



“Pedagogical tweeting” in higher education: boon or bane?

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Abstract

Social media have become widely adopted by the current generation of students. Yet, not every social media tool is as popular as others; for instance in 2016, 74.4% of Flemings ever had an account on Facebook, only 34.1% were once active on the microblogging platform Twitter. However, Twitter might have advantages over Facebook as a didactic agent in higher education. To date, research results on the added value of Twitter as a learning and teaching tool are still ambiguous. Therefore, this paper describes two interventions, which are evaluated using a mixed methods approach, to determine higher education students' expectations and experiences about using Twitter for educational purposes. Results indicate that although students had moderate to high initial expectations about using Twitter in higher education, they were rather skeptical about this tool after using it. The most critical obstacles formulated by students were competence frustration, (information) overload, and extrinsic motivation; that were taken into account by designing the second, follow-up intervention. The results of both interventions are presented and discussed. This study also highlights practical implications regarding the educational use of Twitter as well as suggestions for further research.

Keywords: Higher education, Social media, Twitter, Mixed methods, Expectations and experiences

Introduction

How to satisfy our “digital natives” in higher education?

Students grow up in a digital world in which they are frequently confronted with technologies. Of the range of recent technological developments, social media - of which Facebook, Twitter and YouTube are known examples - have become the most widely adopted by the current generation of students (Evans, 2014; Osgerby & Rush, 2015). People born after 1980 are consequently often labelled as “digital natives” (Prensky, 2001). Due to social media, the ways in which students communicate, collaborate and learn are transforming (Tess, 2013). Some scholars (e.g., Bennett, Maton, & Kervin, 2008; Kvavik, 2005), therefore, expected that “digital natives” prefer the use of technology in the classroom. As a result, the added value of social media to enhance teaching and learning in higher education has received increased interest in research (Tess, 2013). Yet, it has to be noted that the idea of the existence of a generation of “digital natives” is a debatable thought (Bennett et al., 2008). Previous research has often shattered the myth of “digital natives” and concluded that growing up in a digital

environment is no guarantee of having the same experiences and needs regarding the use of technology in education (Bennett et al., 2008; Kvavik, 2005; Raes & Schellens, 2011). Since there is a growing body of literature that shows a more diverse view of technology use of young people and demonstrates that a significant amount of them have less developed technological skills than might be expected of digital natives (Bennett et al., 2008), this study is important to unravel students' expectations and experiences about using Twitter for educational purposes, as educational changes cannot be based solely on the supposed needs of this new generation (Bennett et al., 2008).

Why using Twitter in higher education?

Twitter is a microblogging social networking platform which combines the opportunities of blogging and instant messaging (Tang & Hew, 2017). Several studies (e.g., Junco, Heiberger, & Loken, 2010; Menkhoff, Chay, Bengtsson, Woodard, & Gan, 2015; Welch & Bonnan-White, 2012) indicate that Twitter has started to be used in higher education. Menkhoff et al. (2015) appoint this innovation as "pedagogical tweeting".

In existing research, both benefits and pitfalls of using Twitter in higher education are reported. Some benefits of Twitter are: (1) students learn to write concisely thanks to the word limit of tweets (i.e., 140 characters), (2) better relationships and communication between students and teacher(s), (3) supporting formal and informal learning, and (4) enhancing social presence of students and teachers in broader research and academic communities (Dhir, Buragga, & Boreqqah, 2013). Nevertheless, as previous studies show, these advantages are bound by a number of conditions. For example, a study by Menkhoff et al. (2015) suggests that the teacher's behavior on Twitter is a critical enabler of students' engagement as learners expect active involvement of the teacher in the tweeting process. Concerning students' motivation to use Twitter, not only the (rapid) feedback of fellow students or teachers that moreover contributes to community building (Wakefield, Warren, & Alsobrook, 2011) is important, but also the connection between formal and informal learning (Ebner, Lienhardt, Rohs, & Meyer, 2010; Kassens-Noor, 2011). As Ebner et al. (2010) stated, students' acceptance of microblogging in formal education is also determined by both the opportunity for informal communication between students and the use of the tool according to individual needs. However, the use of Twitter may not feel as "log-in overload", as students are already encouraged to follow up an online course management system, university email system, textbooks, study aid websites, etc. (Welch & Bonnan-White, 2012). In accordance with this finding, in research of Fox and Varadarajan (2011), students indicated that the large volume of tweets to read was sometimes overwhelming. Additionally, other possible pitfalls of using Twitter were listed by Dhir et al. (2013), namely (1) wasting time as students write irrelevant tweets, (2) constraints towards freedom of expression and weakening of students' grammatical skills because of tweets' word limit, and (3) privacy related concerns due to the open accessible nature of Twitter.

In sum, educators who want to use Twitter must balance the positive aspects of this tool with potentially negative features (Fox & Varadarajan, 2011). Although several studies describe the use of Twitter in educational contexts, much uncertainty still exists about students' attitudes towards "pedagogical tweeting". Whereas Tang and Hew (2017) established that most studies (e.g., Bista, 2015) report positive results regarding

learners' interaction with Twitter, Osgerby and Rush (2015) emphasized that students' enthusiasm and motivation vary. Moreover, Thoms (2012) noted a downward shift when comparing students' perceptions before and after using Twitter in an educational context. Because of these contradictory results, two consecutive interventions were set up during a Bachelor course in Educational Sciences to broaden research on both students' expectations and experiences about "pedagogical tweeting".

Purpose of the intervention studies

The Bachelor of Educational Sciences training program aims at providing students with a deep understanding of pedagogical research and enabling them to acquire a critical and personal view on both theoretical paradigms and research approaches in educational sciences (Ghent University, 2017). To reach this goal, education-related discussions via Twitter can be suggested. This study was organized to design and evaluate such an educational intervention throughout a pilot and one iteration. An overall research objective was to formulate design principles and implications for future implementation and research, based on the answers to three research questions:

RQ1: What are students' prior experiences with and expectations about Twitter (in higher education)?

- a. *What is students' initial status of Twitter use in general?*
- b. *What are students' expectations about using Twitter in higher education?*

RQ2: How do students use Twitter in the context of the course?

- a. *How do students experience "pedagogical tweeting"?*
- b. *How motivated are students to use Twitter as teaching and learning tool?*

RQ3: How did the experience with Twitter in education affect students' perceptions of using Twitter to support course learning, interaction, and community building?

Methods

Context & participants

The intervention studies were conducted in the context of the third year Academic Bachelor course "Instructional Strategies" taught at the Faculty of Educational Sciences of Ghent University. As shown in Table 1, both study groups were similar. A few students dropped out because of discontinuation of the course.

This study was situated within a blended learning environment in which face-to-face synchronous learning during the lectures and workshops were complemented with

Table 1 Descriptives of the participants

	Pilot: Academic year: 2015–2016	Iteration: Academic year: 2016–2017
Number of participants	59 students (including 5 dropouts)	58 students (including 1 dropout)
Mean age	22 years ($SD = 4.38$) (min. 20, max. 51 years old)	22 years ($SD = 3.46$) (min. 20, max. 44 years old)
Gender	91.5% female students ($n = 54$), and 8.5% male students ($n = 5$)	84.2% female students ($n = 48$), and 15.8% male students ($n = 9$)
Background	42.4% regular students ($n = 25$), 57.6% professional bachelor background ($n = 34$)*	38.6% regular students ($n = 22$), 61.4% professional bachelor background ($n = 35$)*

*Regular students started at university immediately after their secondary education program. Students with a professional bachelor background can also enter the university program after completing a preparatory course

some asynchronous group and individual work. In particular, in both studies, Twitter was implemented complementary to the main curriculum with predominately synchronous face-to-face activities. Within the course “Instructional Strategies”, students were asked to register on Twitter if they did not have an account yet. The examination for this course was a combination of permanent (50%) and periodic (50%) assessment. The “pedagogical tweeting” exercise was part of the permanent evaluation. Consequently, the use of Twitter was made mandatory to conform to the design principle suggested by Tang and Hew (2017) that students are tended to rate Twitter more positively and use it more frequently in the case of mandatory use compared to voluntarily use. Therefore, the teacher, the students and the teaching assistants were encouraged to use Twitter frequently with the aim to reach the following objectives:

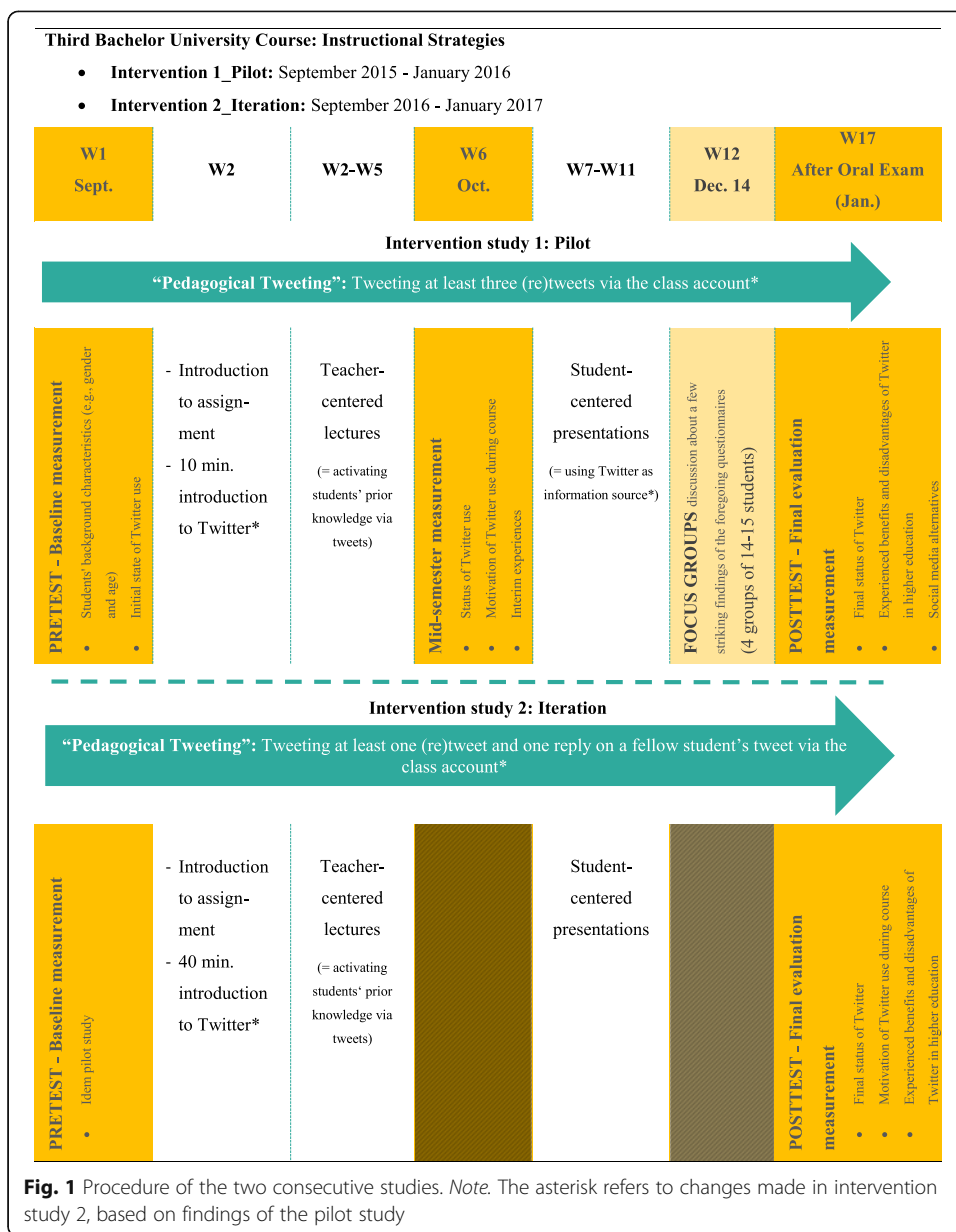
- 1) *Activating prior knowledge* about lesson topics. Before some lectures, a corner of the veil was raised via the Twitter class account. For example, a short video about problem-based learning was spread via the class account several days before the lesson about this topic.
- 2) *Increasing interaction and discussion* within and without lectures about tackled lesson topics and broader actual educational topics.
- 3) *Increasing community building* within both the student group and the broader educational community since many important educational organizations and influential persons (cf. the Minister of Education) have a Twitter account.

Procedure

As displayed in Fig. 1, the intervention studies ran over a whole semester in two consecutive academic years. To uncover students’ initial status of Twitter use and their expectations, a pretest was administered before the lessons started. During the second lesson of the course, the students got briefly introduced to the task assignments and became acquainted with the use of Twitter as the teacher showed the basics such as how to send tweets and to create a Twitter account. Based on the competence frustration experienced during the pilot study, this introduction has been expanded from a 10- to a 40-min workshop in the iteration study. During the first 6 weeks, students got the more traditional, teacher-centered lectures. Next to activating students’ prior knowledge about the lesson topics, students were already challenged to tweet by themselves during these weeks. In the pilot study, a mid-semester survey was sent out to gauge students’ first experiences. During week 7 till week 11, students gave a group presentation about an instructional strategy (e.g., Jigsaw and Philosophy for Children) that they had studied in depth. For this, students had been encouraged to check Twitter as an information source. In week 12, all students of the pilot study attended one of the four focus groups that were moderated by two of the teaching assistants. Finally, in both the pilot and the iteration study, a posttest was administered mid-January after the oral exam to uncover students’ final evaluations about using Twitter in higher education.

Measurements & analysis

Several authors (e.g., Cohen, Manion, & Morrison, 2011; Creswell, 2008; Greene, 2008) suggest the power of a mixed methods approach (i.e., the combination of quantitative and qualitative research methods) in answering research questions and in strengthening the inferences in both processes and outcomes of data analysis.



Quantitative data obtained through pre-, mid-semester-, and post-test survey

The pre-, mid-semester-, and post-test survey consisted of several sections (see Fig. 1), partly based on existing scales to measure perceptions about Twitter (e.g., Evans, 2014) and the self-determination theory (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009) to measure motivation for Twitter use. The surveys included both Likert-scale questions using six-point agreement levels from 1 (strongly disagree) to 6 (strongly agree) and open-ended questions. Online links to the surveys (with the aid of Limesurvey software) were sent to the students via the learning management system, and during the second intervention, announcements were sent via Twitter in parallel.

Qualitative data obtained through focus groups

In the pilot study, four focus group interviews were organized. To semi-structure these focus groups, a PowerPoint Presentation was prepared that included three major parts. During the first exploratory and introductory part (“digital natives, myth or fact?”), students were challenged to discuss whether they consider themselves as “digital natives” and to figure out which social media tools became part of their living environment. This discussion was introduced with the aid of both a video explaining the digital native idea and a slide about differences between “digital natives” and “digital immigrants”. Secondly, some notable results of the survey(s) were presented to uncover qualitative comments. In a final part, a discussion was held to reveal students’ suggestions about future use of Twitter and other social media tools in higher education. The one-hour focus groups were audiorecorded and fully transcribed afterwards. Based on the transcriptions, thematic analysis (Howitt, 2010) was used to generate common experiences of students about using Twitter during the course. By reading and rereading the transcriptions, the first two authors of this paper highlighted important statements in each transcript, compared these statements to those of the other focus groups, and cross compared them against each other. Through this process, initial codes could be granted to certain text passages. Next, the different codes were grouped in more general themes. Any new emerging data were compared to these preliminary themes. If necessary, new categories were created. All data were thoroughly analyzed through this iterative and bottom-up process by the first two authors. Discrepancies in the double coding were resolved through discussion until consent was reached.

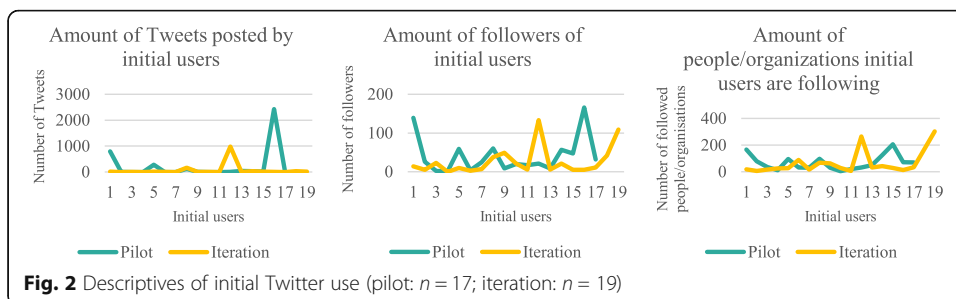
Results

In this section, the results of both consecutive interventions will be presented in parallel.

RQ1: What are students’ experiences with and expectations about Twitter (in higher education)?

What is students’ initial status of Twitter use in general?

The results of the pretest showed that, in both study groups, the minority of the students had a Twitter account before the course started: 28.8% in the pilot study, and 33.3% in the iteration study. As visible on Fig. 2, which illustrates (1) the amount of (re) tweets these initial users already posted, (2) the amount of followers the initial users have, and (3) the amount of people/organizations that students follow; there is a big difference in the degree of active involvement of students with prior Twitter



experiences. Only a handful of students is highly active on Twitter before the educational intervention.

What are students’ expectations about using Twitter in higher education?

All students were asked to complete the questions examining students’ initial expectations about “pedagogical tweeting”. Table 2 shows the results on provided statements and the asterisks indicate - based on a one-sample t-test - which statements significantly differ from the neutral score of ‘3.5’ on a 6-point Likert agreement scale. As illustrated in Table 2, students’ initial expectations about using Twitter for teaching and learning were moderately positive. For example, they believed that Twitter is a good tool to get insight into teachers’ and peers’ opinions, to close the gap between formal and informal learning, and to keep informed about education-related topics.

Table 2 Students’ initial expectations about the use of Twitter in higher education

Statement	Pilot (n = 59)			Iteration (n = 57)		
	M (SD)	t(58)	p-value (test value = 3.5)	M (SD)	t(56)	p-value (test value = 3.5)
Twitter can be an interesting tool for instruction.	3.49 (0.95)	-0.07	.95	3.33 (1.07)	-1.17	.25
Twitter can be interesting to get insight into fellow students’ opinions.	4.54 (0.80)*	10.07	.00	4.53 (0.93)*	8.35	.00
Twitter can be interesting to get insight into teachers’ opinions.	4.66 (0.84)*	10.58	.00	4.63 (0.93)*	9.11	.00
Twitter can be interesting to learn how to formulate your own opinion.	3.78 (1.18)	1.83	.07	3.72 (1.32)	1.26	.22
140 characters is not enough to react on an educational topic.	3.80 (1.23)	1.85	.07	3.65 (1.23)	.914	.37
Twitter can affect the productivity within learning and instruction.	3.08 (0.77)*	-4.13	.00	3.05 (0.83)*	-4.06	.00
Twitter can increase the flexibility within learning and instruction.	3.90 (0.92)*	3.32	.00	3.84 (0.84)*	3.07	.00
Twitter can favor the boundaries between students (i.e., group cohesion).	3.39 (1.00)	-0.85	.40	3.40 (0.99)	-0.73	.47
Twitter can make me more connected with the teacher and teaching assistants.	3.61 (0.91)	0.93	.36	3.67 (1.3)	0.97	.34
Twitter can close the gap between formal and informal learning.	4.17 (0.75)*	6.89	.00	4.23 (0.89)*	6.20	.00
Twitter is a good tool to keep posted about educational topics.	4.42 (0.95)*	7.46	.00	4.74 (0.99)*	9.42	.00
Twitter gives you the opportunity to follow important people.	4.83 (0.81)*	12.58	.00	4.88 (0.83)*	12.60	.00
Twitter can be a good tool to become acquainted with relevant expertise in our field.	4.02 (0.96)*	4.16	.00	4.30 (0.93)*	6.52	.00
Using Twitter in education can fade the border between education and private life.	4.10 (1.08)*	4.29	.00	4.35 (1.04)*	6.16	.00
Twitter can be a good tool to learn how to filter information.	3.59 (1.12)	0.64	.52	3.77 (0.91)*	2.26	.03
Twitter can be helpful to open your critical mind about education-related topics.	3.75 (1.18)	1.60	.12	4.21 (0.99)*	5.39	.00
Twitter can be helpful to broaden my professional network.	3.97 (0.96)*	3.71	.00	3.96 (0.98)*	3.58	.00
The added value of Twitter depends on how you personally deal with it.	5.32 (0.88)*	15.91	.00	5.12 (0.85)*	14.47	.00

* p < .05

RQ 2: How do students use Twitter in the context of the course?***How do students experience “pedagogical tweeting”?***

Regarding the people and organizations followed by the students, in the pilot 63.2% of the students started following the teacher and/or teaching assistants involved in the course, 70.2% started following people and/or organizations related to the broader educational practice and policy, and 49.1% started following non education-related persons and/or organizations. In the iteration, it concerns 73.7%, 87.7%, and 50.9%, respectively. In the context of the course, all students (re)tweeted, however, for the majority it was limited to the required number of tweets. In line with the fact that visiting Twitter did not become a daily routine for most students ($M = 2.18$; $SD = 1.82$) and they indicated that they had to encourage themselves to visit Twitter ($M = 4.39$; $SD = 1.41$), the tweets that the university teacher had posted to activate prior knowledge about specific course topics were rarely noticed.

Additionally, in the pilot study, students were also assigned to use Twitter as an information source in the context of their group assignment. A limited group of students ($n = 7$) admitted that they did not make an appeal to Twitter to search more information about the instructional strategy that was assigned to them. Other students especially used Twitter to get insight into both practical experiences of teachers with the specific instructional strategy and the opinions of leading persons in the field. Below, a few quotes of students are listed to illustrate this:

In the context of the group assignment, I used Twitter for discovering articles and quotes of people who have experiences with Jigsaw. It was interesting because we got acquainted with practical experiences in real classrooms instead of just reading scientific articles [student ID: 53].

Via Twitter, we checked the opinions of several people about philosophizing with children [student ID: 16].

In the iteration study, students were no longer required to make use of Twitter with respect to their group assignment; yet students were encouraged to do so.

How motivated are students to use Twitter as teaching and learning tool?

In the pilot study, students were rather extrinsically motivated to use this microblogging tool as they agree that using Twitter within this course felt like an obligation for them ($M = 4.51$, $SD = 1.21$). Based on this result, it was decided to decrease the mandatory Twitter activities during the iteration phase. Although students in the iteration study still experienced the “pedagogical tweeting” activities as an obligation ($M = 4.37$; $SD = 1.28$), they more agreed that the educational use of Twitter is interesting ($M = 3.86$; $SD = 1.20$) compared to the students of the pilot study ($M = 3.61$; $SD = 1.13$). Additionally, during the interventions, students mainly used Twitter in the context of the course (pilot: 76.6%; iteration: 78.9%), and less for private purposes. Results also indicated that most students (pilot: 61.7%; iteration: 57.9%) do not like using Twitter because of its public character. Moreover, about half of the students (pilot: 43.3%; iteration: 52.6%) declared being afraid to send “wrong” Twitter messages. The majority (pilot: 58.4%; iteration: 64.9%) also expressed that they feel unconfident to tweet due to a lack of knowledge about the several functions of Twitter. Consequently, 43.3% of the

students in the pilot study indicated that a longer training would be meaningful. Despite a longer training in the iteration study (see Fig. 1), 57.8% still expressed a need for more information about how using Twitter.

RQ 3: How did the experience with Twitter in education affect students’ perceptions of using Twitter to support course learning, interaction, and community building?

Quantitative results based on survey

To answer the third research question, the 18 statements of the pretest (see Table 2) were asked again in the posttest to uncover differences between students’ expectations about and students’ experiences with the use of Twitter in higher education. Based on paired-sample t-tests, significant differences with regard to six statements for both the pilot and the iteration study were found (see Table 3). Regarding some statements, students’ experiences were more positive than their initial expectation about the use of Twitter in higher education. For the pilot study, this was the case for students’ perception about the opportunity of Twitter to flexibilise learning and instruction, to learn how to filter information, and to get acquainted with expertise in the field. Additionally, another positive change is found in the iteration study in which students have experienced that Twitter is a good tool to keep posted about educational topics. Next, in the pilot study, students indicated that Twitter fades borders between education and private life more than they initially expected (see also #fading borders below). This result is in contrast with the perception of students in the iteration study. Another contradictory result concerns the opinion of students about Twitter as a tool to get insight into fellow students’ views. Whereas students in the pilot study expected more about this, a positive turn in students’ perceptions was found in the iteration study. After the experience with Twitter, students were less positive about the opportunity of this social software tool to get more connected with the teacher and teaching assistants.

Table 3 Significant differences between students’ expectations about and experiences with using Twitter

	Pilot (n = 54)				Iteration (n = 57)			
	Pretest	Posttest	Difference		Pretest	Posttest	Difference	
	M (SD)	M (SD)	t(53)	p	M (SD)	M (SD)	t(56)	p
Twitter is an interesting tool to get insight into fellow students’ opinions.	4.53 (0.82)	4.19 (1.00)	-2.34	.02	3.33 (1.08)	3.72 (1.01)	2.69	.00
140 characters is not enough to react on an educational topic.	-	-	-	-	3.65 (1.23)	4.47 (1.39)	3.83	.00
Twitter increases the flexibility within learning and instruction.	3.91 (0.93)	4.28 (0.99)	2.11	.04	-	-	-	-
Because of Twitter, I feel more connected with the teacher and teaching assistants.	3.57 (0.95)	3.19 (1.09)	-2.18	.03	3.67 (1.30)	3.19 (1.08)	-2.73	.00
Twitter is a good tool to become acquainted with relevant expertise in our field.	4.02 (0.95)	4.47 (0.95)	3.04	.00	4.30 (0.93)	4.58 (0.80)	2.25	.03
Twitter fades the border between education and private life.	4.06 (1.05)	4.38 (1.00)	2.02	.05	4.35 (1.04)	4.04 (1.05)	2.10	.04
Twitter is a good tool to learn how to filter information.	3.57 (1.10)	.00	-	-	-	-	-	-
Twitter is a good tool to keep posted about educational topics.	-	-	-	-	4.74 (0.99)	4.98 (0.81)	2.18	.03

Qualitative results based on focus groups

As mentioned earlier, focus groups were organized in the pilot study to get a more detailed picture of students' experiences with Twitter and their suggestions about the design guidelines for future interventions. Based on thematic analysis, six general themes were identified in the transcripts.

#fading borders, good or bad?

One of the objectives of implementing Twitter was to stimulate education-related discussions in a more informal way, outside the classroom. Based on the quantitative data, we noticed that students were of opinion that Twitter fades the border between education and private life. However, during focus groups, most students expressed that they did not prefer this. Students stressed that they will not share private things on Twitter since their teacher and teaching assistants can follow them (ST2_FG1). Based on several comments, we can conclude that students very much value their privacy; e.g., "This is a kind of threatening for me, that people can follow you just with a click. Personally, this goes too far for me, because this is my personal life in which people intrude" (ST3_FG1). Another student mentioned that she already had a Twitter account before the start of the Twitter exercise, but that she deleted two of her tweets about football since she thought "now with this exercise, my Professor and fellow students will be able to see this" (ST15_FG4). Another student explicitly stated that she does not like the openness of Twitter: "It took me till November before I tweeted my first tweet since I thought 'everyone can read this,' and I do not know all the persons who started following me and I do not know how I can block this" (ST8_FG2).

On the one hand, most students expressed that they approach Twitter as a professional tool compared to Facebook, which is especially used for entertainment (ST10_FG3; ST13_FG4; ST14_FG4). The preference to separate professional and entertaining affairs has frequently been stressed: "I want to structure it for myself, if I'm on Twitter, this is for school, otherwise there is no limit" (ST13_FG4). The majority did not prefer that school life become fused with their private life. On the other hand, two students made the possible benefits of this fading border explicit by stating the following: "Your study is not something that is disconnected with who you are. In this regard, using Twitter seems benefiting, you will reflect more about your study and the topics discussed within educational studies, also outside the school context." (ST11_FG4), and "Thinking about education should not be something that only happens in class settings, this is related with lifelong learning" (ST12_FG4).

#information and log-in overload

In line with the faded borders between private and school life, many students expressed a stressed feeling about the continued presence of Twitter: "Twitter creates a feeling that you should be available 24/24" (ST5_FG2). According to the students, this stressed feeling is related to information and log-in overload:

I followed several Flemish news channels like *De Morgen* [...], but when you open your Twitter, then you have to scroll down 20 times before you see something else. It is such an information overload and I did not find it convenient to use (ST21_FG2).

When you have the [Twitter] app on your smartphone, I have to switch off these announcements, because I really became paranoia of it [...]. You are required to read Facebook announcements, and emails of school, and Twitter for school [...]. I think that it became too much of everything (ST19_FG2, also ST20_FG2, ST21_FG2, ST22_FG3).

#extrinsically motivated

In accordance with the quantitative results, a lot of students stressed that “pedagogical tweeting” was experienced as an obligation. One student for example mentioned: “I often make to do lists, with things I have to do for school, and one of these things was ‘tweet!’, but this should be something spontaneously, no?” (ST29_FG3). The following statement is in line with this: “Using Twitter felt as an obligation [...]. I tweeted since we had to tweet, but nothing more” (ST25_FG1). Nevertheless, some participants also mentioned this obligation as a need to get acquainted with Twitter: “I agree that in the beginning it felt as an obligation, but I’m happy that I had this external stimulus to get acquainted with Twitter. I could already use it for different purposes. So thank you for introducing us” (ST30_FG3).

#competence frustration & #fear of failure

The experienced extrinsic motivation was possibly strengthened by the fact that most students were not used to tweet which resulted into competence frustration, as can be deduced from the following statement: “I found it difficult, because I’m used to work with Facebook, so I thought that Twitter would work in a similar way, but it is very frustrating, it is so different” (ST32_FG1). Another student (ST43_FG3) consequently indicated that more explanation about how to use Twitter would be useful. In other words, students did not feel prepared for “pedagogical tweeting”. Regarding some students, this ignorance also led to a fear of failure:

I found in literature that Twitter can break down barriers, that for example when someone is less active in a [face-to-face] group discussion, this will go easier via Twitter, but I noticed the reverse. You have to share it formally, and if you make a writing error, you cannot undo it. If you say something in a face-to-face group, it is gone after saying. Posting on Twitter is a little bit frightening (ST48_FG2).

#power of Twitter

Although many students raised their thoughts and even objections against using Twitter in education, in all focus groups also statements were made about the power of Twitter. This was described as follows:

In the beginning, I started with it from the idea “I need to do it” [...], but I notice now, especially last month, that I’m using it constantly [...]. I think you have to get used to it. For Facebook, it was the same in the beginning [...], but after some time... when you really use it, I have discovered the power of Twitter. Our local authority is only open on weekdays, in the afternoon, and I stay at a student room and I had to renew my ID card. I send a tweet to them with a picture of the opening hours and

the question “when have students who stay in student rooms to renew their ID card?”. And they responded “you can just call, we will open on a Saturday” (ST50_FG2 + ST 55_FG2).

Another student recognized both negative (e.g., the chaos and information overload on Twitter) and positive aspects of Twitter: “You expand your knowledge in various fields, not only in educational sciences [...], but also for sport and media, and indeed that is maybe confusing - there is not much structure - but it has widen my vision about everything” (ST58_FG4). Another student stressed that “because it is shorter, I’m informed more quickly than when I have to look on news websites” (ST62_FG4).

#relatedness

As illustrated in the quantitative data (see Table 3), according to the students, the power of Twitter also lies in the opportunity to get access to (educational-related) people and wider communities all over the world. If students experienced this interaction on Twitter, it was predominantly seen as a positive aspect:

When the terroristic attack in Paris just happened, I posted a related tweet: “How do you make it debatable in the presence of children?”. And then I also got a reaction like “talking is important, you can only talk about it”, and people also shared articles with steps to follow. I really liked it that people interacted with me (ST65_FG1).

I once tweeted @mnm [= Flemish radio station] and then Peter Van de Veire [= presenter of a radio program] reacted on my tweet. This is really cool; you can easily reach people who were out of reach in the past (ST68_FG1).

In the context of the pilot study, students also mentioned the absence of relatedness as a drawback: “The task was posting 3 tweets or 3 retweets and that is clearly vague. You can do what you want. But maybe if you had said ‘answer twice on someone’s tweet’, then you promote interaction between students” (ST76_FG1).

Discussion and conclusion

The microblogging software Twitter has been launched in 2006, but after 10 years into market it is still ambiguous whether teachers should invest in “pedagogical tweeting” or not (Menkhoff et al., 2015). Therefore, the present intervention studies, namely a pilot and an iteration study in which Twitter was introduced in a third year Bachelor course in Educational Sciences, were designed to determine higher education students’ expectations and experiences about the use of Twitter for educational purposes. Although adaptations were made to the iteration study based on results of the pilot study, there are no major differences noted in students’ expectations and experiences.

In general, whereas the results of this study indicate that students had moderate to high initial expectations about Twitter use in higher education, they were more skeptical about using this tool after the educational intervention. This finding is in agreement with research of Thoms (2012), however, most previous studies (e.g., Bista, 2015; Tang & Hew, 2017) mainly reported positive results regarding students’ attitude

towards using Twitter in education. Below, possible explanations for this overall result are summed up.

Compared to Facebook, Twitter is not the tool that young adults commonly use (Vanhaelewyn & De Marez, 2016). Consequently, only a minority of our participants had a Twitter account before the intervention, which clearly resulted into competence frustration during the interventions. Despite the training about “how to use Twitter”, which had been expanded from a 10- to a 40-min introduction in the iteration study, students (still) referred to the fear of sending “wrong” Twitter messages and their limited knowledge of specific Twitter functionalities. As mentioned by the participants themselves, a possible explanation for this might be that the duration of the intervention (i.e., 12 weeks) was too short to fully explore the microblogging tool. To challenge students to discover the educational added value of Twitter, upon recommendation of Tang and Hew (2017), its use was made mandatory during the course. Unfortunately, most students indicated that posting tweets felt as “one thing of the to do list for school”. Whereas Tang and Hew (2017) argued that students rate Twitter more positively and use it more frequently in the case of mandatory use, this study - in which the participants are extrinsically motivated to use Twitter - could not approve this finding. To stimulate tweeting in an intrinsically motivated way, the students suggested to promote relatedness. Confirming research of Wakefield et al. (2011), relatedness is interpreted by the participants as getting a response on your tweet instead of posting “lost tweets”. In this regard, according to Menkhoff et al. (2015), learners especially expect actively involved teachers. In this context, Dhir et al. (2013) moreover argued that Twitter is a good tool to enhance relationships and communication between students and teacher(s). However, before the intervention, the participants of the current study expected that Twitter would stimulate the relation between the teacher and themselves more than they had experienced during the intervention.

Although relatedness is seen as a prerequisite for using Twitter in education, attention must be paid to the border between education and private life. Whereas Ebner et al. (2010) stated that students’ acceptance of microblogging in formal education is, among other things, determined by the opportunity to use it for individual needs, most students are no proponents of fusing their private life with the public character of Twitter. Therefore, they will not share private things on Twitter since their teacher and teaching assistants can follow them. In previous research, Dhir et al. (2013) already expressed privacy related concerns. Another reason why the majority of students used Twitter only for educational affairs, and not for private purposes, is to avoid information overload. As indicated by some participants, it is difficult to see the forest for the trees when you start following, for example, news channels that post a lot of tweets per day. However, by ignoring non-educational aspects, it is interesting to note that our participants considered Twitter as a good tool to become acquainted with relevant expertise in the field as well as to keep posted about educational topics. This finding further supports the idea of Dhir et al. (2013).

Future research should be undertaken to investigate whether a longer time span (e.g., the complete bachelor or master program instead of only a one semester course) will lead to more positive Twitter experiences. Although many students had doubts about using Twitter in education, some of them discovered the power of Twitter in professional and private areas after using it in an intensive way during the intervention.

Long-term studies are needed to investigate if longer, more spread exposure would shift students' competence frustration into competence satisfaction, and stimulate students' intrinsic motivation. In line with this, the question raises whether or not teachers should use Facebook - a much more popular social network site (Vanhaelewyn & De Marez, 2016) - instead of Twitter. During the focus groups, it became clear that opinions are divided about using Facebook in the context of formal education. On the one hand, most students are familiar with the functionalities of Facebook which promotes the implementation of the tool. Moreover, as demonstrated by Moore-Russo, Radosta, Martin, and Hamilton (2017), a Facebook group in a higher education context could promote social connections among students. On the other hand, according to some students, the use of Facebook feels even more as an intrusion into your personal life than using Twitter. In the future, it is required to conduct a comparative study in which the pros and cons of several tools such as Facebook, Twitter or a forum on the learning management system are put side by side. In addition, the findings of this study must be interpreted with caution because data were collected in one specific setting, namely Educational Sciences consisting of predominantly female students. Expanding the intervention by involving other faculties, for example Communicational Sciences or Economics and Business Administration whose students probably are more intrinsic motivated to use Twitter, may generate different results. To the best of our knowledge, no previous research explored this difference, but the Digimeter (Vanhaelewyn & De Marez, 2016) indicated that Flemish media and technology consumers can be grouped into segments or media profiles.¹ It can be hypothesized that students from a certain faculty rather belong to a certain media profile. Next to a comparative study, future research should broaden the methodology to better grasp students' Twitter experience. Twitter analytics, as space, time and text content, can be translated into useful knowledge based on innovative methods in the field of data mining (Xiao, Attanasio, Chiusano, & Cerquitelli, 2017).

Notwithstanding these limitations and suggestions for future research, this study reaches a number of practical guidelines. First, organizing an extensive training session is necessary since students' basic knowledge about the functionalities of Twitter varies. Some students already sent a number of tweets and had a lot of followers; others did not have an account yet. While the digital native idea (Prensky, 2001) has already been subject for discussion in previous research (Bennett et al., 2008), our results confirmed that this cannot be generalized to all contexts. Due to social media, the ways in which young people communicate and collaborate outside higher education are extremely digital, yet, this did not transform the generation into "the digital students" who prefer the use of technology in education. A second implication is about the importance of community building, as also Wessner (2014) emphasized. This can be stimulated by an actively involved teacher, and creating Twitter-related educational activities that challenge students to interact with each other and broader learning communities. Third, a teacher has to think about mandatory versus voluntary Twitter use. Although in previous research (e.g., Tang & Hew, 2017) mandatory use is recommended, this study shows that it can be counterproductive by stimulating extrinsically instead of intrinsically motivation.

In conclusion, whereas Twitter can be an interesting tool to advance students' learning and academic experiences, the advantages of Twitter are bound by several conditions as

privacy related concerns. Although this work gave insight into how educators can use the microblogging technology in formal education, it still remains a search for suitable Twitter-related educational activities that positively influence students' experiences.

Endnotes

¹See <https://www.imec-int.com/en/digimeter-2016/digimeter-profiles>

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Availability of data and materials

The datasets supporting the conclusions of this article can be retrieved from the authors of this manuscript.

Authors' contributions

BA and AR conceived and designed the study. They explored existing literature, performed quantitative and qualitative analyses, and drafted the manuscript. As HM and TS are a teaching assistant and the responsible lecturer, respectively, of the course "Instructional Strategies", they were also involved in this study. All authors read and approved the final manuscript.

Authors' information

All authors were part of the department of Educational Studies of Ghent University (see institutional address below) on the moment that the data have been collected. However, Annelies Raes is now working at KU Leuven and she did revisions for this paper within this work environment.

Ethics approval and consent to participate

As prescribed in the ethical protocol of the faculty Psychology and Educational Sciences of Ghent University, it was not required to submit an application to the ethics committee for undertaking this study. Regarding the consent to participate, all the participants were informed as completely as possible about the aims and practicalities of the study during the first lecture of the course. All information was also individually provided at the beginning of each questionnaire. It was indicated that participation was voluntary and that (1) they could send an email to the first two authors of this manuscript in case of questions or the need for additional information, (2) the collected data will be saved, processed and reported in an anonymous way, (3) they could decline to participate at any time and this will not negatively influence their academic achievement; yet no students had decided to stop participating, and (4) a summary of the research results could be requested. Moreover, students were debriefed after participation during the last lecture of the course.

Competing interests

The authors declared that they have no competing interests.

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