

# Stimulating STEAM learning through the use of humor

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## ABSTRACT

The use of humor could be a useful tool in order to increase students' attention and their concept retention in classrooms, particularly regarding to STEAM (Science, Technology, Engineering, Arts and Mathematics) learning or other abstract and complex knowledge. This paper presents the advantages of humor introduction in teaching activity at different levels, providing some examples for didactics of mathematics and concludes with an analysis of results extracted from some scientific dissemination activities.

**Keywords:** STEAM, humor, teaching style, didactics

## 1. INTRODUCTION

One of the major issues reported by teachers from both schools and universities is the growing lack of motivation in students.<sup>1</sup> And this problem is much more evident in abstract subjects such as mathematics, for which complementary tools would be helpful in order to increase the students' retention of complex concepts.

As previously exposed by Herrera-Melián,<sup>2</sup> innovative proactive teaching methods should be combined with the classical expository method. However, humor could be a useful tool to reach students even during this passive learning. It has been proven that the use of humor in ICT teaching significantly increases success in students' retention and decrease their anxiety.<sup>3</sup>

Humor itself could be presented in several ways and formats including audio-visual material, music resources, illustrative examples or simply a fun speech. Interaction between teachers and students could also be reinforced by the introduction of these tools in a proper way and context.<sup>4</sup> Nonetheless, it must be used considering aspects such as how receptive students are or the educational level considered. The way in which humor will be introduced varies significantly if it is for primary or secondary education, for universities or for the general public in scientific dissemination activities.

In this paper, section 2 focuses on the implication of humor in teaching activity and which are the possible consequences both positive and negative of its introduction; section 3 presents statistics of some scientific communication activities with humor as key factor. Section 4 outlines the main conclusions extracted from the article.

## 2. HUMOR IMPLICATION IN DIDACTICS

Learning process is highly affected by the environment surrounding students, and this includes the relationship they have with their teachers. A positive emotional response to a speech including hilarious comments highly contributes to the enhancement of that relation and environment considered to be essential for the educational activity.<sup>5</sup> The introduction of humor in teaching activities has demonstrated being useful in the following ways:

- Improvement of students success and attitude when facing lesson's contents.

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- Increasing knowledge retention, specially about complex scientific and technical concepts.
- Decreasing anxiety levels in students.

However, aggressive humor or humor unrelated to course content could cause the opposite effect on students.<sup>6</sup> In such cases it is proven both that giving a funny speech is not enough by itself to improve learning, and also that aggressive humor usually creates anxiety in students.

Science Dissemination activities could give an approach on public reaction to the different speech styles that could be further carried into the classroom. The international scientific talks competition FameLab<sup>7</sup> could be an adequate example to illustrate this idea. Since the year 2007 its competitions have been held in more than 25 countries with more than 5.000 participants. The objective is to perform a hilarious scientific talk that lasts no more than 3 minutes.

During its first edition in Spain, the selected winner was Eduardo Sáenz de Cabezón with a talk called "Mathematics lasts forever". From this experience, an extended talk under the same name was performed at TEDxRiodelaPlata event in Argentina, now with more than 650.000 views on its YouTube video (see Figure 1).

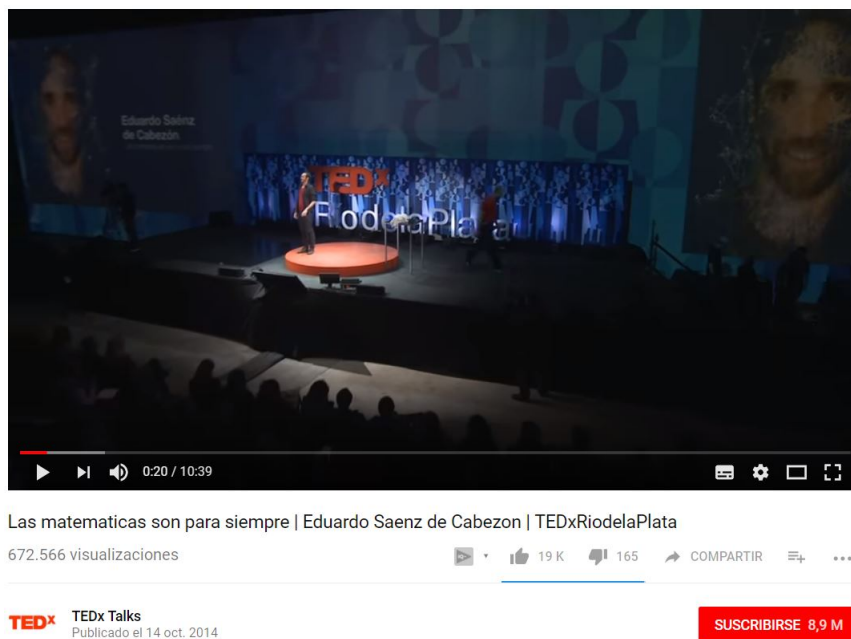


Figure 1. Mathematics lasts forever (<https://youtu.be/jej8qlz1AGw>)

One year later, the mathematician S. García-Cremades (one of the authors) was awarded with the 3rd prize in the same competition for his talk called "Fermat's Last Theorem" (see Figure 2), in which humor is not the only innovative tool to teach mathematics but also music becomes an essential aspect.

Both examples shows how mathematics perception could be highly different when introducing the concept of fun as a key aspect in the pursue of teaching abstract and complex knowledge. However, once confirmed humor has considerable implications in teaching, the real challenge would be to clarify if it is possible to train teachers towards the use of humor in their lectures. As stated by Derakhshan K.,<sup>8</sup> it is not only possible to train teachers but also recommendable through humor inclusion as part of teacher training courses.

### 3. RESULTS FROM SCIENTIFIC TALKS AND WORKSHOPS EXPERIENCES

As mentioned previously, mathematics acceptance could be enhanced by the use of humorous speeches. The collective named after "Big Van Science"<sup>9</sup> has been demonstrating that since 2013 not only with their talks through Spain and Latin America, but also with specific workshops for primary and high school teachers.



Figure 2. Fermat's Last Theorem (<https://youtu.be/jej8qlzlAGw>)

Their initiative "Locos X Ciencia" carried during 2016 joined 175 education centers, 239 teachers and more than 11.500 students in 8 Spanish cities. It consisted on a series of scientific hilarious talks for students and several workshops for their teachers. The statistical results obtained after the activity<sup>10</sup> are presented and analyzed hereafter. Figure 3 shows teachers' opinion about the contents of the talks for students. On the other hand, Figure 4 shows their opinion about the contents of the workshops they participated in.

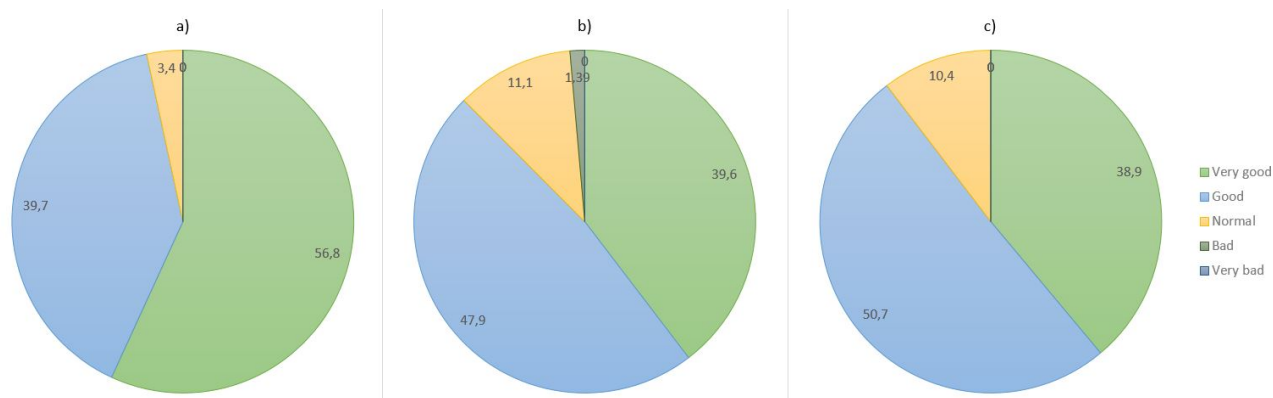


Figure 3. Scientific talks content perception from teachers' point of view. (A) General perception about talks contents. (B) Usefulness for students. (C) Contents adequate for students' age.

Teachers appear to agree about the talks content suitability for students. However, some of the teachers confirming a very good and good perception about contents do not think they are useful enough for students. This could be related to the misconception that classical ways of teaching through the expository method should respect the purity of knowledge itself with no interference from tools such humor. Still, the overall perception is mostly positive and encouraging.

For the case of workshops the results are also very positive. While general perception about contents and

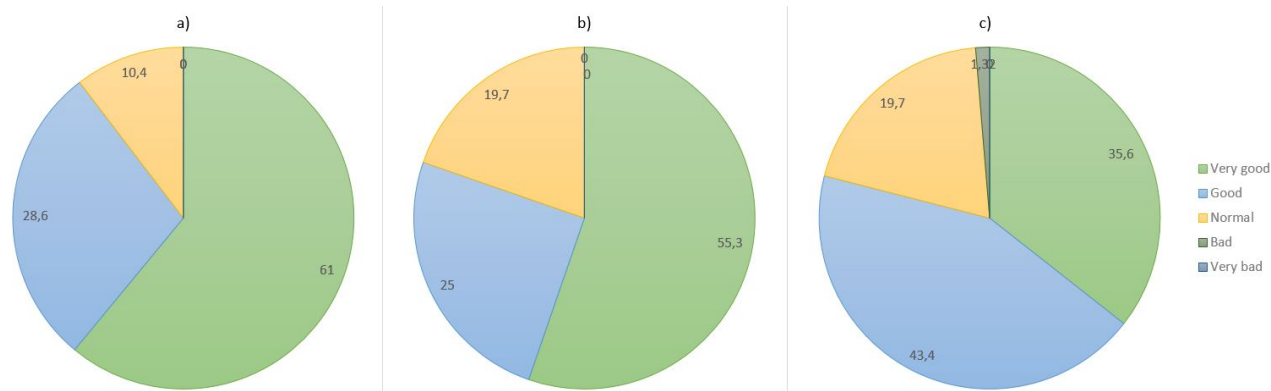


Figure 4. Workshops for teachers content perception. (A) General perception about contents. (B) Usefulness for teachers. (C) Relevance and usefulness of contents for classroom lectures.

usefulness for teachers is very good, their relevance for lectures is mostly considered to be good. This is still confirming the general conformity with the activity and its value for improving not only the way students face STEAM subjects, but also how teachers face their lectures.

In order to obtain a numeric evaluation from participants, both teachers and students, they were asked to rate the activities from 0 to 10. For scientific talks, teachers gave a mean punctuation of 8.79 and students a mean punctuation of 8.94. For the case of workshops, the mean punctuation given by teachers was 8.85.

Finally, surveys asked one last question to teachers: do you think this kind of activities help enhancing students' motivation towards STEAM fields of knowledge? 97,32% of teachers answered yes.

#### 4. CONCLUSIONS

Analyzing results from "Big Van Science" experience, it is clear that humor in a proper way and context is helpful for improving students' motivation and attitude towards STEAM. This activity confirms humor has an important impact on how STEAM subjects are taught, and mostly on how they are perceived by students.

Through this paper it has also been confirmed that introducing hilarious explanations as part of the speech reduces anxiety in students when facing STEAM lessons and enhance the relationship between students and teachers. On the other hand, regarding to society and general public perception of mathematics, the use of humor and music increases interest on the subject and acceptance in comparison to conventional talks about the same subject.

To conclude, STEAM perception changes with the fact that humor turns an abstract and complex knowledge in an educational amusement activity.

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