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Article abstract

The main objective of this study was to analyse the influence of social media participation on academic performance. The sample consisted of 1960 students taking one of two courses at undergraduate or postgraduate level, respectively (Faculty of Education, National Distance Education University, Spain), of whom 411 students carried out an activity based on social media participation. We used a mixed quantitative (descriptive analysis and ANOVA) and qualitative (content analysis) design. Our results showed that the students who participated in a social media-based activity presented better academic performance than those who did not carry out any activity or who took part in a more traditional learning activity. We conclude that regardless of educational level, social media participation exerts a positive influence on performance. Consequently, it is important to consider the variable of social networking site use because this can partially explain academic performance. We also found that the networks generated during the course did not constitute stable communities of practice. Our main recommendation is that three stages of instruction should be considered when designing a course based on social media participation: beginners, intermediate, and professional.

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February – 2019

The Impact of Social Media Participation on Academic Performance in Undergraduate and Postgraduate Students



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Abstract

The main objective of this study was to analyse the influence of social media participation on academic performance. The sample consisted of 1960 students taking one of two courses at undergraduate or postgraduate level, respectively (Faculty of Education, National Distance Education University, Spain), of whom 411 students carried out an activity based on social media participation. We used a mixed quantitative (descriptive analysis and ANOVA) and qualitative (content analysis) design. Our results showed that the students who participated in a social media-based activity presented better academic performance than those who did not carry out any activity or who took part in a more traditional learning activity. We conclude that regardless of educational level, social media participation exerts a positive influence on performance. Consequently, it is important to consider the variable of social networking site use because this can partially explain academic performance. We also found that the networks generated during the course did not constitute stable communities of practice. Our main recommendation is that three stages of instruction should be considered when designing a course based on social media participation: beginners, intermediate, and professional.

Keywords: social participation, Twitter, academic performance, educational level

Introduction

Research into Higher Education affirms that online students demand more direct, more synchronous communications with teachers and classmates (Bonk, Wisher, & Nigrelli, 2006), and that use of synchronous tools in university-level distance education has been observed to be a motivating element for students, as it facilitates interaction within the working group and therefore cohesion and a sense of community belonging (Santoveña, 2012). Social networks such as Twitter provide an original framework in which to attempt to respond to students' new demands.

Research has pinpointed several variables that affect the performance of university students in general and of first year students in particular. One such variable currently considered of particular importance is social relations (Bond, Chykina, & Jones, 2017). It has been demonstrated that the social connections undergraduate students establish in their first few months of university life can exert an influence on their academic performance (Krasilnikov & Smirnova, 2017) due to the signal importance for these students of building a network of contacts, which can in turn help improve academic performance (Pascarella & Terenzini, 2005).

The use of social networking sites as part of the learning process is no longer a novelty, and increasing numbers of students (Dahlstrom & Bichsel, 2014; Karal & Kokoc, 2013) and teachers employ them in their daily academic work (Fox & Bird, 2017; Lupton, 2014). Consequently, it is essential to study their influence on academic performance. Various authors have highlighted the added value of social networking sites in education, their pedagogical potential (Durak, 2017), and their especially effective role in social learning (Johnson, Becker, Estrada, & Freeman, 2014). However, studies of the relationship between social media participation and academic performance have obtained conflicting results.

The goal of this study was to analyse the influence of social media participation, in this case using Twitter, on the academic performance of undergraduate and postgraduate students aiming to become education professionals (social educators, educationalists, and teachers in secondary education and/or vocational training), attending the National Distance Education University (UNED) Faculty of Education.

Literature Review

This study rests on the concept of learning as social participation, understood as a process "of being active participants in the practices of social communities and constructing identities in relation to these communities" (Wenger, 2001, p. 22). It is considered that to facilitate a space for direct, immediate interaction with teachers and students through Twitter reinforces a feeling of group affiliation that may help maintain the community of practice over time. We, like Wenger (2001), feel that an overlap exists between a community of practice and a community of learning, and that communities are made up of people who are participating in a collective learning process.

Mixed results have been found in regard to social networking site use in educational settings. Some studies have reported significant evidence concerning the negative relationship between social media and academic performance (Karpinski, Kirschner, Ozer, Mellott, & Ochwo, 2013; Paul, Baker, & Cochran, 2012; Rosen, Carrier, & Cheever, 2013). Paul, Baker, and Cochran (2012) found that devoting

time to social networking sites has a negative impact on academic performance. According to other studies, this negative impact mainly occurs when social networking sites are used in the classroom because multitasking diminishes performance (Bellur, Nowaka, & Hullb, 2015; Wood et al., 2012), and when the students involved are in their first year of university (Junco, 2015; Krasilnikov & Smirnova, 2017; Liu, Chen, & Tai, 2017). It seems that students who use social media spend less time studying, with an adverse effect on outcomes (Kirschner & Karpinski, 2010). However, other studies have found no relationship between the use of social networking sites and performance (Al-Bahrani, Patel, & Sheridan, 2017; Pasek, More, & Hargittai, 2009), and have even reported that responding to or posting tweets of an academic nature does not impair learning (Kuznekoff, Munz, & Titsworth, 2015).

Furthermore, some have suggested that social networking sites offer added value in educational settings, facilitating assimilation of this new knowledge on teaching practice and new educational methodologies and theories (Balakrishnan & Lay, 2016; Eid & Al-Jabri, 2017; Macià & García, 2016), and thus creating the conditions necessary for developing new methodologies (Putnik et al., 2016). The main benefits that social media offer in educational settings stem from their value as a tool for information exchange (Asterhan & Bouton, 2017) and as a means of socialisation and communication (Balakrishnan & Lay, 2016; Eid & Al-Jabri, 2017; Macià & García, 2016).

Social networks offer a unique opportunity to spur socialisation at university. The social interaction processes and patterns of information sharing that can develop on Twitter have a positive influence on the sense of community generated among students (Blight, Ruppel, & Schoenbauer, 2017). As Mamonov, Koufaris, and Benbunan-Fich (2016) assert, social interaction has a positive relationship with the sense of community on social networks. Social networks foster student interaction, thus generating higher levels of satisfaction and participation (Yu, Tian, Vogel, & Kwok, 2010), and students who have social networks, in addition to a virtual course, tend to finish their academic tasks and show greater commitment (Callaghan & Bower, 2012). In effect, the use of social networking sites seems to reinforce student commitment to and participation in academic activities (Alhazmi & Rahman, 2014; Tur & Marin, 2015). These studies found that satisfaction and participation were associated with improved performance. Some authors have highlighted the value of social networking sites as spaces that facilitate the development of cognitive abilities (Alloway, Horton, Alloway, & Dawson, 2013) and as a means to improve academic performance (Al-Rahmi, Othman, & Yusuf, 2015; González-Ramírez, Gascó, & Llopis-Taverner, 2015).

Various initiatives have spotlighted the benefits of microblogging. Such benefits include its ability to serve as a personal learning network (Mitchell & Powell, 2011) or as a space that facilitates debate and fosters student participation (Clarke & Nelson, 2012; Gao, Luo, & Zhang, 2012; Jones & Baltzersen, 2017). Others have highlighted the positive influence of Twitter use on academic performance (Clarke & Nelson, 2012; Khan, Wohn, & Ellison, 2014; Quansah, Fiadzawoo, & Kuunaangmen, 2016) and even on collaborative and reflective learning (Gao, Luo, & Zhang, 2012).

It is important to note that despite having found that social media use facilitates student participation, some reports indicate that the networks generated in this context do not constitute stable communities of practice, since students stop using the social networking site once the academic activity is over, at which point the teacher becomes no longer involved in the interaction (Lima & Zorrilla, 2017). These authors have suggested that in Spanish-speaking countries, student behaviour is regulated by teacher leadership and consideration as a source of reinforcement (Lima & Zorrilla, 2017). By themselves, networks alone do not reinforce student commitment; instead, this may be influenced by a multitude

of factors (Alhazmi & Rahman, 2014). As Henrie, Bodily, Manwaring, and Graham (2015) have indicated, in an analysis of continued student participation over time in virtual learning settings, it is important to bear in mind that the clarity of the instruction and the relevance of the activities exert more influence on student satisfaction than the medium used for instruction. Forbes (2017) has highlighted the importance in social media-based teaching of offering different types of support according to the students' experience and confidence with social media platforms. Forbes indicates that regarding Twitter, students may be classified as beginners (just starting Twitter activity), intermediate (attracting followers, among other aspects), and professional (learning through social networking sites).

Results indicating a correlation between social media use and performance should be viewed with caution. Despite having found a low correlation between both variables in the studies analysed, it is important to consider the variable of social networking site use because it can partially explain academic performance (Huang, 2018).

Research Question and Hypotheses

The main research question was as follows:

- Does student participation in social networking sites, in this case Twitter, influence the academic performance of undergraduate and postgraduate students?

The following hypotheses were derived from this research question:

- H1. Educational level (undergraduate or postgraduate) influences social media participation and academic performance.
- H2. Students who use Twitter show better academic performance than those who do not.
- H3. Instruction in social networking sites ensures continued student participation over time, after conclusion of the academic activity itself.
- H4. Instruction in social networking sites should include different stages adapted to educational level.

Methodology

Participants

This document examines the Twitter participation experience of the students of two different courses given at the Faculty of Education at the National Distance Education University (UNED) in Spain. The study population consisted of 2866 students, of whom 68.4% (n=1960) opted to take the course and comprised the study sample. Most participants were women (73.9%) and undergraduates (73.9%). Of the total sample, 14.3% (n=411) took part in a continuous assessment activity (CAA) based on participation in social networking sites. Sampling error was estimated on the basis of simple random sampling in the worst-case sampling scenario ($p=q=0.5$), obtaining an error of 1.2% for the sample of students taking the course and an error of 4.5% for the sample of students who took part in the social media-based CAA (Table 1).

Table 1

Study Population and Sample

Participants	Enrolled		Sat test		Completed CAA on TW	
	No.	%	No.	%	No.	%
Undergraduate	2090	72.9	1448	73.9	345	83.9
Postgraduate	776	27.1	512	26.1	66	16.1
Both	2866	100	1960	68.4	411	14.3
Sampling error			1.2%		4.5%	

Each course lasted one half-year term; the undergraduate course ran from October to January, and the master's degree course, from February to July. The objective of both courses is to train future education professionals. Both are core courses students must take, and both are based on a distance methodology in a process of autonomous, self-regulated distance education. Accordingly, students carry out the learning process on the basis of UNED's teaching model, where the established learning situations are virtual courses (for all) and guidance sessions (virtual and face-to-face sessions for undergraduates and virtual sessions only for postgraduates). The means of communication traditionally used at UNED in general, and specifically in the courses at issue here, are discussion boards linked to and forming a part of each virtual course.

The objective of course activities was to reinforce learning. The undergraduate students were assessed based on the outcome of a classroom test (an objective test featuring 20 questions with three multiple-choice answers) and the outcome of the voluntary continuous assessment activity, which was worth 20% of the grade. In the postgraduate course, the activities were mandatory and subject to grading. Two options were made available, a *Traditional* activity or *Twitter* activity, and students chose which kind of activity they wished to complete. This activity accounted for 30% of students' final grade, while a classroom test consisting of five questions, requiring short essays for answers, accounted for 70% of their final grade.

The CAA based on social media participation comprised two parts. The first part (analysed in the present study) was common to both courses and was aimed at teaching students how to post on Twitter and overcome any difficulties involved in maintaining an account. In addition, students were required to select resources of social, cultural and/or educational interest, and to include the course hashtag in their tweets. For the undergraduate course, the second part of the CAA consisted of using *Scoop.it* as a means to curate content, while for the postgraduate course, students were required to design a teaching plan for using social networking sites in the classroom. To sum up, the primary objective of the activities was to get the students started on acquiring competences for swift, effective social network management, learning to share information, and creating a community with shared interests.

Research Design and Instruments

A mixed quantitative and qualitative design was used, based on three types of analysis: statistical (descriptive and relational) analysis and content analysis. Data analysis was performed using the SPSS Statistics package, version 22. Data on academic performance were obtained from student marks (examination, CAA, and global evaluation), while data on Twitter participation were obtained from the application programming interface (API).

Data gathering began with the transcription of the lists of test grades and continuous assessment activity (CAA) grades at the end of the academic year (September). Data on Twitter participation were extracted in December 2017. Students' Twitter accounts were accessed and their activity (number of tweets, followers, followed, and likes) was recorded. In addition, we analysed continuity of Twitter activity once the course had ended (whether the Twitter account was still active in December 2017 and if students posted a tweet from their account in 2017).

Due to the temporary nature of Twitter data, data collection systems present limitations. The Twitter API limits the retrieval of tweets, depending on the number of messages sent; however, as Bruns and Stieglitz (2013) have noted, the data remain relevant for research despite their temporary nature. Furthermore, in order to retrieve all tweets or hashtags, it is necessary to rely on the API, as this is the only means to obtain large quantities of data. Researchers have no other means to confirm the quality and accuracy of the data, and this is therefore considered an inevitable limitation that does not invalidate the results.

Data Analysis

The quantitative study was conducted using descriptive analysis and a relational analysis. The latter was based on the contrast of means (independent samples t-test) and factorial analysis of variance (multivariate ANOVA). These analyses shed light on the influence on performance of the following variables: *educational level* and *type of continuous assessment activity*. We conducted a Spearman's correlation analysis of *Twitter participation*, *academic performance*, and *continuity of activity over time*.

The qualitative study consisted of a content analysis of the messages posted on the discussion board with questions about the Twitter-based CAA: this entailed objective reading of messages, encoding, subsequent grouping by thematic categories and quantifying the responses. In addition, we analysed the timing and organisation of the discussion throughout the semester.

Results

The study results are presented according to the hypothesis tested.

H1. Educational Level (Undergraduate or Postgraduate) Influences Participation and Academic Performance

Undergraduate students obtained significantly better marks for the CAA [$F(.018) t = -7.224$, sig. (bilateral) = .000], confirmed by the Mann-Whitney U-test (sig. 0.000). As regards social media participation, postgraduate students obtained a higher mean for tweets and likes, whereas undergraduate students had a higher number of followers and followed more Twitter users (Figure 1).

Significant differences were only detected in relation to the number of followers [$F(3,478) t = -2.254$, sig. (bilateral) = .025], confirmed by the Mann-Whitney U-test (asymptotic sig. (bilateral) = .003).

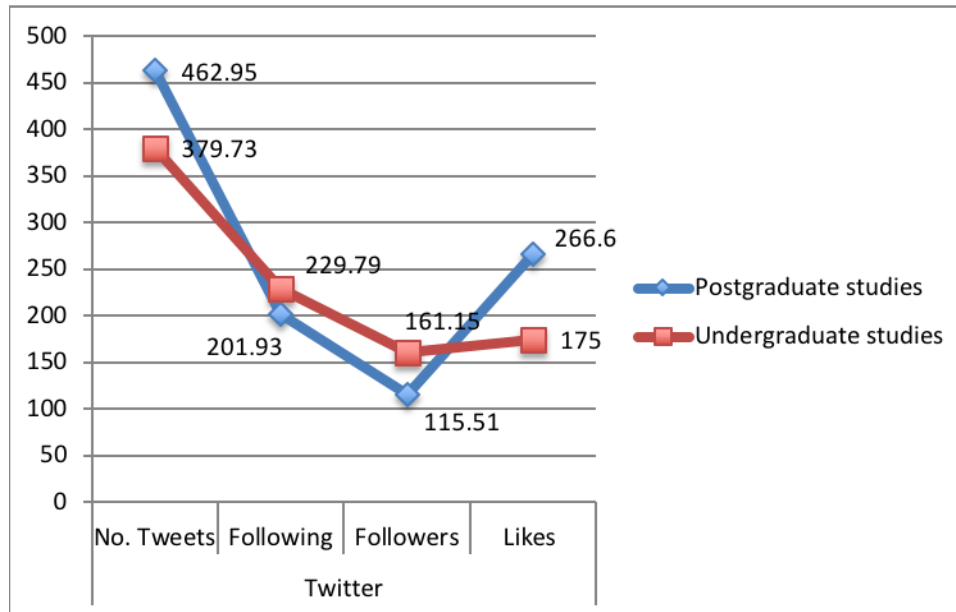


Figure 1. Descriptive analysis of Twitter participation (means).

H2. Students Who Use Twitter Show Better Academic Performance Than Those Who Do Not

A descriptive analysis showed that 56.3% of the students did not carry out any activity, 22.8% participated in the more traditional activity (analysis and evaluation of teaching materials), and 21% took part in the Twitter-based CAA.

The students who completed the social network-based activity were found to earn higher grades than the students who completed the more traditional activity or those who did not complete any activity. The differences were significant in relation to CAA and test grades ($[F(7,030)$, Sig. (bilateral) = .001]), confirming our findings as resembling those of Welch and Brown-Forsythe (sig. .000 y .0001). The post-hoc or a-posteriori tests (Bomberroni, Tukey and T2 Tamhane) found that the differences lay in the *test* grades of those who completed the *CAA on Twitter* and those who completed the *Traditional* activity (sig. .023), likewise those who *Did not complete CAA* (sig. .001). However, despite having significant differences, the estimate of the size of the effect of the analysis of variance shows a weak effect for the dependent variable “test grades;” only 0.7% of variance in test performance can be explained by the type of CAA completed (Table 2).

Table 2

Tests of Between-Subjects Effects: Estimates of Effect Size

Origin	Dependent variable	Type III sum of squares	df	Root mean square	F	Sig.	Partial-eta squared	Observed power ^d
Corrected model	TestGrade	40.8 ^a	2	20.4	7	0.001	0.007	0.92
	CAAGrade	31924.8 ^b	2	15962.4	14842.5	0	0.94	1
	FinalGrade	606.7 ^c	2	303.3	104.8	0	0.097	1
Intersection	TestGrade	63380.8	1	63380.8	21816	0	0.92	1
	CAAGrade	47391.4	1	47391.4	44066.6	0	0.96	1
	FinalGrade	73901.8	1	73901.8	25539.3	0	0.93	1
CAAType	TestGrade	40.8	2	20.4	7	0.001	0.007	0.92
	CAAGrade	31924.8	2	15962.4	14842.5	0	0.94	1
	FinalGrade	606.7	2	303.3	104.8	0	0.097	1

Note. a. R squared = .007 (adjusted R squared = .006); b. R squared = .938 (adjusted R squared = .938); c. R squared = .097 (adjusted R squared = .096); d. Calculated using alpha = .05

In addition, we found that although only 21% of students took part in the Twitter-based CAA, mean participation on this site was very high: 393.09 tweets sent, 225.31 followers, 153.82 Twitter users followed and 189.77 likes. A correlation analysis (Spearman's rho) between social media participation and academic performance revealed a significant correlation between all variables at a different level of bilateral significance (0.01 or 0.05).

H3. Instruction in Social Networking Sites Ensures Continued Student Participation Over Time, After Conclusion of the Academic Activity Itself

A total of 84.2% of students maintained their Twitter accounts throughout the academic year 2016-17; however, only 29% of the students posted a tweet in 2017 (Figure 2).

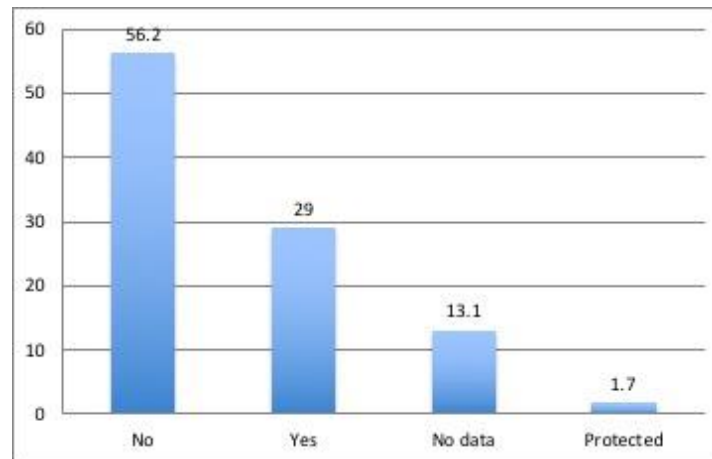


Figure 2. Messages sent from Twitter accounts in 2017 (percentages).

H4. Instruction in Social networking Sites Should Include Different Stages Adapted to Educational Level

A time analysis of student participation on the discussion boards showed falling use as the course progressed, reaching minimum figures in the last month. Participation in the boards was highest in the first month, when 50.7% of messages were posted (Figure 3). However, differences were detected between undergraduate and postgraduate students, whereby the former posted more questions at the beginning of Twitter participation, in the first month (60% of messages), whereas the latter were most active in the third month (41.23% of messages), one month before handing in the activity, mainly with the objective of renegotiating evaluation criteria with the teaching staff (Figure 4).

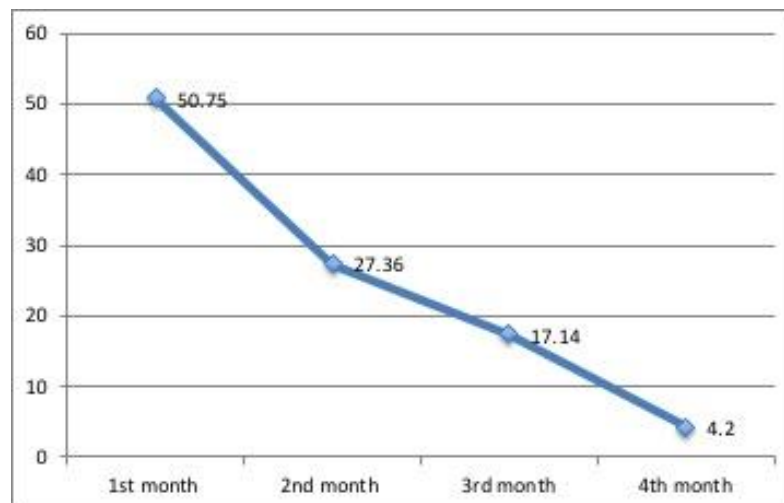


Figure 3. Time analysis of discussion board participation (percentage of messages posted on the boards).

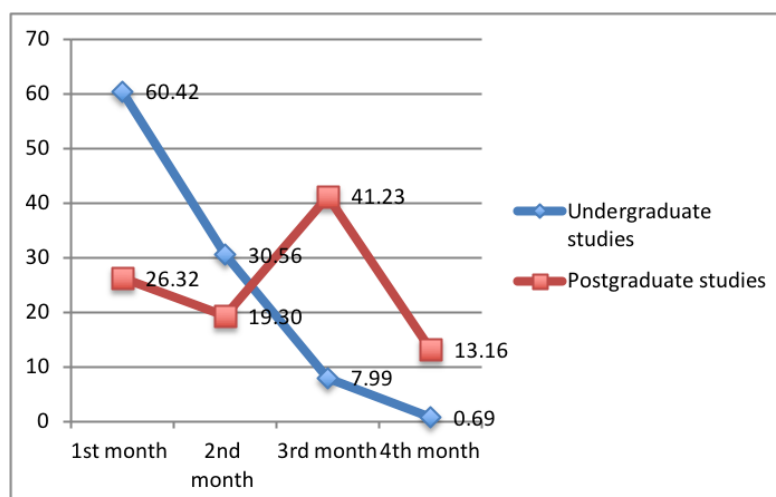


Figure 4. Time analysis of discussion board participation (percentages).

A content analysis of messages posted on the discussion board showed that for both courses, students tackled the activity in three stages: initiation, intermediate, and finalisation (Figure 5). However, each group gave more weight to a different kind of problem.

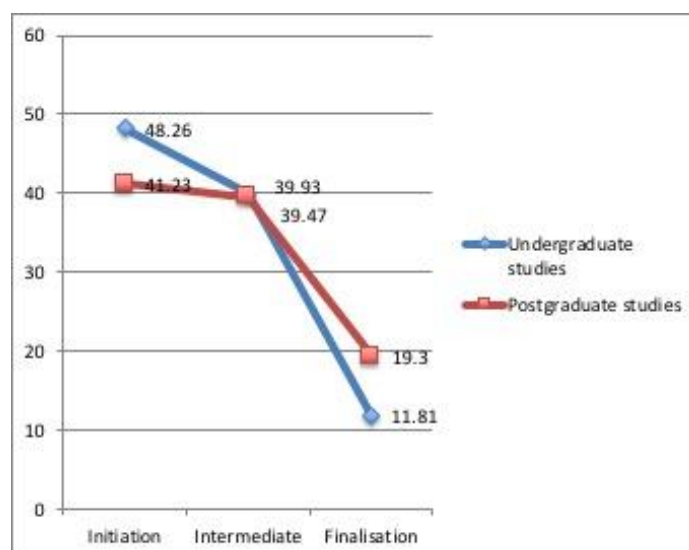


Figure 5. Stages of tackling the task: comparison of undergraduate and postgraduate students' discussion board activity (percentages).

Student Approach to Tackling Activities

Initiation stage: Starting the Twitter-based activity. Most of the students' discussion board activity occurred during this stage. This was when 46.27% of the messages were posted, and 68.9% of messages were posted during the first month of the semester. This thematic thread included various kinds of questions; however, all were related to starting work on the Twitter-based task. Most of the questions (32.9% of messages) were related to activity duration or clarifying when to start Twitter participation (e.g., Does the activity consist of consecutive or separate weeks? Have I spent the right amount of time on the task? What is the deadline for handing in work?) These were followed by questions on how to share Twitter addresses on a Google Drive file (27.27%), and thirdly, on how to

tailor the account topic (16%). Other themes included students' expectations and insecurities (7.4%) and questions about creating a specific Twitter account to carry out the activity (8.5%).

Undergraduate students' questions focused on problems related to sharing an address on Google Drive (17.36%). In 3.8% of messages, students expressed their expectations and insecurities about starting the activity with statements such as "I hope I'll pick all of this up soon," and "Actually, I feel a bit lost." In responding to these messages, teaching staff attempted to reassure students with statements such as "She doesn't seem lost to me. Quite the opposite. She's doing fine."

Postgraduate students' questions focused on the activity start date (20%) and duration (10%). We also observed that in April (a few weeks before the deadline for handing in work), postgraduate students returned to the subject of activity duration and timing with the aim of renegotiating evaluation of the CAA. For example, one student posted:

So here is how I see it: according to the task instructions, we had to use Twitter for at least three weeks. I opened an account yesterday for this activity, but there isn't enough time left now so I can't comply with the instructions. On the other hand, if I used my personal account, which has been active for longer, I could comply with them...

It was then explained by a teacher that in order to achieve the CAA objectives, students had to fulfil the requirements published in the course outline:

The activity must be carried out for at least three weeks, which is why it was set at the beginning of the semester. In fact, the most important aspect of the activity is to demonstrate an interest in interacting with peers throughout the semester.

Intermediate stage: Continuing to work on Twitter. The second highest amount of activity, accounting for 39.8% of messages posted by students throughout the semester, occurred during this stage. Activity was highest in the second (40%) and third (37.5%) months of the semester. Questions mainly concerned technical problems, how to carry out the activity (28.7%), how to use the course hashtag (20%), how to retrieve tweets (18%), and among postgraduate students, how to carry out the second stage of the task (18%). Other questions focused on how to attract followers on Twitter (10%) and how to compile a report on the bibliographical references (4%).

Undergraduate students were more uncertain about how social networking sites functioned, experienced more technical problems, and presented a greater tendency to seek approval from the teaching staff and confirmation that they were doing the activity correctly. Some 16% of their messages were related to this subject ("When I changed my account from Yahoo to Gmail, Twitter blocked it as suspected spam ... I haven't been able to fix it.") Teaching staff responded to these questions by providing guidance, reminding students about the supporting documents available to them with statements like "don't forget to look at the course outline, the discussion board and the video tutorials." Students also had questions about how to use the course hashtag in their tweets (11.11%), such as where to place it, what kind of tweets to include it in, in tweets like: "Thanks for following me," and "Go guys! We can do it!" They also needed advice on how to attract followers and find other users.

The postgraduate students did not ask many questions about technical issues, attracting followers or using the hashtag. 25.4% of students asked about the design of a social media-based teaching plan, for example, one student asked "In the section 'General objective of the plan' do we need to describe the

goals pursued?” 6.14% of messages concerned the bibliographic references required to document the work, with questions such as “in the part on Twitter references, do we put the links we’ve visited that gave us ideas?”

Finalisation stage. There was less activity on the discussion boards during this stage, which accounted for only 13.93% of the messages posted and took place in the third (25%) and fourth (14%) months of the semester. Questions were raised about the report to hand in (42%) and evaluation of the activity (25%). Some 32% of discussion board activity focused on a thematic thread created by the teaching staff, concerning application of knowledge.

Both groups of students asked about how to compile the final report necessary to pass the CAA (the sections to complete, how to send it through the virtual platform, etc.). Undergraduate students asked more questions about the evaluation process than the postgraduate students. In order to encourage student participation on social networking sites, teaching staff provided information about other tools that complement Twitter, for example, *ifttt* (to synchronise different social networking sites), *Klout* (to see the impact of each account), *Topsy*, *Twittercounter.com* (to collect Twitter data), and *Scoop.it* (to publish on different networking sites).

Discussion and Conclusion

The undergraduate and postgraduate students had similar outcomes in terms of performance and Twitter participation. Therefore, *hypothesis 1* is not confirmed, and it is concluded that educational level does not influence social media participation or academic performance. Comparison to detect differences between undergraduate and postgraduate students enables teaching staff to adapt social media participation activities where necessary to suit students’ educational level and to ascertain if, in the course of their university experience, students develop a greater disposition to embrace new forms of networked social interaction. The data indicate that the Spanish university system does not seem to have favoured student predisposition to collaborate in social learning processes. In fact, it was found that postgraduate students chose to do a more traditional activity of analysing and evaluating teaching materials, which consisted in a solo project instead of networked interaction. Obviously, the attempt failed to reach the majority of the students and failed to instil an interest in social media participation. The outcome disconfirms previous studies suggesting that students are increasingly choosing to use social networks (Dahlstrom & Bichsel, 2014; Karal & Kokoc, 2013) as in the courses at issue here the majority of students chose to complete no activity at all, and only 21% chose *CAA on Twitter*.

The students who completed the CAA on Twitter displayed significantly higher test grades and final grades; however, the effect of activity type on performance was weak. Therefore, our conclusion is that, even though there are significant differences, the type of activity completed does not have a strong influence on student performance. On the other hand, it was found that, the more students participated in Twitter, the greater their performance, and vice versa. Social media participation over Twitter could provide added value for the Spanish education system by offering students the possibility of enriching their online social capital, as highlighted by authors such as Jones and Baltzersen (2017). In short, the data do not allow us to confirm *hypothesis 2*, because Twitter participation had only a weak influence on academic performance, but sufficient signs do exist to consider social network participation a means that can facilitate learning, as affirmed by Al-Rahmi, Othman, and Yusuf (2015), among others.

Academic instruction concerning social networks, more specifically Twitter, was found not to guarantee social network participation over time beyond the end of the academic activity in question. Although most students maintained their Twitter accounts, we observed that over half ceased active participation once the academic activity had ended. Only 29% of the students posted messages on Twitter in 2017. These results are consistent with those found by authors such as Lima and Zorrilla (2017), and in line with their argument, we conclude that cultural variables may have influenced these results: in Spanish-speaking countries, student behaviour is regulated so by teacher leadership and consideration as a source of reinforcement than by socialization with peers. As noted by Alhazmi and Rahman (2014), it is important to bear in mind that social networking sites by themselves cannot explain student commitment. Furthermore, as indicated by Henrie, Bodily, Manwaring, and Graham (2015), in order to analyse continuing student participation, it is necessary to consider variables such as the clarity of instruction and the relevance of the proposed activities. It is possible that the proposed Twitter activity on the courses analysed lacked relevance, which could explain this lack of commitment to and participation on social media. The Twitter activity had a primarily practical, functional focus. Its objective was for students to learn to interact on Twitter and form a community. The activity may need to be redesigned to give a more analytical focus, requiring students to engage in a more reflective, more critical kind of participation based on academic discussion processes on Twitter. Discussions could be scheduled throughout the academic year, and teaching staff intervention on Twitter could be changed from an *observer* role to a *participant* role, where teachers could interact more with students. Thus, it would be possible to analyse whether this type of activity influences performance and what influence the teacher's role has on social network participation by distance university students. We therefore conclude that the networks generated did not constitute stable communities of practice. Hence, *hypothesis 3* was not confirmed.

Lastly, when designing a learning activity involving social networking sites, it is essential to incorporate the three stages proposed by Forbes (2017) (beginners, intermediate, and professional), since we observed that students tackled the task in these three stages. Although our quantitative results suggest that educational level affects neither performance nor participation, our qualitative study indicates the need to offer different scaffolds according to educational level. In the initiation stage, undergraduate students experienced more basic problems; therefore, instruction at this stage for these students should focus on and address these problems. This is especially important in the first month of carrying out a social media-based activity in order to prevent disengagement and ensure continuity, since this month was when most activity occurred and exerted a decisive influence on effective implementation of the task. Among other things, the timing of the activity should be made very clear to the students at this point. In the intermediate stage, our undergraduate students were unsure how to use a hashtag or attract followers, indicating that attention at this stage of a social media-based activity should focus on technical problems and how social networking sites work. Technical support and answering questions about how to carry out the activities are the main functions in the intermediate stage. Our undergraduate students were more uncertain about how social networking sites functioned, experienced more technical problems and presented a greater tendency to seek approval from the teaching staff and confirmation that they were doing the activity correctly. This aspect should be borne in mind when designing an activity. In the finalisation stage of carrying out social media-based activities, we observed less activity on the discussion boards, and the main questions raised by students concerned evaluation of the activity and the final report to hand in, rather than seeking further knowledge about social networking sites. We conclude that the students did not show a very high level of interest in the acquisition of knowledge. *Hypothesis 4*, that instruction in social networking sites

should include different stages for students at different educational levels, was confirmed, since although both groups tackled the task in the same stages, their questions reflected different themes.

In short, as Huang (2018) affirms, outcomes indicating a relationship between social network use (in our case Twitter) and performance must be viewed with concern.

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