



How the use of an internet radio program and podcast helped Civil Engineering students engaged with local communities in need

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ABSTRACT

Engineering students sometimes have a lack of soft competences such as communication, self-motivation, and leadership. The development of soft competences serves to engage students in utilizing critical thinking and problem-solving skills. In the higher education sector, there is a growing recognition of the need for generic skills development using online-learning and self-directed learning pedagogies. The aim of this work is to present a strategy designed to develop the communication skills of civil engineering students through their participation in a radio podcast program and how this strategy has started social projects. In this study we propose a framework for the development a radio podcast for students in universities in order to enhance their soft skill along their studies. We propose a methodology and then we present a case study for the implementation of the method approach. The results show that the radio podcast program helps the students and university to engage with the community in order to attend social problems. Also, the program has demonstrated to develop the communication skills of the students involved by creating innovative solutions in specific socio-economic contexts and coordinating in multidisciplinary teams.

Keywords: podcast, social media, engineering education, Tec21, higher education, educational innovation.

1. Introduction

Engineering students sometimes are labelled as good professionals with technical knowledge but lacking soft competences such as speaking in public or excellent oral skills. The development of soft competences serves to engage students in utilizing critical thinking and problem-solving skills to interact with the subject matter [1]. Also, soft competences encourage students to acquire a deeper understanding of social problems in their communities and how they can contribute to solve them through engineering [2]. Podcasting is increasingly capturing the attention of educators in the last three decades from a wide variety of disciplines to support the development and updating of a range of competences including communication skills [3]-[5]. In the higher education sector in general there is a growing recognition of the need for generic skills development using online-learning and self-directed learning pedagogies [6], [7]. The aim of this work is to present a strategy designed to develop the communication skills of civil engineering students through their participation in a radio podcast program and how this strategy has started social projects.

With this in mind, we carried out an empirical study with undergraduate students of the program of civil engineering of the Tecnológico de Monterrey campus Puebla in Mexico. Several projects have started with local communities that get to know the students throughout the program and podcast. One example is the

work done in a rural community affected by the strong earthquakes of 2017 in Puebla, Mexico. Inhabitants from very poor communities affected by the earthquakes approached to our university asking for help after listening to some episodes of the program. These people could not afford the inspection services to evaluate the damage to their homes. Therefore, students from the university, under the supervision of lecturers, developed the assessments to determine the extent of the damage in the dwellings. The experiences and lessons learned were shared in local radio programs and more communities approached asking for similar help.

Students got motivated by this experience and they started a project to design a basic home that was structurally safer for marginal rural zones of central Mexico. The radio podcast program has helped the students and university to engage with local communities in order to attend social problems. Also, the program has demonstrated to develop the communication skills of the students involved by creating innovative solutions in specific socio-economic contexts and coordinating in multidisciplinary teams.

2. Background

2.1. Podcasting in education

According to Meng [4], podcasting is defined as “the process of capturing an audio event, song, speech, or mix of sounds and then posting that digital sound object to a web site or blog in a data structure called an RSS 2.0 envelope (or feed). Using specialized news readers, users can subscribe to a web page containing RSS 2.0 tagged audio files on designated web pages and automatically download these files directly into an audio management program on their personal computer. When a user synchronizes their portable audio device with their personal computer, the podcasts are automatically transferred to that device to be listened to at the time and location most convenient for the user”. Nowadays there are new kinds of podcasts such as enhanced podcasts and video podcasts, or vodcasting [8]. Vodcasting, which refers to video files that are distributed in a digital format through the internet using personal computers [9], has become the most popular kind of podcast due to the dissemination of social media and due to the key benefits included positive affective and cognitive attitudes [10]. Kay [10], developed an extensive literature review about the growth of podcasting in education finding benefits such as, positive affective attitudes toward vodcasts (e.g. enhancement of the learning experience and increase in the perception of confidence along the learning process), positive cognitive attitudes toward video podcasts (e.g. improving the learning process and improvement of analytic, communication, cooperation, creativity, and technology skills), positive impact on students behavior (e.g. frequency of viewing, consistent attendance at lectures, and improvements in study habits), and positive impact of students learning performance (e.g. improvement on the performance in test scores, self-report data, and changes in practice). Also, recent studies have demonstrated the technical benefits of implementing podcasting in terms of: 1) practicality of content production, publication, and

delivery [3], 2) flexibility for user control and portability that allows time-shifting and multitasking [5], [11], 3) affordability for accessing the content [12], and user's engagement [8], [13].

Even though the research in regards the benefits and limitations of using podcasting in education are still ongoing, the evidence suggests that podcasting is becoming a powerful tool for the education in the new century. Research in the field of Technology-enhanced learning (TEL) has demonstrated the benefits of utilizing information and communication technologies (ICTs) in learning and teaching [14]-[16]. It has been argued that the use of ICT as didactic tools has the potential of enhancing the learning experience and outcomes by taking advantages of the ICT characteristics of flexibility, accessibility, affordability, and without temporal or spatial limitations [14], such is the case of podcasting. There is no doubt about the importance of TEL for the education of the 21st century. Therefore, it is important to develop studies that develops a documentation of the results of the implementation of TEL.

2.2. Development of soft skills in engineering students

Soft skills are personal traits that have the potential of enhancing engineer students' interactions, job performance, and career viewpoints. Soft skills are defined as personality traits, social gracefulness, fluency in language, personal habits, friendliness, and optimism to varying degrees [7]. Some studies have pointed out the importance of developing soft skills in engineering education. In their study Debnath et al. [2], reported that engineering students realized the need to enhance their soft skills in order to have a "competitive edge" when seeking employment. On the other hand, it has been proven that the Corporate World gives preference to engineering graduates who have developed soft skills such as persuasive communication skills, emotional intelligence, critical thinking, and versatility [1]. Unfortunately, currently engineers are not prepared and equipped during higher education with the appropriate soft skills in leadership and management and most of the times engineer hone their soft skills while at work (i.e. learning "in the hard way") [6]. Therefore, it is necessary to create the mechanisms in engineering education to include the development of soft skills in the students in order to prepare them better for the employment market.

2.3. The knowledge gap

Today's competitive global market demands engineers with soft skills in addition to technical skills. Unfortunately, the evidence shows that the current models for engineering education do not incorporates efficiently the development of soft skills in the students. Therefore, the aim of this work is to present a strategy designed to develop the communication skills of civil engineering students through their participation in a radio podcast program and how this strategy has started social projects.

3. Methodology

Figure 1 shows the proposed methodology in the framework of higher education in Mexico.

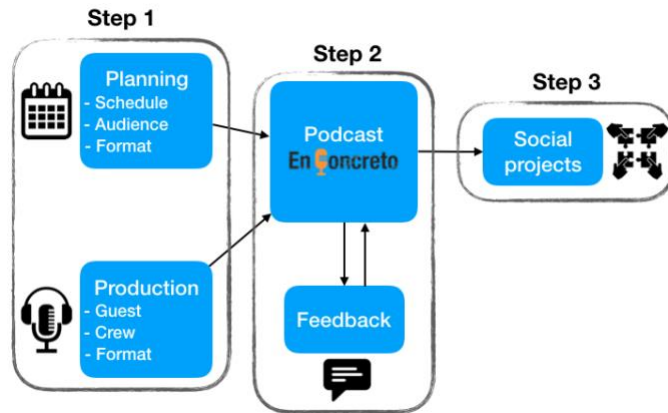


Figure 1. Proposed methodology.

3.1. Step 1.

Planning. In this step, the contents that will be addressed in the program corresponding to a final audience are planned. Most of the participants are students of the Tec de Monterrey, however the public outside the university community may listen the podcast and participate eventually. Because of this, the creation of social projects that gives meaning to this work was possible. The program consists on talking about civil engineering topics. The students have the opportunity of participating by giving their opinion and creating a debate. A teacher, who is the moderator of the topics, gives the guideline of the program to have a pleasant and fluid conversation.

Production. Here we define who will be the guests for each of the programs based on current topics of debate. Students contact the guests to invite them and explain their participation. As the podcast is a program made by students, it is necessary to define a schedule in which most of the students can attend. The schedule is always flexible enough in order to allow the students to participate regardless other academic responsibilities. The student teams change from semester to semester because some of the members graduate and find it difficult to attend the podcast on the schedule that is defined.

3.2. Step 2.

Podcast. In this step, the podcast is developed in a radio studio inside the Tec facilities. The duration of the podcast is one and a half hours and the topics agreed in the planning stage are discussed. The students have freedom to speak when the moderator allows it. The teacher or teachers who accompany the student team serve as moderators during the podcast and collaborate with questions towards the guest or guests

promoting that the students participate actively. During the podcast the audience can interact with the entire team. This interaction can occur mainly through comments on social media platforms or direct messages. This part of the interaction with the audience is what in Figure 1 is called Feedback. During the feedback of one of the podcast programs, a representative of the Chietla community contacted us to request our help to evaluate homes that were affected after an earthquake that occurred on September 19, 2017.

3.3. Step 3.

This step was created to attend the request of the representative of the Chietla community. In this step we contacted the authorities of Chietla. Then, the podcast work team, “En Concreto” team, with the collaboration of the instructors devised a strategy to help the community. The strategy was designed and implemented. Figure 2 shows the main steps of the proposed strategy.

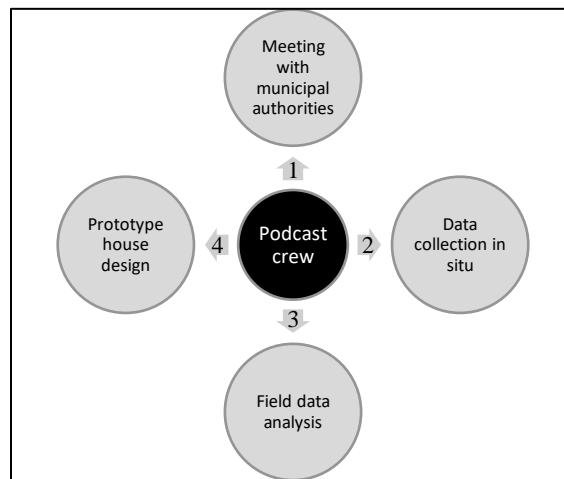


Figure 2. Strategy created to help affected people.

The first step of the strategy was a meeting with the municipal authorities to present the project and the idea of helping people who had contacted us through the podcast. After the meeting with the authorities, we made a tour with the podcast crew to make a recognition of those affected using a questionnaire where we specified the type of housing, the type of construction materials, basic services, the age of the inhabitants and inhabitant’s disabilities. The data collected was analyzed and a prototype of sustainable dwelling was designed to satisfy the basic needs of affected population. The proposed dwelling design can be adapted in the future, allowing it to expand its space and be more comfortable. The distribution of the dwelling areas was according to the general needs of the inhabitants. However, it was more important to ensure the safety of the building in terms of seismic design and materials.

The design of the dwelling is as shown in Figure 3 and 4. The design, distribution of spaces, and the square meters considered are based on the budget for the construction of the house. The construction budget was received from donations made to the Tecnológico de Monterrey through alumni and parents of students who wanted to help. For the design of the house, the elements shown in Figure 5 were considered. The objective was not only to design the dwelling but also to integrate the design with the environment and try to make it as sustainable as possible considering local aspects for the budget, comfort, and the possibility of expanding the house. Figure 4 shows a transversal section of the dwelling design.

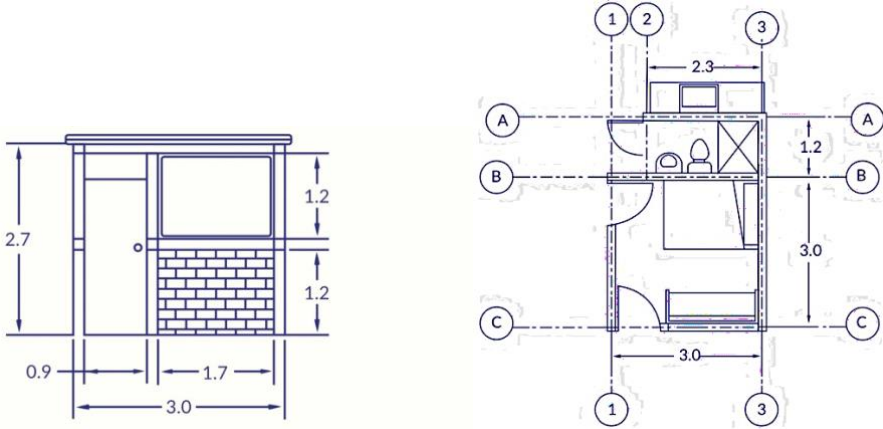


Figure 3. Dwelling design.

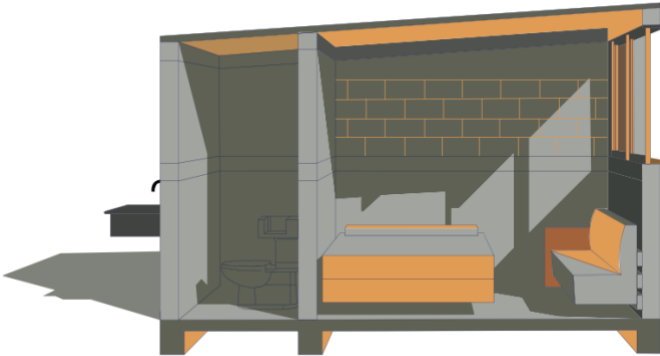


Figure 4. 3D model of the dwelling design.

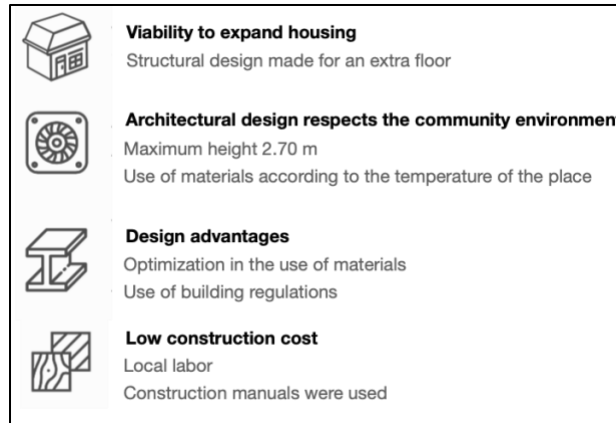


Figure 5. Characteristics of the dwelling design.

4. Case Study

4.1. Background

On September 19, 2017 there was a 7.1 magnitude moment earthquake (Mw) with an epicenter in the city of Axochiapan, Morelos. The proximity to the epicenter caused significant damage in cities and towns in the south of the State of Puebla. One of these towns is Chietla, it is located 20 km from the epicenter. Chietla has a population of 5,726 inhabitants. The total number of houses in the city is 1,145 and 100 of them were severely affected by the earthquake. 22 dwellings were selected for this project because they did not received help from the government.

4.2. Stakeholders

From the moment the inhabitants of the Chietla community approached with the team, our first reaction was to contact the municipal authorities of the place to have all the details of the situation. The relationship with the authorities from the first moment was very polite and they provided us with a list of the people affected and who still did not have government support to rebuild their homes. They also helped us with the demolition of the houses, the preparation of the properties to build on them and with all the necessary steps to start construction (permits, connections to the sanitary network and drinking water, etc.). A special mention should be made to the community itself, from the first moment they believed in our project and participated from start to finish. The trivalent of Tec de Monterrey, municipal authorities, and community was essential to carry out this project.

4.3. Results

Through field data analysis we found the different characteristics of the houses that were affected by the earthquake. Figure 6 shows the percentages of the materials with which the houses we rebuilt were built.

As it is display in Figure 6, 65% of the houses were built with adobe walls and the second most used material were bricks. Figure 7 displays the type of materials for the roofs for the affected buildings.

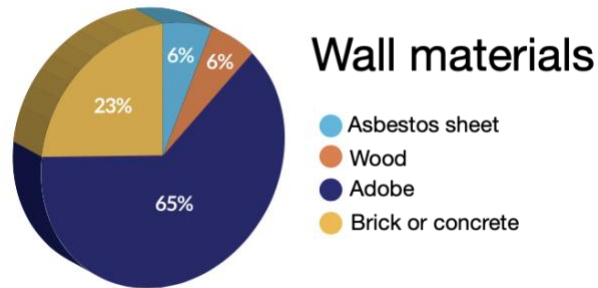


Figure 6. Wall materials of reconstructed dwellings.

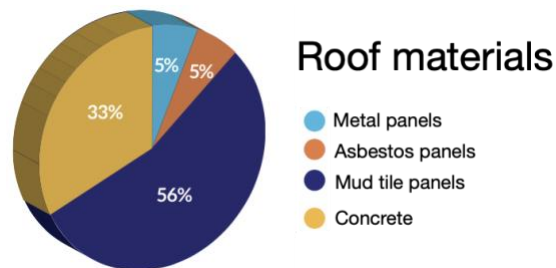


Figure 7. Roof materials of reconstructed dwellings.

Both figures show that 50% percentages of the houses were built with mud tile panels and adobe walls. This could be a factor for the extended damaged by the earthquake. Another interesting fact is the aging of the affected houses. According to Figure 8, 50% of the affected houses are in an age range from 61 to more than 99 years. With the help of local authorities, donors, Tec de Monterrey authorities, and the podcast crew, the 20 houses for the families affected by the earthquake were built. The main objective was to bring a comfortable and safe dwelling for the inhabitants.

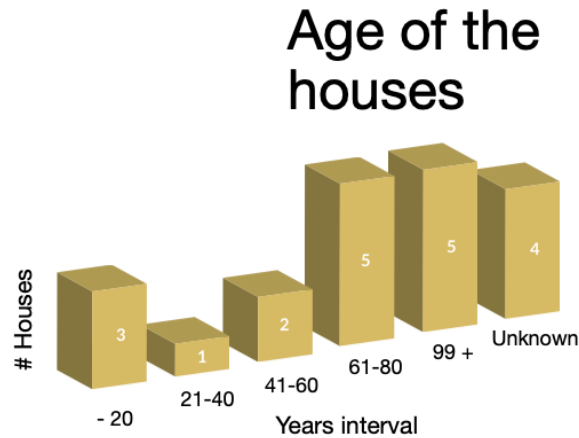


Figure 8. Age of houses.

5. Conclusions

This study proposes a simple methodology for the planning and execution of podcast radio program managed by students and in the context of universities in Mexico. This study demonstrates with a case study the impact that a podcast radio program can have for improving soft skills in the students that are involved. An important aspect to highlight, is the fact that the podcast radio program was developed without the need of extra funding. In other words, it is demonstrated that this kind of initiatives do not need extra budget. The existing infrastructure of the systems can be used in order to implement these kinds of projects.

It can be concluded that the podcast is a powerful tool for the dissemination, development of skills for engineering students and, more importantly, for allowing us to help a community that needed technical knowledge in an emergency such as it was the earthquake of 2017. Currently, the program is still broadcasting but with a more social and not just engineering approach.

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