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# Students' perspectives on using YouTube as a source of mathematical help: the case of 'julioprofe'

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**ABSTRACT**

YouTube is one of the most popular sources of mathematical help among young students. In this study we explore the perspectives of engineering students on the use of YouTube videos with the intention of broadening our understanding of the general characteristics of the mathematical help that students obtain through this type of videos, particularly about the qualities of the sources of mathematical help that they prefer and trust. To conduct this exploration, we take as a reference the case of 'julioprofe', a YouTube channel on mathematics lessons with almost four million subscribers, which is widely known and used among Latin American students. Through focus groups, 22 engineering students from a Mexican university were interviewed about their experiences using the julioprofe videos as a source of mathematical help. The results suggest that the mathematical help that students get from these YouTube videos is a type of multifunctional help, always available, private, easy to use and self-paced. It is a type of mathematical help that students cannot obtain from more traditional school contexts. We argue that these features contribute to making YouTube such a popular source of mathematics help among contemporary students.

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**KEYWORDS**
Internet-based mathematical help-seeking; YouTube; julioprofe; students' perspectives on the use of YouTube videos; students' reliability criteria

## 1. Introduction

Help-seeking is an inherent element in the study of school mathematics. It is a common and recurring practice among the many students who encounter doubts or obstacles related to the content of their mathematics lessons or their mathematical assignments. Traditionally, students have turned to handy sources of mathematical help such as the teacher, classmates, or the textbook.

However, the Internet and mobile devices have transformed the way students seek help in mathematics. Gone are the days when students used only their textbook, their teacher, their classmates, or their relatives as a source of help to clarify their mathematical doubts. Nowadays many students prefer to watch a YouTube video at home rather than to turn to a library in order to clarify a mathematical interrogation (Puga, 2013). Indeed, recent studies

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on mathematical help-seeking indicate that the video sharing platform YouTube is one of the most popular sources of help among contemporary mathematics students (Cardoso et al., 2014; Muir, 2014; Puga, 2018; Puga & Aguilar, 2015; Tisdell, 2017).

Our own studies on mathematical help-seeking (e.g. Aguilar & Puga, 2020) have allowed us to identify a source of help from YouTube that is particularly popular among Mexican mathematics students: the channel called 'julioprofe' (see https://www.youtube.com/user/julioprofe). Exchange of information with colleagues and students from other regions of Latin America confirms our empirical observations: this YouTube channel is also popular among students from countries such as Guatemala, Colombia, Chile, and probably beyond.

With more than 4.6 million followers, and stellar appearances in mass media such as *National Geographic* and *BBC News* (e.g. Redacción, 2018), julioprofe is undoubtedly one of the most consulted Internet-based sources of mathematical help in Latin America, but why? What characteristics or qualities do julioprofe's videos possess that make them so popular among mathematics students? Why do the students trust this content?

In this study we try to answer these questions. In particular, our study explores the reasons why a group of Mexican students trust and use julioprofe's videos as a source of mathematical help. Although our study focuses on a particular source of mathematical help on the Internet, we believe that inquiring about this particular source can shed light on more general help-seeking behaviours of mathematics students, particularly about the qualities of the sources of mathematical help that they prefer and trust.

This paper is structured as follows: first, a brief overview of research on help-seeking is presented, paying special attention to studies that examines engineering students' use of Internet-based resources as a source of help in mathematics. Next, the conceptual stance and research aim of this study are introduced. Subsequently, the research method implemented will be presented, including the context where the study was carried out. Following this, the results of the research study are presented, and the paper closes with a discussion of the research results and some of their implications.

## 2. An overview of help-seeking research

According to Aguilar and Puga (2020), help-seeking has been studied for several years by scholars from different fields. Studies on help-seeking try to identify and explain what factors encourage people to seek – or to avoid – the help of others. Initally, help-seeking was conceptualized as a behaviour that should be avoided, as it was associated with low self-esteem and self-perception, as well as over-dependence on others and lack of an individual sense of competitiveness (see Beller, 1955; see also Shapiro, 1978).

In the field of educational research, the work by Nelson-Le Gall (1981, 1985) was fundamental for developing a more positive conceptualization of help-seeking behaviour. She introduced a reconceptualization where this behaviour was interpreted as a useful skill for students' self-learning that would allow them to address problems that otherwise would be difficult to tackle.

### *2.1. Research on help-seeking in mathematics education*

Aguilar and Puga (2020) point out the existence of several studies addressing help-seeking in mathematics from a psychological perspective (e.g. DeFeo et al., 2017;

Ryan et al., 2005). Newman and Schwager (1993), one of the first studies that were developed within this perspective, investigated which people students (aged 9–13) preferred to ask for mathematical help when needed. 'They found that students generally preferred their teachers to classmates as helpers because they were thought to be more likely to facilitate learning and less likely to think they were "dumb" for asking questions' (Aguilar & Puga, 2020, p. 1004). Looking 'dumb' before classmates for asking questions of the mathematics teacher was a concern of some the children participating in the study, particularly some girls.

As already noted by Aguilar and Puga (2020), most of the research studies that have been developed on mathematical help-seeking consider only human agents (teachers, classmates, family members, faculty, staff) as sources of help (e.g. Kempler & Linnenbrink, 2006; Webb & Mastergeorge, 2003). In the next section we briefly review research studies that have addressed the way in which digital technologies can serve as a source of mathematical help for students, and how such technologies affect mathematics students' help-seeking practices.

### 2.2. Research on internet-based help-seeking in mathematics

Early studies developed in this area focused on characterizing students' help-seeking behaviours in Internet-based mathematics help forums (Puustinen et al., 2009; van de Sande, 2011). Particularly, these studies characterized the messages that the participants of these forums exchanged, as well as the help-seeking behaviours that they exhibited in these virtual spaces. An example is the study by Puustinen et al. (2009) who examined for more than three years the content of students' help-seeking messages in a French forum that provides students with free individualized help in mathematics. This study allowed us to understand that there are differences between the youngest and oldest students in terms of the abilities to formulate clear and explicit requests for help. Usually it is the younger students who have less developed these capacities, and therefore have a greater risk of being misunderstood by the tutors in the forum.

The work of van de Sande (2011) focused on characterizing student activity in a free and open online mathematics forum called 'Math Help Forum'. This is a forum with users around the world, where people post their mathematical doubts and questions in order to solve them collaboratively with other forum users (see http://mathhelpforum.com). The study of van de Sande (2011) shows that there are students looking for help in this forum who passively wait until the problem they posted in the forum is solved, while other students get more actively involved in the collaborative construction of the solution.

While Puustinen et al. (2009) and van de Sande (2011) showed the popularity of online help forums among mathematics students, our research studies and our teaching practice suggest that the universe of Internet resources on which students rely to support their learning is much broader. For example, we have identified that some students use Google's search engine, Facebook, Yahoo! Answers, and YouTube as sources of mathematical help (Aguilar & Puga, 2020; Puga, 2018). This observation is confirmed by other studies that examine mathematics students' self-initiated use of online resources (e.g. Muir, 2014). Of particular relevance to the research reported in this paper are the previous studies that have been developed on how engineering students use the Internet as a source of mathematical help. These studies are discussed in the next section.

### 2.3. Engineering students' use of internet-based resources as a source of mathematical help

Several practitioners and researchers acknowledge that contemporary engineering students have access to a wide variety of mathematics learning resources: Both, traditional resources like worksheets and textbooks, but also a limitless number of online resources. However, it is also recognized that the way these students are using online resources to study mathematics has been little studied (Anastasakis et al., 2017; Pepin & Kock, 2019; Tisdell, 2017).

The few existing studies on the use of online resources as a source of mathematical help among engineering students have identified that online videos are particularly popular among these students. In a study focused on analyzing the links between British engineering students' goals and their choice of educational resources, Anastasakis et al. (2017) report that online videos are among the resources most used by the students in preparation for their mathematics exams. Similarly, Pepin and Kock (2019) study the way in which engineering students from a Dutch university select and use different traditional and online resources to study mathematics. These researchers identify engineering students who turn to online video sites such as YouTube and Khan Academy for studying. Pepin and Kock (2019) claim that these video resources seem to gain importance compared to high school. In turn, Tisdell (2017) focuses on investigating whether and how Australasian engineering students engage with instructional YouTube videos as part of their mathematical learning. The results of this study show that more than 71% of the participating students use these online videos for their mathematical learning, increasing their consultation during exam periods. Tisdell (2017) reports that students find these online videos very useful. The students use these videos as (p. 5):

- A revision tool to prepare for assessment
- A way of catching up on missed classes due to illness or late enrolment
- A mechanism for clarifying points that were not fully understood within class
- A forum to provide feedback or raise questions by commenting on the YouTube video
- An avenue that enabled self-paced study

In the study that we report in this paper, we delve into the use of online videos among engineering students. In particular, we study their use of YouTube videos, which, as illustrated, is one of the most popular sources of mathematical help among contemporary students. One contribution of our study to this research area is that we inquire into why engineering students trust these digital resources. This is an aspect of students' use of online video that has not been addressed in depth in previous research.

## 3. Conceptual stance and research aim

In this section we want to introduce some conceptual notions that clarify our theoretical position on mathematical help-seeking. After introducing those notions, we declare the aim of our research study in a more precise way.

### 3.1. Mathematical help-seeking

We adopt the conceptualization of mathematical help-seeking provided by Aguilar and Puga (2020), which follows the line of thought that conceptualizes help-seeking as a self-regulated learning strategy (e.g. Karabenick & Gonida, 2018; Nelson-Le Gall, 1985; Smalley & Hopkins, 2020):

> We understand *mathematical help seeking* as a self-regulated learning strategy in which an individual draws on the people and resources around them (including technological resources such as the Internet and mobile devices) as sources of help to overcome the difficulties and doubts that arise during their mathematics learning process. When we use terms such as *Internet-based mathematical help seeking* or *Internet-based help seeking*, we refer to mathematical help-seeking behavior that is solely based on resources from the Internet. (Aguilar & Puga, 2020, p. 1006)

### 3.2. Research aim

The aim of this research study is to explore students' perspectives on the use of videos from the YouTube channel julioprofe as a source of mathematical help. In particular, we try to answer the following questions:

1. How did they discover julioprofe's videos?
2. To what extent do they use julioprofe's videos?
3. For what purpose do they consult the videos?
4. Do they think julioprofe's videos are reliable? Why?
5. Do students think that julioprofe's videos have distinctive characteristics?
6. What advantages and disadvantages do students find when using these videos?

## 4. Method

The main source of empirical data to conduct this study was interviews with engineering students through focus groups. In this section we describe the general characteristics of the students who participated in the focus groups, and the way in which such focus groups were implemented and analyzed.

### 4.1. Characteristics of the research participants

The research participants come from an engineering institute that is part of a public university located in the city of Ciudad Juárez on Mexico's northern border. The first author of this paper – who teaches mathematics at this institute – invited 90 of her freshman engineering students to participate in the research study, of which 22 agreed to participate (20 female students, 2 male students). As part of the invitation, they were informed that the aim of the study was to explore students' use of videos from the YouTube channel julioprofe. Thus, we were expecting that the volunteers would be people who already knew the channel, so that they could help us explore students' experiences with this type of help resources.

The students volunteered to participate in the study. They were aware that their activity would be recorded, anonymized, and analyzed for research purposes. They were also

informed that their participation in the study would not affect their academic grades. During their participation in the study, the undergraduates were studying the first semester of an engineering branch (systems engineering, electrical engineering, industrial engineering, biomedical engineering, environment engineering, mechatronic engineering and geosciences engineering). The age range of the participants was 18–31 years. At the time of the interviews, the 22 participating students were taking courses on linear algebra, differential calculus and statics (physics). They were average students with regular academic performance.

### 4.2. Focus group implementation

The participating students were distributed in four focus groups to conduct the interviews (two groups with five members, and two groups with six members each). The focus groups took place during downtime between lessons in a classroom at the engineering institute, during the August–December 2019 semester. We decided to use focus groups because the specialized literature and our own research experience suggest that this type of group interview generates an atmosphere of trust, since the interviewees are surrounded by classmates who share their experiences, just like them. This favours the openness and participation of the students in the interviews (e.g. Krueger & Casey, 2008; Puga, 2018).

The focus groups were carried out by the first author of this paper. To conduct the interviews in the focus groups, the researcher used the following interview guide:

1. How long have you known about julioprofe's channel?
2. How did you discover the channel?
3. Do you currently use julioprofe's videos? (If the answer is *yes*, then continue with the following questions. If the answer is *no*, ask him or her why he or she doesn't consult them.)
4. What do you use the julioprofe's videos for?
5. How often do you use julioprofe's videos?
6. What topics have you consulted?
7. Do you think julioprofe's videos are reliable? Why?
8. Are julioprofe's videos different from the tutorial videos of other mathematics teachers on YouTube? (Those who say *no*, are not further questioned; those who say *yes* are asked about what they consider different or special about julioprofe's videos.)
9. Do you find any benefit or advantage when consulting julioprofe's videos?
10. Do you find any drawback or disadvantage when consulting julioprofe's videos?

The 10 questions in the guide are related to the six research questions previously mentioned, and are intended to generate the information to answer them. The following section explains how the information generated through the focus groups was processed.

### 4.3. Data analysis

The interviews in the focus groups were audio-recorded and subjected to a *tape-based analysis* (Onwuegbuzie et al., 2009). Both authors participated in the data analysis process. We first became familiar with the data – by listening to the interviews repeatedly – in order to

identify the answers to the guide's questions, and then we transcribed only the parts of the interviews that were useful to illustrate the answers identified. Each researcher independently identified the answers to each question and grouped them, to later compare them. If there was discrepancy or doubt about how an answer should be categorized, an explicit discussion was organized to reach a consensus on its interpretation; however, the discrepancies were minimal. Through this process of analysis and comparison certain categories of answers emerged. These categories are presented in the next section.

## 5. Results

Our presentation of the results is intended to illustrate the students' perspective on the use of videos from the YouTube channel julioprofe. To structure the presentation of the results, we will follow the order of the six research questions previously declared. The results are illustrated with transcripts of the students' utterances, which were translated from Spanish to English.

### 5.1. How did they discover julioprofe's videos?

At the time of the interview, more than 31% of the participants (seven students) had known of the julioprofe videos for six years, that is, since they were in lower secondary school. Approximately 45% of the participants (10 students) had known of these videos for two or three years; this suggests that they discovered the videos during their upper secondary school. The rest of the participants (five students) came across these videos at the beginning of their undergraduate studies.

The ways they discovered these videos are varied. Some found them by browsing the web or YouTube, while others received recommendations from lecturers or peers. The following transcripts illustrate this situation:

> Once I could not solve a task and he recommended it to me. A lecturer said: "if you are left with doubts, go and look for julioprofe". (*Student 1, focus group 1*)

> They said there were tutorials for mathematics and my dad told me they were on YouTube: "if you don't understand something, get in there" and I got in and a lot of the videos were by julioprofe. (*Student 3, focus group 1*)

### 5.2. To what extent do they use julioprofe's videos?

All the participants, except one, answered that they were currently using julioprofe's videos. When asked how frequently they used these videos, five students reported using them once a week, eight answered that they consulted them during the exam period, while nine answered that it was up to the lecturer: if the lecturer does not explain clearly, they resort more frequently to julioprofe's channel.

### 5.3. What do they use julioprofe's videos for?

When we inquired into how the students use these videos, they reported using them for the following purposes (some students reported using them for more than one purpose): to clarify doubts when they do not fully understand a topic lectured in class (15 students),

to review or study a topic – taking advantage of the fact that the video can be stopped, advanced or rewound at will (7 students), as an introduction to a topic because the mathematical content of the videos is simple (3 students), and to catch up on lessons when you are late or unable to attend (6 students). The following transcripts illustrate some of these uses:

> More than anything to start as an introduction because the examples he has are very basic, it does not include fractions or anything [...] it is as an introduction to a topic for me. (*Student 3, focus group 2*)

> Those of us in the afternoon shift, normally work in the morning, so it can happen that due to adverse circumstances we are late or we cannot come to class. So, what we do is to ask what the class is about, for example determinants and inverses, then I look for videos to catch up. (*Student 2, focus group 4*)

When asked about which topics they had consulted, the students listed a wide variety of topics that included elementary topics in arithmetic and algebra (arithmetic rules for negative and positive integers, factorization, algebraic identities), trigonometry (laws of sines and cosines, trigonometric functions), linear algebra (systems of linear equations, matrix operations, Gaussian elimination), calculus (limits, derivatives and integrals), and statistics.

### 5.4. Do they think julioprofe's videos are reliable?

Only one student stated that julioprofe's videos could be unreliable because the examples that appear in the videos may not be the same as those seen in class; the rest of the participating students declared that the videos were reliable. Among the arguments provided to justify the reliability of these videos, two stand out for being the most mentioned among students: the videos have helped them to pass assignments or complete tasks (8 students), and the videos have many 'likes' or positive comments from YouTube users (9 students). These arguments are illustrated below.

> Yes [they are reliable] because they have helped me to pass exams or assignments. (*Student 5, focus group 2*)

> Yes, for some reason it is and continues to be among the students' favorites. (*Student 6, focus group 1*)

> I see the comments beforehand, I regularly see many congratulations and compliments and that builds confidence. He has become famous based on his work, so that builds trust. (*Student 3, focus group 3*)

### 5.5. Do they think that julioprofe's videos have distinctive characteristics?

The students indicated that they considered julioprofe's videos to be different from those of other YouTube channels devoted to mathematics teaching. The characteristics that they consider distinctive are: the brevity and simplicity of the videos (8 students), the variety of topics covered in the videos (5 students), and the use of step-by-step explanations (9 students). The following excerpts illustrate the students' views on this issue.

> I feel that he explains clearly and also covers many university topics, so to speak, is an easy resource. (*Student 3, focus group 4*)

> He shows the [procedure] step by step, if you go to other channels they assume that you already know something, then they 'jump' like five steps and they go directly [to the answer]. (*Student 6, focus group 1*)

### 5.6. What advantages and disadvantages do students find when using these videos?

The participating students pointed out advantages and disadvantages of using the julioprofe videos. Among the advantages mentioned were the short duration of the videos (7 students) and their availability, that is, the possibility of clarifying doubts anytime and anywhere (all 22 students), as illustrated in the following transcripts:

> Yes, a benefit would be the accessibility of clarifying the doubt at the moment. If you are doing the assignment at 3 in the morning, it is always there. (*Student 1, focus group 2*)

> With the Internet I can check it anywhere, anytime. Much more comfortable than attending tutorials, and if you don't understand, you can repeat it as many times as you want. (*Student 3, focus group 4*)

> Suppose that YouTube did not exist and you are left with a question. You cannot contact the lecturer, or if you send him an email and he does not answer? Here [on YouTube] you already clarify the doubt and you are not falling behind in classes. (*Student 5, focus group 2*)

> Julioprofe is concrete, he goes straight to the point. I have seen videos that last a long time, like 20 to 30 minutes, but his videos last between 10 and 12 minutes at most. (*Student 3, focus group 2*)

Among the disadvantages mentioned were not being able to consult julioprofe directly (9 students), the possibility of confusion because julioprofe uses different procedures or notations than those used in class (8 students), and that julioprofe explains too many things (5 students). These views are illustrated below:

> You cannot ask him directly and if you do so, the semester ends before he answers you. Because he is famous, he does not answer the comments, someone else who also knows mathematics answers. (*Student 3, focus group 3*)

> I have struggled because sometimes he uses other letters and it confuses you; for example, here [in the university] we see a formula, and there he uses other letters. (*Student 5, focus group 2*)

> Personally, I feel that julioprofe confuses you because he begins explaining too many things, and it overwhelms you, and you no longer understand anything. I feel that julioprofe writes a lot and I like something more visual. (*Student 3, focus group 1*)

## 6. Concluding discussion

This study adds to the existing evidence suggesting that YouTube videos have a prominent place among the sources of mathematical help consulted by engineering students. Studies in other regions of the world have documented this trend among engineering students (Pepin & Kock, 2019; Tisdell, 2017). In the case of the undergraduate students participating in this study, it is clear that most of them use YouTube videos on a regular basis, and some of them have used them for several years of their school life, as a support to study a variety of mathematical topics.

Several observations related to the way participating students use YouTube videos are confirmed by other studies. Eight of the students who participated in this research report consulting YouTube videos during the examination period, which coincides with the findings of Anastasakis et al. (2017) and Tisdell (2017) who found that online videos are among the resources most used by the students in preparation for their mathematics exams and assessment. The results of this study that refer to the uses that students make of YouTube videos have similarities with the findings of Tisdell (2017) who studied the use of the same video platform among engineering Australasian students. Both studies indicate that the videos are used by engineering students for catching up on missed lessons, as a mechanism for claryfing doubts that may emerge during instruction, and as a source of help that enables self-paced study.

Thus, although we have studied the particular case of julioprofe, we argue that our study provides information about the general characteristics of the mathematical help that students obtain through this type of videos. Such general characteristics are:

- *It is multifunctional*. Through these videos, students get multipurpose mathematical help. They can use it when they have attended class but they have some doubts left and they want to clarify them, they can use it to introduce themselves to a new mathematical topic, or they can use it when they could not attend class and they want to catch up on lessons. In addition, the mathematical help they get from these videos could cover different school mathematical topics, from the most basic to the most advanced.
- *It is always available*. Another major feature of this kind of mathematical help is that it is available anytime, anywhere – as long as the student has Internet access. Students can turn to this source of mathematical help in and out of school and, as one student put it, 'if you are doing the assignment at 3 in the morning, it is always there'.
- *It is private*. Students can refer to this source of help privately, without the need to reveal their doubts to their classmates or the lecturer. As previously mentioned, some studies suggest that students may feel 'dumb' in front of their peers when asking for help or expressing doubts in the mathematics class (Newman & Schwager, 1993). The mathematical help obtained on YouTube eliminates these inconveniences, because it can be consumed privately.
- *It is easy to use and self-paced*. Some of the interviewed students highlighted the brevity and simplicity of the videos by julioprofe, as well as his step-by-step explanations. There was a student who even referred to the videos as 'an easy resource'. Moreover, YouTube videos are an easily accessible source of mathematical help, which students can locate by entering keywords into a search engine (Aguilar & Puga, 2020; Sapa et al., 2014). In addition, the student has personal control over the source of help, since the video can be stopped, skipped, or repeated as many times as needed.

A source of mathematical help that is multifunctional, always available, private, easy to use and self-paced cannot be obtained in a traditional school setting. Mathematics lecturers could not provide this kind of help to all of their students. Videos like those produced by julioprofe provide mathematical help in a format with unique characteristics that make it attractive, accessible, portable, and easy to consume. This could be one of the reasons why this type of mathematical help is so popular among students.

Another factor that seems to contribute to the popularity of this source of mathematical help is the fact that students trust it. Our study suggests that such trust is based on three elements:

- *People close to them recommend it*. Several students describe how their lecturers, parents, or classmates recommended that they look for mathematical help on YouTube, or particularly on the julioprofe channel. We think that the fact that authority figures such as their lecturers or their parents recommend it – in addition to their own classmates – promotes students' trust in this source.
- *It works*. Another element that we believe increases students' confidence in this source of mathematical help is that it has helped them to solve assignments and even pass exams – as some of the students interviewed report. We think that when students receive positive notes and evaluations after using julioprofe's videos to study, they interpret it as a tangible proof of the effectiveness of those videos as a study support.
- *It get 'likes'*. Finally, students tend to pay close attention to the 'likes' and comments that the videos receive from other YouTube users. According to some interviewed students, they analyze the number of 'likes' and the kinds of comments that a video receives to weigh its quality. In the case of julioprofe, his videos receive thousands of 'likes' and positive comments.

As we have illustrated, when it comes to assessing the reliability of the videos, students seem not to pay attention to the intrinsic mathematical properties (Lithner, 2003) of the information contained in the videos. Rather, they base their assessment on features not related to mathematics, for instance the 'likes' and comments that a particular video gets, or recommendations that they receive from people close to them. This behaviour reveals different ways of evaluating information sources from the Internet, which some authors have pointed out as lacking a critical spirit (e.g. Lederman & Lederman, 2016). Furthermore, these forms of evaluation have been also identified in other related studies on mathematical help-seeking. For instance, Puga and Aguilar (2015) report that some engineering students based the reliability of the Internet resources that they consult on the authority provided by the academic degree of the author or the prestige of the institution that produces the resource.

YouTube is an example of new sources of mathematical help that are broadly used by students around the world and that are widely accepted by them. It seems that these new sources of help tend to be preferred by students over more traditional sources (the library, the teacher, the classmates) (Puga, 2013); in fact, these new sources provide students with a *different* kind of help than can be found in traditional school contexts. What do mathematical educators do when faced with such a phenomenon?

We know, from students' testimonials, that some teachers promote the use of sources of mathematical help like YouTube, while others ban their use in their mathematics lessons. What are the reasons behind each of these teachers' stances? Should we try to integrate these new sources of help into mathematical instruction as some authors have attempted (e.g. Stohlmann, 2012)? We believe that it is our responsibility as mathematics educators to try to understand how mathematics students are using these technological resources, in order to incorporate them into mathematical instruction that may better meet their academic needs and preferences.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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