

Universities behaviour and opportunities on Twitter

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Abstract—This research is focused on analyzing the main trends of Twitter usage of the first 200 universities in the Shanghai Ranking and identifies some of the opportunities that these universities can obtain.

The statistical analysis of their Twitter accounts -number of followers, tweets, retweets and hashtags- show two basic tendencies: the first one consists in the promotion and consolidation of his corporate image and the second one is related with communication between the members of the educational community. Besides, the results demonstrate that the biggest presence and activity in Twitter is related with their followers number. The best universities in the mentioned ranking have more users, implying greater activity and increased publication of tweets and retweets.

The widespread use of Twitter made by these universities demonstrates the utility of the opportunities that Twitter offers them to improve their visibility, promote their services and encourage communication among their members. Nevertheless, universities must learn how to manage their official account effectively facilitating formulas that help monetize their social capital, involving their managers as corporate strategy to increase its 2.0 reputation, and towards teachers and students providing an agile interaction that should include the collaborative construction of knowledge.

Keywords-Social networks; Twitter; universities; higher education; communication

I. INTRODUCTION

Web 2.0 is an ecosystem in which any user can contribute and share content in a creative way [11], [14]. So this ecosystem becomes a new scenario for teaching-learning processes [15] and makes an interesting contribution to the creation of knowledge [35], [41]. Universities consider that Web 2.0 is a valuable source of information so they participate in social networks with their educational community members

[4], [16] and besides, universities keep an updated profile and interact with the users reaching a quick and direct feedback. All of these activities help universities to improve their corporate image [22], to optimize their service strategies and to foster the participation of the educational community. For this reason, it's valuable to detect the universities behavior regarding their use of social networks, especially Twitter, in order to use them as communication channels.

This article focuses on the study and identification of the variety of Twitter uses in the international university context by showing the main usage trends. More specifically, we analyze the importance given by universities to Twitter as a means to promote their corporate image through the publication of institutional information and the opportunities that appear for universities. First some general considerations on the use of Twitter are carried out at the University level. Next, it is described how universities leverage Twitter usage both to encourage participation among members of the educational community, as to disseminate information about their services and academic activities.

To do this, we analyze the behavior of the sample composed of the top 200 universities in the Shanghai Ranking [2] with respect to their behaviour on Twitter, using Multivariate analysis techniques. Finally, following the results and discussion section some opportunities are mentioned and the opportunities offered by Twitter to universities are outlined.

II. LITERATURE REVIEW

A. Twitter opportunities for higher education

Twitter facilitates interaction between its users [9]. Two major advantages it offers: the use of tweets, which are short phrases of a maximum of 140 characters [4], [40], which reflect the personal opinions and can include links, photos or videos; and the use of hashtags (words or phrases preceded by “#”) in order to discuss certain issues or events [18]. Other basic features include: retweets, following, followers and lists.

Tweets enable online interaction to take place by means of reacting to this: a retweet consists of someone sharing a tweet and so information can be distributed virally [3], [4]. “Following” concerns being subscribed to the tweets of particular users and “followers” are those people who are subscribed to a particular account.

Twitter offers great attractions to Higher Education institutions:

- It's promoting easy interaction between teaching staff and students [20], [33].
- It enables direct access to messages which followers can comment upon and retweets immediately [34].
- Its documents conversations [1], [9].
- Its multimedia format encourages communication and participation [7], [14].
- It facilitates the creation of interest groups regarding various issues and events [17].

One of the goals of this paper is to check the level of fulfillment of these advantages by universities; basically it means to contrast the communication with their groups of interest and the publication of issues to promote themselves. However, it is important to study to what extent the universities take advantage of the potential of this tool.

1) *Twitter: communication between members of the university community*

Some authors have advocated the use of Twitter as a tool with which to exchange information, communicate and interact with students [7], [11], [26], [32]. Specifically, [26] maintains that Twitter enables its users to come together and discuss particular issues for its rapid form of interaction. [9], [34] recognize that it is useful in the university environment, as it facilitates the dissemination of information and it encourages debate between students interested in a specific issue [29]. In addition, technological communication tools such as Twitter facilitate learning through the participation of the community [28]. In general, Twitter encourages the exchange of opinions and enriching experiences between people participating in diverse groups and projects [29], [42]. The use of hashtags enables lectures, seminars, etc., to be transmitted in real time and opens up the possibility of making holding polls and formulating direct questions to the speakers.

The participation of the teaching staff on Twitter is becoming more and more important. Using a sample of 2000 tweets published by teaching staff, [12] found that lecturers encourage participation in educational communities. Twitter has proved to be useful in an academic setting as a medium in which students and lecturers can collaborate and discuss issues [7], [9], [42], and it can be even be used in the assessment of the performance of teaching staff and for the capture of feedback on courses.

The following are some of the opportunities Twitter offers:

- It can change the learning dynamic as it encourages communication and stimulates creativity and the imagination.
- It facilitates easy, entertaining and motivating communication.
- It enables experiences and opinions to be shared [42].
- It encourages co-operation in projects and assessment from experts [17].
- It generates interest, discussion and participation [29].
- It is an ideal with which to communicate with students [19].
- It offers a diverse range of issues to attract teaching staff and students to participate in micro- debates [4], [42].
- It improves interaction between members of the educational community [7].
- It is useful in acting as a catalyst to the teaching-learning process. Lecturers use hashtags to label the theme of the tweets and share them with the educational community.

2) *Twitter on the promotion and dissemination of institutional information*

Usually microblogs are used by universities to share and communicate news and various types of information [23], [30]. Specifically, Twitter facilitates the dissemination of information regarding lectures, courses, grants, etc., keeping users up to date with the latest news and encouraging their participation [10], [24] in forums, conferences and seminars [17]. It is used to invite the educational community to participate in activities of social interest [1]. It is also employed for promotional campaigns linked to consolidating the position of some universities in their region, to market their educational services, to increase competitiveness (for example, the Campus of Excellence Programme in Spain), to attract students, and to publicise the universities' cultural activities and issues related to the services they offer [10], [24], [25].

Teachers share information and resources related to their professional activity, request help, offer suggestions and contact other lecturers based in diverse geographic locations [21], [40]. Furthermore, it enables them to co-operate by taking advantage of the synergy of collective intelligence: it is an example of crowdsourcing in Higher Education [13]. It also encourages the participation of research groups and brings together professionals from diverse areas of knowledge that have complementary and enriching perspectives [9], [11].

On the one hand, the use of Twitter at universities can be attributed to its nature as a tool which facilitates didactic interaction, but it also makes communication within the university community more dynamic. This study focuses on this use, because it has been less studied, but also because of its importance in raising the profile of academic institutions and

creating relationships between members of the educational community.

B. Research Methodology: Institutional use of Twitter in universities

1) *Sample*: A sample formed by the 200 first universities in the Shanghai Ranking [2] and extracted from the 500 that constitute this population. So, from this sample, we have been able to identify priority uses of Twitter in ranked universities by the quality and impact of their publications. In addition, it has been possible to identify the most outstanding trends that are oriented for foster the communication and interaction between the university and to promote and disseminate their academic activities.

2) *Procedure*: First, we conducted a statistical descriptive analysis of the data obtained from the main account of each university on Twitter. The indicators used -tweets, retweets and hashtags- have yielded information about the activity of selected universities in Twitter, and some hints to glimpse the offered opportunities to monetize their social capital. The number of published hashtags in the accounts of the universities was classified according to their purpose: consolidating their presence, strengthen their corporate reputation and brand image of each of them, to promote communication and interaction between the members of the educational community, etc. All of this information made it possible to highlight two important usage trends. This prior analysis was partially corroborated by a later cluster analysis. The period of time in which data were collated was limited to the month of April 2012 in order to reduce the seasonal effect of periods without classes.

3) *Data collection tools*: Three tools were used to measure presence and activity on Twitter:

a) *Tweetreach* can measure three aspects: the impact of a username, hashtag or web address. It can also be used to see how many people have used one of these items in their tweets. The “reach” concerns the number of users who received tweets about a particular item (potential audience) and the number of total “impressions” generated by the tweets containing a given term on Twitter (exposure). The number of impressions can therefore indicate the number of times Twitter users have seen have seen information from the university’s account. Finally, the “activity” indicator provides details about the tweets and enables the number of users who receive them, of retweets and of replies to be viewed [27], [38].

b) *TweetStats* shows the detailed statistics on the information traffic and also user-specific information flow: total number of followers and followers for periods of time (year, month, etc.) [6], [36].

c) *TwitterTrending* makes possible to analyse the published hashtags in a user’s account during a year, besides, it delivers information disaggregated by languages and countries [5], [39].

4) *Method*: The goal of this work is to explain the relationship between the presence and activity of the universities in Twitter with a set of descriptive universities features. The activity of the universities in Twitter is assessed considering their followers, tweets, retweets and hashtags. The descriptive features have been divided into two groups of variables:

a) *Context variables relative to the universities*: 1) Country of origin; 2) Age of the university; 3) Number of registered students; 4) Type of organization.

b) *Variables relative to the universities presence and activity on Twitter*: 1) Followers; 2) Users followed; 3) Tweets; 4) Retweets; 5) Hashtags for promotional purposes; 6) Hashtags aimed at encouraging communication; 7) Reach with regard to a specific issue; 8) Impressions or number of times a user has seen the tweets in question.

Data were collected considering the relationship between tags with defined categories and with the classification of entries from each university during the period of study (April 2012). The following multivariate techniques have been used: bivariate correlation to detect the relationship between the variables and a cluster analysis. Cluster analysis has made possible to classify Twitter usage according to the trends of the followers of the universities’ accounts and the degree of association between the variables. Finally, Pearson’s chi-squared statistical was applied to study the dependence of the variables: number of students, tweets and followers. The estimated level of confidence is 95%. The statistical package used was SPSS (v.18).

III. RESULTS

A. Description of universities

Next, the universities sample is described according to the mentioned variables:

1) *Country of origin*:

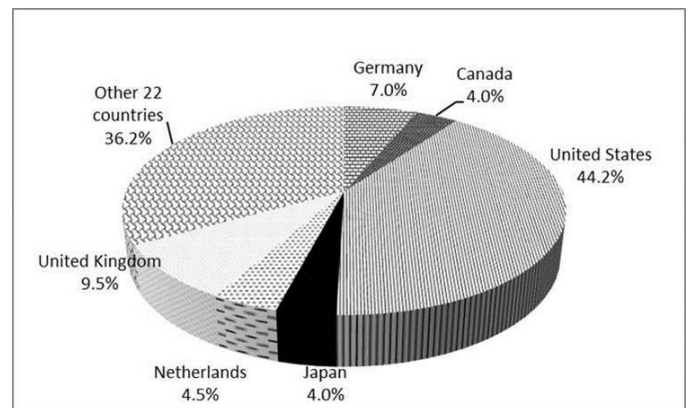


Figure 1. Distribution of universities by country.

By regions, North America accounts for almost half the universities in the sample (44.2%), followed by Europe (37.0%). The top performing countries are the USA (88), the

UK (19), Germany (14) and Japan and Canada, with 8 each. A total of 54 universities make up those located in other countries (36.2% of the sample): Asia (9.5%), Australia (3.5%) and Latin America (1.5%) (See Fig. 1).

2) *Age*: The universities were placed in three groups: a) less than 50 years old (7.0%); b) between 51-100 years old (15.1%); and, c) over 100 years old (77.9%). One can see that the most numerous group consisted of those universities which are more than 100 years old. The man average age of the universities was 237 (standard deviation=209). The newest were the University of Tsukuba in Japan and Oregon Health and Science University (39 and 38 respectively) and the oldest were the University of Oxford and the University of Cambridge (916 and 803 years respectively).

3) *Number of registered students*: Three classifications were made: a) less than 20,000 (38.2%); b) between 20,001 and 40,000 (47.7%); and, c) more than 40,000 (14.1%). The mean value for students was 22,929 (standard deviation=9,699). The University of Buenos Aires had the most students, with 316,050, followed the National Autonomous University of Mexico (290,000). The institutions with the fewest students were Baylor College of Medicine (1,211) and the California Institute of Technology, both in the USA (967).

4) *Type of organization (public or private)*: 88.4% of the universities studied were public, with the rest (12.6%) being private.

B. Presence and activity of universities on Twitter

The 97.0% of the universities possessed at least one Twitter account. However, not all of the institutions demonstrated the same levels of activity as can be seen from the following indicators. The universities have an average value of 12 Profiles (standard deviation=7.44). Highlights include the University of Oxford with 42 and the University of Cambridge with 39, and those with the least were Tohoku University (Japan) and University of Paris Sud with just one account. To facilitate the study was considered to be the official one, with the rest being secondary.

Activity in Twitter by universities was diverse as can be seen from the following indicators:

1) *Followers*: a mean value of 8,361 (standard deviation=13,237.60). The National Autonomous University of Mexico had the greatest number of followers (111,377), followed by Harvard University with 101,268. However, universities have very few followers, such as the University of Paris Sud with 15 or Tohoku University with just 13.

2) *Users followed*: The mean value was 1,049 users being followed by the official accounts of the universities studied (standard deviation=2,403.60). The highest values were achieved by Technion-Israel Institute of Technology (Israel) (23,352) and the University of Sheffield (UK) (12,951); and the lowest values were those of Catholic University of Leuven and University of Paris Sud.

3) *Tweets*: The universities with the highest number of published tweets were the University of Wisconsin-Madison

(12,301), followed by Harvard University (10,565), and those with the fewest were the University of Amsterdam (7) and Tohoku University of Japan (4). The mean value was 2,048 (standard deviation=2,016.54).

4) *Retweets*: The mean value for retweets by the universities was 16 (standard deviation=11.09). The two with the highest number of retweets were the University of Sao Paulo (42) and the University of Alabama at Birmingham (41); and those with the fewest were the University of Tokyo and Delft University of Technology with just 1 retweet each.

5) *Hashtags for promotional purposes*: The universities generating the most hashtags did so mainly to encourage interaction between lecturers and students (68.3%) and, to a lesser extent, to promote library services (54.8%) and to encourage participation forums, conferences and seminars (50.8%).

6) *Hashtags aimed at encouraging communication*: Universities post hashtags in order to: publicize their cultural activity programme (90.5%); campaigns to disseminate and calls official announcements regarding the participation in activities (87.9%); and 62.8% to disseminate their research and projects.

7) *Reach*: The average tweets by users who received personal searches is 12 (standard deviation=8.47). The universities with the most regular tweets were George Mason University and the Georgia Institute of Technology (USA) (32 and 31 respectively) and those with the least were Nagoya University (Japan) and Utrecht University (Netherlands) with 1 regular tweet.

8) *Impressions or number of times which users have seen the tweets posted by the university's Twitter account*: The mean value for impressions was 47,006 (standard deviation=114,858.53). The University of Florida (1,255,869) and the University of Washington en EEUU (554,678) were those with the highest number of impressions, while North Carolina State University-Raleigh with 22 and the University of Milan only 8.

IV. DISCUSSION

A. Institutional uses of Twitter

With the descriptive results of the sample and those obtained from the Twitter accounts, the statistical analysis was undertaken and the following results were obtained (See Table 1):

TABLE I. SUMMARY OF THE ACTIVITY GENERATED BY THE ACCOUNTS OF THE UNIVERSITIES STUDIED. BASED ON [37], [38] Y [36]

Twitter activity	M (SD)	Number of universities
Followers	8,360.9 (13,237.6)	193
Followed	1,048.9 (2,403.6)	193
Tweets	2,047.9 (2,016.5)	193
Retweets	16.4 (11.1)	184
Reach	12.1 (8.5)	184
Impressions	47,006.5 (114,858.5)	184

1) *Twitter as a means of communication with members of the educational community:* Table 1 displays the Twitter activity statistics. The high standard deviations demonstrate the irregular use made by universities, and although not all of post tweets, many do use it as a means of communication based on the participation of other users. This fact is important for university managers and teachers, who should employ these new channels of communication to involve students in projects and academic discussions. It is also necessary to mention that teachers need to acquire digital skills that students already possess, to foster greater interaction in relation with their knowledge topics.

Esto se debe a que las primeras universidades del Ranking son de Estados Unidos, un país tecnológicamente avanzado, donde han surgido la mayoría de las redes sociales, y donde se localizan los usuarios más activos.

Moreover, a relationship is observed between the position held by the universities in the Shanghai Ranking and their use of Twitter: those near the top use it more (the correlation with the ranking is significant ($p < 0.05$) for the number of accounts 0.254 and followers 0.189). North American display greater use of Twitter and, particularly, those in the USA (44.2%) which has the most followers. This is because the first universities in the Ranking are from the United States, a technologically advanced country, where most of the social networks, have arisen and where the most active users are located.

Having undertaken the bivariate correlations, no relationship was found to exist between the age of the universities with the number of registered students, or with the number of followers of their official Twitter accounts ($p < 0.05$). However, a moderate correlation was found between the number of registered students of the universities and the tweets posted on their accounts ($r\text{-pearson} = 0.177$). There was an even more significant correlation between the number the number of Twitter followers in universities with the number of students ($r\text{-pearson} = 0.343$), for $p < 0.05$. The correlation between the number of tweets and the number of followers was also found to be significant ($r\text{-pearson} = 0.574$), for $p < 0.01$. Therefore, it can be said that the universities with the greatest amount of students have more followers and post more tweets. This is an asset that universities should take advantage of.

In general, universities follow other users in order to become acquainted with their concerns and tweets. Their presence on Twitter and their level of communication with their community are increasing, although the trend is not the same for all of them.

2) *Participation of the university community in online discussions via tweets:* The mean number of tweets made by the universities in the period studied were 2,048, based on the number of tweets appearing on their account pages. After reviewing the posting of tweets during other months, it was found that there was a stable trend for participation, with the mean value from January 2011 to March 2012 per university being 89 (Tweetstats 2012). In March 2012, there was a greater number of tweets (120 tweets, standard deviation=175.06), as

the academic activity was renewed due to the start of the final term at the universities in North America (a majority in our sample). Although a lower number of tweets was found in January 2011 (64 tweets), it is likely that the reason for this is that coincided with the exam period in Europe, with holidays ongoing in other countries.

The participation of the educational community on Twitter was reflected in the number of tweets on the universities' timelines. The months with the most activity on the university timelines were May, September, and October 2011 and February 2012, for in them were more tweets (with mean values of 100, 106, 100 and 102, respectively). Probably because it coincides with the start of class periods in the majority of universities in the northern hemisphere in the sample. These months see a greater flow of information and interaction between the universities and their communities, with frequent retweets and hashtags and useful content is generated for other users.

It was found that the universities studied have an average reach of 37,355 users (standard deviation =109,475.25) and 47,005 impressions (standard deviation=114,858.53). In order to determine whether there was a link between these two variables and the number of university accounts on Twitter, bivariate correlation was performed and no significant difference was found ($p < 0.05$). This indicates that it is not necessarily true that the universities with the most accounts reach the largest audience.

3) *Trends in the usage of Twitter by the universities:* The analysis of the hashtags enabled the identification of two major types of usage trends. In order to get these trends the hashtags were regrouped and cluster analysis was made using 200 valid cases via Ward method and measured with squared Euclidean distance. This analysis made possible to identify the main universities behavior trends on Twitter:

a) *Maintenance of the university's brand image: promotion and communication.*

- Dissemination of service promotion campaigns.
- Information of the cultural activity programme.
- Dissemination of research and projects.
- Promotion of official announcements in order to encourage participation in activities of social interest.

b) *Interaction of the university with its educational community:*

- Participation in forums, conferences and seminars.
- Promotion of library services.
- Boosting interaction between students and lecturers.

In summary, 2 clusters were obtained (Figure 2) which exhibit two major trends: 1) the consolidation of the university's brand image: promotion and communication; and 2) encouraging the interaction of the university with its educational community.

V. CONCLUSIONS

In short, although the use of Twitter offers a valid option to university as a means of communication, it will not be an effective one until universities establish a strategic operational protocol aimed at maintaining their presence on social networks. Therefore, it is currently difficult to assess its use as an indicator of quality.

There is no doubt that universities must adapt to the latest technology and they must possess someone who can fulfill the role of community manager, as is the case in other organizations of a commercial nature. The community manager is a key figure with regard to social networks in that he or she can ensure that the most important research and publications receives adequate exposure, promote the university's activities and make the participation of members of the educational community more dynamic, in a rigorous and professional fashion. Therefore, a future area of research could concern the definition of the skills required for this emerging role as information manager at the university.

The opportunities provided by social networks for the dissemination of information, communication and interaction between different members of the educational community are numerous and they represent effective resources through which universities can enhance their corporate identity and promote their services. In fact, many important institutions are attempting to boost their corporate image by actively participating on Twitter.

The study of the descriptive indicators of the universities with regard to their Twitter accounts showed that students commonly follow their institutions accounts and that, logically, the universities with the most students have more followers and tweet more. As a consequence, the universities that tweet more have greater numbers of followers eager to read about the news that is posted using hashtags, as the retweets (16 on average) indicate the resending of messages seen by users to other Twitter accounts. In general, the universities follow other users in order to discover their concerns and tweets, generating a multidirectional communication flow.

The difference between the mean values and the standard deviations of most of the variables studied demonstrates that Twitter usage is not homogeneous for all universities. However the cluster analysis carried out in this study – undertaken after classifying the hashtags posted by the universities – identified two important trends in their use of Twitter: 1) promotion and consolidation of their corporate image and 2) communication between members of the educational community.

Analyses show that the variables antiquity, ownership and number of students in the universities are not related with a more intense activity on Twitter. However, the number of followers of the universities contributes to increase their activity and that is reflected in an increase in the number of tweets and retweets.

We are facing a new generation: the interactive generation requires a digital skills training. More technologized countries

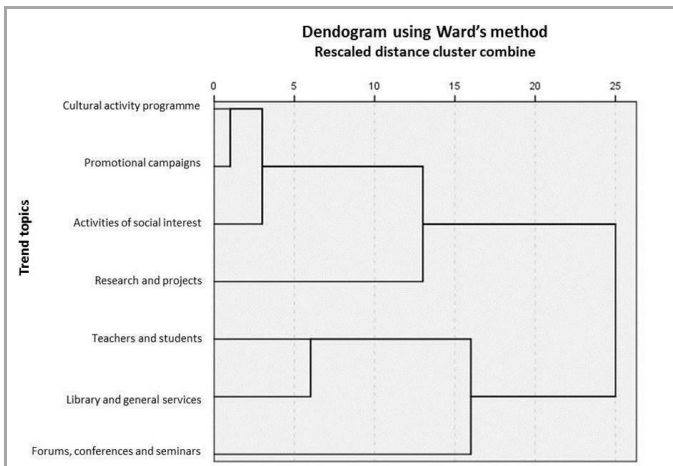


Figure 2. Categories into which the hastags posted.

B. Opportunities for universities Twitter

Through data analysis it can be inferred that it is necessary to optimize the potential of Twitter as a communication tool by using new formulas that enable universities to take advantage of the social capital they have in their accounts, such as the creation of working groups to facilitate the active participation of all their members, the promotion of collaborative work between the different agents of the social network, the proposal of some dynamics of exchange of experiences between users through publications that encourage the involvement, the study of users requirements in order to propose training activities more consistent with their interests and to dispense a personalized education, etc.

There is no doubt that the use of Twitter by universities requires the efficient participation of internal and external agents of the institution (university managers, teachers and students) linked to social networks to optimize the use of microblog.

In fact, the managers of the university can use Twitter to better position their institution, promoting its visibility in international academic scope.

In addition, teachers can promote the participation of their students and generate greater motivation based on discussions and direct interactions with their stakeholders. In this regard, it would be convenient to establish networks of users with similar research interests for the exchange of experiences taking advantage of the synergies of the groups of researchers from different universities, allowing the update and follow-up of scientific advances.

Finally, the use of Twitter helps students, -many of them equipped with digital skills and experience in management of technology resources-, to participate in the development of interuniversity collaborative projects and the generation of a pluridirectional flow of information in accordance with their own views.

logically have more opportunities to access information social resources and therefore implement them.

Given the special make-up of the sample, it can be seen that the universities with the greatest presence and activity on Twitter are the oldest public American universities, particularly those of the USA, which stand out in terms of the numbers of their followers and the tweets that they produce. This is mainly due to the fact that social networks have been developed in the U.S. whose technological advancement is superior to other regions of the world and fosters a digital culture of internet users. On the other hand, it is noted that institutional policies of most traditional public universities are committed to the use of social networks, specially Twitter, to foster communication between members of their educational community.

It was found that the fact that a university may have several accounts does not necessarily mean that they will reach a greater audience, given that what is important is that the university knows how to manage the official account appropriately, concentrating their efforts without duplicating information and confusing their followers.

This research shows two main trends in universities behaviour on Twitter: 1) encouraging communication and interaction between members of the educational community, and 2) promoting or disseminating institutional information.

All in all, it is important that universities use Twitter conveniently because it will help them to increase their visibility through their public profiles, facilitating the dissemination of their publications through tweets and ensuring communication in several directions among their followers, this way, and some synergies can be created.

The study shows that Twitter is an important tool to be used by universities and their external agents because it promotes communication among them through their short messages. In addition, it allows the creation of inter-university user communities that foster the collaborative construction of knowledge.

Twitter allows managers of universities, teachers, students and internal and external stakeholders of higher education institutions to create partnerships to promote teamwork.

Finally, universities can leverage Twitter features, -short messages, ease of communication between users, and its viral nature because they are clear opportunities to strengthen their brand image [31] through promotion and communication campaigns that can contribute to increase their 2.0 reputation.

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