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Ted Talks to Improve Oral Skills in Spanish Engineering Students

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ABSTRACT: This paper is characterized by its interdisciplinarity, since it converges in an unusual way for undergraduate engineering students, three aspects of scientific dissemination: the contents of an engineering degree, the transmission of these contents orally in an effective way following the model offered by the TED talks, and the use of oral English as the language of scientific transmission.
The main objective of the communication is to highlight the need for the future Spanish engineers to bring their work closer to the general public through oral presentations that, without losing rigour, are brief and entertaining. The core of the study is made up by the analysis of three TED talks related to different fields of engineering degrees. In conclusion, we have tried not only to verify the need for the Spanish engineer to receive specific training in professional oral communication, but, in addition, the close relationship between the necessary tools (the method, the "how" of the transmission of knowledge) and the contents to be transmitted (the subjects of the degree in engineering, the "what" or "crux" of the matter). One part of the problem, of course, is the mastery of English. But no less important is what is known for effective oral communication, in English, in Spanish or in any language.

KEYWORDS: Oral Skills; Scientific Content; Spanish Engineering Students; Technical English; Ted Talks

INTRODUCTION

In recent years, with a greater popularity of this type of phenomenon thanks to the internet, TED talks have been incorporated as teaching material, being applied in different fields of education, especially in the subject of Technical English. Oral presentations have been gaining importance as an academic genre, especially with English language students and in academic and work settings. This occurs even in countries where English is not a language spoken by the social majority, not even a language taught in schools. But it can be seen that the skills that a person obtains thanks to oral presentations are very important in the development of their educational, work and even social environment.
The talks, being so many and so varied, allow you to choose from a wide range of topics, which is why they can serve multiple purposes. For example, certain talks could be chosen based on their content. Thus, students of technological degrees could learn the latest news about science and technology, or medical students could complement their studies with talks about advances in this field Although the paper addresses philological issues related to oral communication strategies, its most important contribution lies in the fact that the focus from which it starts has been moved from this more usual field (that of the linguist) to that of the engineer, in an effort to highlight for the latter group in general, and from the Spanish context in particular, the importance not only of the knowledge acquired, but the need to transmit it to society as a whole in an agile and effective way. This constitutes, therefore, the main objective of the study.
To achieve this objective, the core of the study is made up of the analysis of one TED conference related to a field of engineering, and specifically with subjects of the Degree in Engineering in Industrial Electronics and Automation and other related degrees, as they are currently taught. The methodology followed is similar to that of a "text analysis" in which aspects of the scientific dissemination previously shown come together in different ways. It is, therefore, a step-by-step breakdown of the form / content tandem, intended for the engineer, to "park" his attention to his formulas and tables and look up towards the public, diverse, but with a great interest, in front of which it has the urgent necessity to explain his findings and investigations.
We consider that this novel approach of an engineer to his own science (from the need for communication) can open parallel paths to the investigation of a specific content in itself in the Spanish university. There is no reason why the Spanish engineer cannot carry out a communication in TED format in their own language, with which this study could represent, as an additional contribution, a starting point for initiatives of this type

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THE USE OF TED TALKS TO TEACH TECHNICAL ENGLISH

TED is a non-profit organization dedicated to the dissemination of ideas through short talks, whose speakers are people from all disciplines and cultures seeking a deeper understanding of the world. They are based on the belief that the power of ideas can change people's attitudes and lives and, consequently, the world. This global community emerged as a conference where Technology, Entertainment and Design (TED) converged, and today it covers most topics such as science, business and global problems, among many others. The talks are translated by specialized translators on a voluntary basis into more than 100 languages and through events held throughout the world throughout the year, it has become a social phenomenon in recent years.

In recent years, with a greater popularity of this type of phenomenon thanks to the internet, TED talks have been incorporated as teaching material, being applied in different fields of education, especially for teaching specific English. Oral presentations have been gaining importance as an academic genre, especially with English language students and in academic and work settings. This occurs even in countries where English is not a language spoken by the social majority, not even a language taught in schools. But it can be seen that the skills that a person obtains thanks to oral presentations are very important in the development of their educational, work and even social environment.

There are already, in fact, numerous publications dedicated to this purpose, that is, to study the importance of TED talks in educational settings. Some examples of very useful and interesting talks are also proposed from pages specialized in education, with which it is sought in some way to revolutionize the way of thinking of children and young people[1].

The talks, being so many and so varied, allow you to choose from a wide range of topics, which is why they can serve multiple purposes. For example, certain talks could be chosen based on their content. Thus, students of technological degrees could learn the latest news about science and technology, or medical students could complement their studies with talks about advances in this field, or, on the contrary, about how little progress is being made in some developing countries in terms of medicine and health. Another example could be the use of a selection of talks for learning English. Thanks to the translations that are made of all the TED talks, they can be used as a method to learn English or even another language, since, as mentioned above, the talks are translated into more than 100 languages.

Regarding oral presentations in the field of education at the university level, two approaches can be distinguished. An approach in which presentations are made in the English for General Purposes (EGP) classroom, and a different approach in which they are made in the English for specific purposes (EAP / ESP, English for Academic Purposes / English for Specific Purposes)[2]. Particularly in engineering degrees, the oral presentation techniques that are carried out are based on a professional / academic approach, as occurs, for example, with the instruction in this regard provided by the subject of Technical English. This subject is taught in the different engineering degrees, and the presentations deal with the knowledge acquired during the degree, becoming familiar with the technical vocabulary in English and learning to develop a certain fluency in terms of oral presentations in this language. It is always difficult to make an exhibition in front of an audience, even if it is a teacher and classmates, but also doing it in a language other than the mother tongue provides a special plus that helps to train students in a much more intense way in this field.

With regards to the structure of a TED talk, the publication "Incorporating TED talk assignments into a public-speaking course" shows a series of details that should be highlighted. This article[3] mentions a TED talk by Nancy Duarte, consultant in oral presentations, and in this talk, the structure of the great talks in history is explored in depth. He points out that certain people changed the world through their speeches. But it might not have been so if they had not been able to communicate the idea they wanted to convey. Duarte states the following: "if you communicate an idea in a way that resonates, change will happen, and you can change the world"[4]. An idea remains only in that, an idea, if it is not communicated and transmitted to the rest of the people. And the most effective way to convey this idea is through stories.

There are many possible structures when it comes to telling a story in an oral presentation. Aristotle, for example, followed a structure with three acts: beginning, body, and end. Gustav Freytag, a German playwright, presented the stories in a five-act structure: exposition, increase in action, climax, decrease in action and outcome. But Duarte, after studying these structures for years, decided to combine two of the great talks in history, such as those of Martin Luther King or Steve Jobs in 2007, on the launch of the first iPhone. Even Abraham Lincoln's Gettysburg Address follows this same form. The basis that Duarte proposes consists of presenting the problem as it is, explaining what the situation is and what is happening and, from there, comparing that situation with what it could be, with the proposed solution. The more the gap between what is happening and what could be, the stronger is the belief in the idea that is proposed. It is simply another totally valid structure in terms of presenting a story to an audience.

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In addition, there are certain recommendations to take into account for good oral communication. These are the following:

1. Avoid using too complex vocabulary. Very technical or scientific jargon can be a barrier for non-experts in the field and will mean that they are not interested in the presentation, since they will consider it very complex. This increases the probability that the audience will stop paying attention and lose the thread of the presentation and, therefore, the message that you want to convey. Simple and accessible words should be used, so that all recipients of the message can clearly understand what is being explained, without incorporating unnecessary technicalities or acronyms.

2. Avoid so-called "bullet points". This concept consists of the presentation of a transparency with a list of points or numbered sentences in which there is only text, which is not only boring for the reader, but also, by showing a large amount of text, forces the brain to exert enormous effort, which can lead to neglect or an unconscious loss of attention[5]. As mentioned above, instead of "bullet points", what is currently used in universities such as MIT or Penn State, or institutions such as Texas Instruments is the Assertion-Evidence Approach technique. The use of good images helps to convey the point of view in an attractive and simple way. Graphs, diagrams or even auditory messages are also great resources to convey the desired information to the listener in an interesting and novel way.

3. Characteristics of the public. It is also important to be aware at all times of who the speaker is addressing, as there are different types of audiences and each of them require special preparation, based on their characteristics. These characteristics could be the age and training of the attendees or the room and region where the presentation is held. These singularities inherent to the audience can mark, in a quite important way, a large part of the writing and presentation of a speech, both in content and in form. What this work should not lose sight of is the need for an expert in any scientific-technical matter to be able to disseminate, that is, to explain complex concepts without excessive complications to a lay public who want to be well informed. In addition, it is necessary to be clear about the purpose for which a text is pronounced. It is different to approach a speech to convey novel information on a current topic, to try to persuade the audience to accept another point of view, or to encourage the public to take action against something specific. Very different purposes that the speaker must be clear from the beginning, in order to be able to convey his message to the listener in a simple way.

4. Structure of discourse. Defining a clear structure of the speech will help to organize the information and to remember the key ideas that you want to convey. The public will be able to be guided in this way in an easy way, without losing the thread, by the topics that are going to be discussed. The structure of the presentation should be a basic structure, with introduction, body and conclusion. This type of structure clearly delimits the parts of the speech, so it constitutes a simple guide for following it.

• Introduction: In this first part, it is essential to involve the audience, that is, to make the public interested from the first moment. This will be key in the future of the presentation. Such an objective can be achieved by asking a question, posing a problem or showing a very short video, in which you can see the path that the speaker is going to take. The main ideas should also be presented in a very succinct way, so that the listener is intrigued and keeps their attention high.
• Body: The body should contain a clear structure as far as the main ideas are concerned. Key points will be discussed one after another, recommending a maximum of three and avoiding burdening the listener with too much information. The most important points and concepts that may be more difficult to understand will be explained in detail, speaking more slowly and speaking more clearly than usual if necessary.
• Conclusion: In this last part, the key points and main conclusions should be summarized, emphasizing the message that has been wanted to convey. The provision of new information should be avoided and also ended abruptly. This is easily accomplished by flipping a question or leaving one or multiple possibilities open. Closing the conference with a personal anecdote makes the audience identify with the speaker. People love to hear stories or anecdotes and they will feel a stronger connection to the speaker.

5. Rehearsal and practice. Practice, as already noted, is essential in a good presentation. Repeating the speech several times, standing up and out loud, before facing an audience is very beneficial to control duration time, pauses, breathing, etc. Maintaining a relaxed and positive posture, with your hands always visible, will influence the audience and keep the attention on the speaker. In addition, you must be aware at all times of the tone and volume of the voice used, emphasizing at times that require it and taking pauses where appropriate.

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6. Feeling of closeness. The visual and repeated contact on many occasions with the audience shows security and sufficiency, which transmits complicity and sincerity, the viewer feeling that he is really being helped to understand what is being explained. The use of rhetorical words, strategic repetitions or deliberate long pauses give the presentation an emphasis that attracts the audience, generating greater expectation and focusing all the attention on the speaker.

7. Not reading and leaning on the equipment. In no case is it recommended to read the speech from beginning to end, since it is not very attractive to see someone read a piece of paper. Small cards instead of a large sheet of paper can help you follow the order of the presentation, avoid reading excessively, and maintain eye contact with the audience. Knowing the equipment that is going to be available and knowing how to handle it with some ease will be very important in order to avoid, as far as possible, any problem with it during the talk. It is good to use the equipment, for example, to control the times or to develop a series of slides.
8. Non-verbal aspects. Head movements are an important aspect in this type of conference. Nodding or shaking the head to emphasize the message, or tilting it to the side expressing inclusiveness helps in the transmission of communication when properly coordinated with the verbal language. Hand gestures also provide extra emphasis to help the recipient of the message. In conclusion, it is important to convey the desired message, but so is how the message is conveyed. Both the verbal and non-verbal aspects will mark the development of the talk and, to a large extent, its success.

From the cited elements it is observed that, although TED talks may seem unstructured to the inexperienced eye, they tend to follow a specific and persuasive format that highlights the passion for a specific topic[6], a format that it's what makes it so much of its success. With this structure common to all the talks, it is possible to attract the entire public, focusing attention on the speaker and getting involved in the topic on which the presentation is about. The structure will always have an engaging story and images and multimedia elements will be incorporated into the story while the information is verbally presented. Furthermore, the interaction between verbal and visual elements highlights the interrelation of invention and organization in contemporary public discourse, trying to achieve a perfect mix between improvisation and order. Thus, multimedia elements become more important than help. They become a fundamental piece to develop a relationship between the speaker and the audience, fostering personal connections between both parties.
A TED talk, despite its innovation and great complicity between the parties, is still a formal talk between a speaker and an audience that does not actively participate in the presentation. There is no interaction or discussion, but this one-way communication does not prevent the personal connections mentioned above. Therefore, it can be said that those responsible for student learning and education should attend these types of events, to learn to communicate effectively and transmit information effectively.

TED TALK ANALYSIS

3.1. Analysis characteristics

Once the use of TED talks and their importance in professional oral communication has been specified, this section will carry out an in-depth analysis of one specific talk. This has been chosen for its relationship with the contents studied in the Degree in Industrial Electronic and Automatic Engineering in particular, although it also presents similarities with contents of the rest of the degrees in industrial engineering, such as the Degree in Mechanical Engineering among others. Due to the limits of the extension of an academic paper, we have reduced the analysis to one talk, since it has been preferred that it be exhaustive, to a less complete analysis of a greater number of presentations.
In this section, therefore, different characteristics such as the content of the talk, the expression and communication strategy of the speaker or the effectiveness of the communication will be studied. All this always keeping in mind, once again, the double objective of highlighting the importance of oral scientific-technical dissemination and the need to use English as a language of international communication. Not only because it is the shared language in this area but, at the same time, because through it those effective communication strategies are materialized that have popularized especially the Anglo-Saxon universities. In this way, it can be said that the "how" matters as much as the "what", in other words, the medium and the message come together to make science and technology accessible, and without losing rigor, to the common citizen.

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3.2. Vijay Kumar: The future of flying robots

Vijay Kumar is the speaker of the talk that is the object of this paper. Kumar is a professor at the School of Engineering and Applied Sciences at the University of Pennsylvania and his work focuses on the control and coordination of robot networks. In this talk held in April 2015, Kumar explains the process by which he has created robot formations in order to help improve the agricultural sector. As the professor explains, 1 in 7 people in the world is undernourished, a problem whose solution is difficult considering that most of the area that can be cultivated already is. Furthermore, production efficiency is declining and, together with water shortages, crop diseases and climate change, further exacerbate this problem. To try to correct this problem that society is currently facing, Kumar and his team have managed to develop networks of autonomous aerial robots capable of flying over crop fields with the aim of building precision models of plants at the individual level. Through the information provided by these robots, the farmer would be able to meet the specific needs of each of the plants that make up his crop, without having to waste inputs on plants that do not need them.

As far the specific content of the talk is concerned, the presentation contains fairly basic language, without a lot of technical words. It is a vocabulary within the reach of all the public, because, although the topic that is developed is about a very specific subject, the speaker transmits the message through simple words with which the talk can be followed without having prior training in the subject. On the other hand, it is closely related to the Degree in Industrial Electronic Engineering and Automation in which an elective course on mobile robotics is taught. In it, this type of robots is studied in a general way, whether they are flying or not. Also, year after year, undergraduate students are offered the possibility of signing up for an expert association in this subject that participates in national competitions regarding the manufacture and development of drones.

Some specific words of the presentation, whose translation is very similar in Spanish are:

i. Autonomous aerial robots. Belonging to the field of robotics, it is an aerial robot, also known as a drone, that flies without a crew. In this particular case the robot is capable of acting solely at your discretion, without the help of a GPS to provide you with the position. Regarding this and other specific terms of the talk, of technical language in general and of robotics in particular, it is worth noting the abundance of the so-called “compound nouns” in English, that is, groups of words that are assembled around a main noun that is always placed at the end of the group. In this case the translation is literal, but in others, when translating it into Spanish, it is necessary to paraphrase the original with the help of prepositions. On the other hand, many of these “compounds”, when their use becomes generalized, become acronyms and stop being translated into the respective languages. For a non-native speaker, be he an engineer or not, this is important to keep in mind if he is to make a correct conceptual transposition into his own language.
ii. Laser scanner. Word that belongs to the field of computer science, allows an analysis of the interior of a body or object through computer processing.
iii. Method of triangulation. Coming from the field of geometry, this method tries to determine the singular points of a territory by means of the exact calculation of the geodesic vertices (exact geographical position).
iv. GPS (Global Positioning System). This acronym of North American origin belongs to the field of geolocation and refers to a system that allows to determine the position of any object throughout the Earth.

This talk is also related with the subjects of the Degree in Industrial Electronic and Automatic Engineering. The subject of the Degree in Industrial and Automatic Engineering that is most related to this talk is Robotized Systems. In this presentation, focused on flying-type robots, the most important contents studied in the subject taken in the third-year deal with the language with which the orders are transmitted to the drone and the communication of the drones with each other.

Also, the subject of Real Time Systems Programming, taught in the third year, is highly represented in the talk, since drones are operated using very specific programming languages. In this subject, various types of language are learned with different characteristics such as ease of programming, robustness or reliability, among others. In different tests carried out by Professor Kumar's team, the programming language used in the implementation of algorithms is C ++[7], the main language studied in the subject.

The Mechanics of Machines subject of the second year of the degree intervenes to a great extent in this project, since the knowledge of the subject is needed in terms of the movement of the propellers, the inertia with which the robot moves or the construction of the drone itself.

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The Microprocessor-Based Systems subject, taught in the third year, is used to check how very simple applications can be programmed using very basic programs. In this case, having a limitation in terms of the weight of the drone, very light, but also robust devices are needed to withstand possible blows. The processors that have been seen and programmed in this subject, once completed, meet these criteria with guarantees.

Another important subject is Power Electronics, taken in the fourth year of degree. Professor Kumar comments on the amount of energy that is necessary to fly a drone according to its weight and other characteristics, which is precisely what is studied in the subject: the energy that the components need to function correctly, the capacity of the batteries during the flight of the drone or the specifications of any power component.

In the early stages of the design process, it is very important to have a basis for further understanding of technological knowledge in general. The subjects of Physics I and Mathematics II taught in the first and second year respectively, are basic to develop more complex knowledge, such as, for example, the trajectories that the drone must follow or the triangulation method referred to by Professor Kumar during the presentation. Also, the subject of the first year of Graphic Expression provides contents related to the design and elaboration of a prototype following a standardized industrial drawing standard.

The most focused subject in this part of the presentation is Systems Modelling and Simulation. Taught in the third year, this subject is essential when recreating a three-dimensional map of the interior of buildings or for the three-dimensional reconstruction of plant models, by estimating the size of the mantle and its subsequent correlation. Another subject involved in this talk is Computer Vision, taken as an optional subject in the last year of the degree, it provides a wide variety of skills in terms of object recognition and the use of various applications for image processing.

The Engineering Projects course is essential in any project of these characteristics. Completed in the fourth year, the subject teaches all kinds of methods and programs for better planning and time control when manufacturing or programming drones, for example.

Lastly, the subject of Technical English is also very important in the project and other similar ones, since they include expert robotics engineers of different nationalities and the language they share, beyond technical knowledge, is English.

Regarding its social aspect, the social application that Professor Kumar's finding carries with it does not become apparent until the last part of the talk. Once Kumar has explained the processes that he has gone through to conclude this project, he explains what are the benefits that his robot networks can transfer to society. Supporting his presentation with a video, Kumar shows a network of robots flying over a crop field and describes how the robots create personalized maps of each plant.

The information provided by the robots is very valuable, since it allows us to know what the needs of each plant are, such as the amount of water they require or the level of fertilizers and pesticides. Obtaining this information, the farmer in a specific way would be able to know:

- The number of fruits of each plant, which would allow you to know the harvest of the crop field, optimizing its production.
- Through a three-dimensional reconstruction, the farmer could know the level of photosynthesis carried out in each plant, which would show the level of health of each one of them.
- By combining visual and infrared information, the robots would provide information on the efficiency of each plant.
- Finally, through a totally autonomous process, the information obtained would reveal the appearance of diseases in crops such as chlorosis (a plant disease characterized by the loss of the green colour in its leaves). In this way, the farmer could detect early which plant is sick.

Thanks to this information, Professor Kumar proposes a possible solution or, at least, a reduction of the current problem of agriculture. And, according to Kumar and his team, the use of autonomous aerial robot networks would increase the yield of the crop field by 10%, as well as reduce the amount of production factors that they need, such as irrigation water in 25%.

This would mean great benefits for society and the sustainability of the environment. According to a report by the United Nations, it is estimated that almost half of the world's population lives in areas at risk of water scarcity for at least one month a year, with the agricultural sector being the main consumer of water (United Nations World Report United Nations on the Development of Water Resources, 2018). Adapting the needs of crops to reduce water consumption is a fundamental factor to protect the sustainability of the environment and the future of the world's population.

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Finally, considering the expression and communication aspects, professor Kumar develops his presentation following a thread of argument, without clearly differentiated parts, in contrast to the two talks previously described in the present work. Kumar begins the talk by showing on stage an autonomous aerial robot like the ones he builds with his team in the laboratory at the University of Pennsylvania. This robot serves to introduce his talk by describing its characteristics, and, as he explains, they have a peculiarity with respect to the robots that are currently on the market.

The robots developed by his team do not have a built-in GPS, which makes it difficult for them to determine their position. To overcome this limitation, the robots are fitted with sensors, cameras and laser scanners. The incorporation of these components increases its size, being heavier and, therefore, presenting a low level of autonomy since energy consumption is high. However, these elements allow the robot, using a triangulation method, to be able to scan the environment creating high resolution maps, thus identifying obstacles in the place where it is.

Once these disadvantages have been raised, the professor begins to show a series of experiments carried out in his laboratory with different prototypes of robots. In the first place, it shows a much smaller robot since the aforementioned components were replaced by a conventional mobile. The mobile, together with an application that can be downloaded through its store, is capable of performing the same function as the initial robot, but correcting the problems found in size, weight and consumption. These robots then became much smaller in size allowing them to go faster and move in environments without a clear structure.

To explain the second essay, Kumar shows a video in which we can see a robot that has had an arm attached to it, allowing it to grasp objects while it is moving. Finally, in the third essay he shows a robot which carries an object hanging from its body with a rope. The total length between the robot and the load is greater than the length of the gap through which the robot has to pass. One might think then that it is impossible to pass the load through the hole. However, this robot is capable of oscillating the load to be able to overcome the obstacles with which it faces without colliding with them. These three tests allow the teacher to demonstrate the advantages and autonomy of designed robots.

However, Professor Kumar and his team were pursuing the goal of building robots even smaller in size in order to make them very light and safer. Inspired by the bees by the very small inertia that their flight has, the professor built a robot so light that it was able to resume its flight when it collided with an obstacle, thus making it safer. In this way, he managed to develop a robot with a weight of 25 grams, only 6 watts of consumption and capable of traveling 6 meters per second. In addition, it was possible to increase its safety since the lightness of this robot allows it to absorb and respond to collisions, thus resuming its flight normally.

Once this robot was built, Kumar and his team realized the disadvantages of its small size. It was then that Kumar, inspired by nature, wanted to create “swarms of robots”. Thus, he began to create networks of robots. Kumar then not only had to create the network, but each of the robots that made up said network had to be able to interact with the others to carry out detection, communication and computing tasks. To achieve this goal, Kumar developed a series of algorithms based on three organizing principles that we can find in nature:

1) The robots have to be able to interact with each other, that is, they must be able to feel and communicate with the other robots that make up the network.
2) Principle of anonymity: there is no central coordination. That is, there is no main robot that sends orders to the rest, but each of the robots individually reacts to the others.
3) Finally, in order for the robot network to be able to follow different forms as can be observed in nature, they included mathematical descriptions of the formations they could execute.

Once the teacher shows which are the characteristics that have been incorporated into the robots, he focuses the final part of the talk on the application of his project. According to Kumar, agriculture can benefit greatly from robot networks. To show how this would happen, first, detail what are the problems facing agriculture today. He then explains how his robot networks are able to obtain information at the individual level of each plant by creating maps through colour, infrared and thermal cameras. These plants that make up the crop field will form a complete map in order to know the amount of fruit it produces, the need for water or if they are suffering from any disease.

Throughout Professor Kumar's presentation, a great visual impact can be found both in the way of presenting the talk and in the introduction of videos with which the public present enjoys and is entertained. As soon as the talk begins, and subsequently on several occasions, drones fly around Professor Kumar that he has built together with his team from Penn State University. In

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addition, the initial videos show the operation of robots at the individual level, as well as at the network level. This allows listeners to get an idea of the project developed by the teacher and his team.

With the information collected, the robot is able to create this map in such a way that anyone would be able to see a certain place without being physically present in it. By using these videos, the teacher allows viewers to view the maps created by the robots, thus reaching a greater degree of understanding.

Next, the teacher shows on the stage another robot built that incorporates a well-known brand mobile phone, which incorporates a high-resolution camera with which costs are reduced. Two videos are also shown in which the different robot prototypes that he and his team have been developing throughout this project are observed. The first, of great impact, shows an eagle catching a fish in the water and shows how a robot would do this.

Subsequently, the teacher begins to explain the objective of the project: the creation of robot networks and their operation. To do this, it displays various images and videos. In the first image you can see how these networks are formed in nature. And then a video is shown in which one of the members of his team is observed with a robot in his hand. The rest of the robots interact with the "kidnapped" robot by moving around it and performing similar movements.

More videos of networks of robots performing totally synchronous movements are also shown, making forms of all kinds under the orders of Professor Kumar's team. Finally, the professor exposes the problems that this network of robots can solve, through applications to improve agriculture and crop fields such as the recreation of an orchard using colour, infrared and thermal cameras.

CONCLUSIONS

Various conclusions can be drawn from the previous information. Regarding the specific content, the vocabulary used by the speaker is very specific, aimed at an audience that must have a medium level of scientific knowledge about which the presentation is about. In this regard, it has been possible to verify the necessary application of practically all the subjects taken in the Degree in Industrial Electronics and Automatic Engineering for the complete analysis of the talk. Nowadays, an engineer must be able to master all the facets of his area of knowledge, and the sufficient capacity is presupposed to adapt to those that he does not master. In this sense, the TED talk shows to what extent the set of knowledge acquired in the different subjects of the degree can and should be put into operation at the service of effective communication.

In the talk analysed, the core element is the social aspect that it treasures. A study is proposed or a product is implemented in order to improve the quality of life of society. This, which must be present in all facets of a professional's life, is something that an engineer should not lose sight of: the why or why of any project, beyond the immediate response from the technical field.

Regarding the expression and the communicative aspects, it can be concluded that the speaker makes his presentation in a personal way, but always framed in the prototype of TED conferences: pleasant talks, with many images and videos with a great visual impact, personal references, closeness to the public, multiple non-verbal aspects that have not had a place here (repetitions, changes in the tone of voice, eye contact, rhetorical questions, humour, body language and many others), great capacity for synthesis and undoubted ability to transmit complex concepts in a language accessible to the average citizen.

Returning, then, to the main objective of the present paper as it was stated in the introduction, we have tried not only to verify the need for the Spanish engineer to receive specific training in professional oral communication from the university classrooms but, in addition, the close relationship, already existing, between the necessary tools (the method, the "how" of the transmission of knowledge) and the contents to be transmitted (the subjects of the degree in engineering, the "what" or "crux" of the matter). We believe that the matter should involve all parties in charge of designing the curricula as a whole. One part of the problem, of course, is mastery of English. But another no less important, as we hope to have shown in these pages, is what is known for effective communication, in English, in Spanish and in any language.

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