently felt good about using the tool. Therefore one of the aims of the course, "to provide a feeling for the potential of new media" was fulfilled.

6. Conclusion and future work

The use of a microblogging tool in a course to foster informal and process-oriented learning led to interesting results. At the end of the course it was shown that microblogging is indeed a new form of communication. It is not the transfer of information or status messages that are crucial factors, but rather, the opportunity to be a part of someone else's process by reading, commenting, discussing or simply enhancing it. Microblogging can help users to be partially and virtually present and to be part of a murmuring community, that is working on a specific problem without any restrictions of time and place.

According to this result following potential for microblogging can be noted:

6.1. Informal learning by microblogging

As the results of the survey showed, microblogging is used for project-oriented communication as well as for private informal communication. The relevance of informal learning is as an easy exchange, in addition to formal communication, which supports social

interactions in group work. In this way the opportunity for informal communication and the use of the tool according to individual needs is considered an important factor for the acceptance of microblogging in formal education. In contrast, too many restrictions (formalisation) prevent informal learning.

Essential to student motivation is also the (rapid) feedback of other students or teachers and the connection between formal learning in lectures and informal learning in practice (transfer of knowledge).

6.2. Process-oriented learning by microblogging

Microblogging supports process-oriented learning by a constant information flow between students and between students and teachers. Posted thoughts and "information pieces" make it possible for users to participate with others in their thinking. In addition, initially discarded thoughts can be picked up and developed by others.

For other students, and especially teachers, the students' learning and working processes become more transparent. The teacher can intervene ad hoc and correct the direction of learning. In addition, there is also greater transparency in terms of the individual contributions within such a group, so that a fairer grading of individual performance becomes possible.

To summarize, the successful use of microblogging and the increasing value that results for students and teachers from the use of microblogging is substantial. For the students this can be summarized in the following points:

- Informal learning through informal communication.
- Support of collaboration.
- Feedback on thoughts.
- Suggestions to reflect one's own thoughts.
- Collaboration independent of time and place.
- Direct examination of thoughts and causes of learning.
- For teachers the following factors are crucial.
- Current information on the status of learning.
- Possibility to steer the intervention in the learning process of individuals and groups.
- Possibility for immediate, direct feedback.
- Facilitation of student group work.
- Getting an impression of the learning climate.

It can be concluded that microblogging has great potential for the future by expanding teaching and learning beyond the classroom. Further research work is needed to indicate how its use can be improved. This should examine the use of mobile devices as well as different strategies to manage the information flow.

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