TWITTER, EMOTIONS AND MATHEMATICS

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Although twitter has been proposed as a tool to engage mathematics students in and out of the classroom and to positively impact their learning of mathematics, in this article it is argued that this social network can serve as a medium that provides us with an insight into students' emotional experiences related to the teaching and learning of mathematics. To illustrate this, a selection and categorization of tweets about mathematics is presented. The categories in which the tweets are organized are: (1) mathematics its difficult, (2) mathematics is useless, (3) mathematics tests, (4) I like mathematics, and (5) love and mathematics.

INTRODUCTION

Mathematics is a subject with which people invariably associate emotions either positive or negative. Such emotions, along with attitudes and beliefs about mathematics, are very important because they form the basis on which people define how to relate to and identify themselves with mathematics (Pepin & Roesken-Winter, 2005). On the other hand, it is well known that social networks are a place where people express, share and spread their emotions about various aspects of their life (e.g., Stieglitz & Dang-Xuan, 2013) like: Work, personal relationships, food, exercise, pets, school, etc., and since mathematics is a subject that is either loved or hated, it does not escape such manifestation of emotions.

With regard to the use of social networks in mathematics education, Twitter is a network that has been proposed as a tool to engage mathematics students in and out of the classroom (Soto & Hargis, 2017) and to positively impact on students' learning of mathematics (Vohra, 2016). Furthermore, it is a useful tool for the organization of teaching issues related to the management of the class such as reminding students about homework assignments and upcoming tests (Danesi, 2016). Twitter has also been proposed as a space for the exchange of ideas, dialogue, discussion and interaction in the community of mathematics education research (Chernoff, 2014). However, in this article I want to support the argument that twitter can function as a "communal mood indicator" in connection with mathematics (Danesi, 2016).

I have been using Twitter for more than a decade, and during that time I have noticed that Twitter—like other social networks—is a space where users express emotions related to mathematics. In fact, I think that Twitter can serve as a kind of window that allows us to look at the emotions that some of the users of this social network associate with mathematics. With this idea in mind, the purpose of this article is to argue and illustrate that twitter can function as a space particularly useful for the inquiry into the students' emotional experiences related to the teaching and learning of mathematics. To develop this argument a brief analysis of how mathematics is represented in this social network will be introduced; in particular, a categorization of user's tweets about mathematics is presented. Such

categorization provides an insight into the emotions and perceptions that people associate with mathematics nowadays.

SELECTING AND CATEGORIZING THE TWEETS

Twitter is filled with tweets about mathematics: people sharing popular articles, images and videos about mathematical curiosities, organizations and their members announcing conferences and other academic events, scientific companies publicizing new articles and journal issues, etc.; you only need to enter the word "mathematics" in Twitter's search engine to corroborate this. However, the categorization presented next is based on tweets in which the authors express an opinion, either positive or negative, or some sort of feeling—sympathy, dislike, confusion, etc.—about mathematics or connected to it.

These tweets have been located over the past eight years: as they have appeared in my own timeline, through retweets by colleagues and friends, and through periodic searches at least once a month using keywords such as "math", "mathematics", and "matemáticas". As a result of curating these tweets, a set of 88 tweets—most of them written in English, although some in Spanish—was generated. Most of these tweets relate to school mathematics, perhaps because school is the main context where the authors of the tweets have contact with mathematics; besides, many of the tweets are written as a joke or in a humoristic fashion. It is important to note that some of these tweets are "favorited" by hundreds and even thousands of users, which can be interpreted as a kind of support, sympathy, or identification with the content of the tweet.

To categorize the 88 tweets, a technique of constant comparison was followed (Teppo, 2015) that began creating codes such as "tweets about being bad at mathematics" or "tweets on how mathematics homework is difficult", and later these codes were merged into five overarching categories. These categories are:

- Mathematics is difficult
- Mathematics is useless
- Mathematics tests
- I like mathematics
- Love and mathematics

Due to space limitations, in the next section each of these categories are briefly described, but only one of them is illustrated with an image corresponding to a tweet.

EMOTIONS ABOUT MATHEMATICS

The first of the tweets presented includes the date of publication, the number of times it has been favorited and retweeted, the username of the author and the link through which it was accessed. Because it is originally published in Spanish, a translation into English is provided.

Mathematics is difficult

This category includes tweets in which users express how difficult it can be to understand mathematics, and the emotions associated—such as frustration—with these understanding difficulties. Also included are tweets in which mathematics is depicted as a topic that is complex and cognitively overwhelming.

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Statistics: 12 retweets; 23 favorites

Translation: "When everyone understands the definition of continuity except you"

Figure 1: Tweet by @Infinito307 retrieved from https://twitter.com/Infinito307/status/752341078523596804

Mathematics is useless

In this category are located the tweets in which it is affirmed that mathematics is useless for daily life and work life. For example, knowledge of mathematical concepts is despised when compared with other skills like writing a CV or knowing how to pay taxes; another example is a tweet claiming: "Another damned day without using algebra"

Mathematics tests

Assessment is a crucial element in the academic survival of mathematics students; as such, several tweets express perceptions and experiences related to the mathematics test: how difficult they may be, unfair assessments, or even the lack of realism in the contexts in which the problems are posed, like mathematical problems making reference to a semi-reality (Skovsmose, 2001).

I like mathematics

People also publish tweets with positive emotions towards mathematics; however, these are not as often retweeted nor favorited as the tweets belonging to the categories presented above. Some people mention the positive emotions that mathematics produce in them, many others simply express that they like mathematics but without further explanation, while others find more creative ways to express their appreciation for mathematics.

Love and mathematics

Yes. Some people tweet about love and mathematics, but not about love for mathematics. These people tweet about romantic love—including heartbreak—and somehow relate it to mathematics. An example of this is the tweet: "I understand multivariable calculus but I do not understand life without you".

CONCLUDING REFLECTION: NEW TECHNOLOGIES, NEW KINDS OF DATA

In their review of qualitative methods in mathematics education research, de Freitas et al. (2018) point out that new technologies are creating radically new kinds of data in mathematics education, y that online sourcing of data is becoming increasingly common, as student lives become lived online more and more. Then the researchers ask: How should we study this data? (p. 174)

This report has tried to illustrate how social networks can provide us with a window to the emotional experiences that students face during the study of school mathematics. I would like to claim that this new type of data has the potential to help us better understand how students live and perceive school mathematics.

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