FLIPPED LEARNING BASED METHODOLOGY PROPOSAL FOR THERMAL ENGINEERING

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Abstract

This work presents the first results of the use of a YouTube themed channel designed expressly to be used as an inverted learning tool of the subject of Thermal Engineering at the University of the Basque Country (UPV-EHU), within a proposal that promotes the active and autonomous learning from the students; The final objective of the proposal is to design and implement a coordinated active methodology for the basic common subjects that the Thermal Engineering Department of the UPV / EHU imparts in the degrees in Engineering of all the technical engineering schools of the UPV / EHU And of the Esc. Sup. De Ing. De Bilbao.

Keywords: Innovation, flipped learning, YouTube.

1 INTRODUCTION

Research in the overturned classroom should employ controlled studies that not only examine the performance of students but also it is imperative that researchers who use the flipped classroom take advantage of the measurements of indicators that allow to optimize videoguides and improve their efficiency. One of these indicators is the capture of the audience.

Social platforms for the dissemination of videos on the internet as YouTube allow access to different audiences data and their behaviour that allow feedback to the researchers who design and create video tutorials for their subjects. In this paper we present the use of these metric data for the optimization of the channel of the subject of Thermal Engineering.

2 METHODOLOGY

On this project, it is proposed to develop a learning methodology based on an inverted learning program, supported by a trilingual YouTube channel for the subjects, in which the student, through videoguides designed based on the Khan Academy video tutorial format can work and develop content previously, individually and at their own pace, so that lower-level skills according to Bloom's taxonomy (knowing, identifying, understanding) are done at home individually through the tutorials available in the YouTube channel of the subject, and classroom time is used to work the higher level skills, more complex to develop (apply, analyze, synthesize, evaluate), through group work activities and with the help / guidance of an active teachers, through guided problem solving (GPS) and the use of ICTs (Socrative).

At the student level, it is expected that not only the academic results of the subjects in which it will be implemented, but also a number of advantages associated with this type of active methodologies will be achieved: improving the student's attitude to the subject, increasing interest and motivation, providing the student with greater autonomy and personal initiative, increasing fellowship and in general it is expected to increase the degree of satisfaction of all involved (students, teacher, families). The student will be aware and responsible for their own learning, Will improve their autonomy and personal initiative, their critical thinking and their creativity to carry out each of the practical tasks we entrust to them in class.

In this first phase a study of the visualization metrics of the different videoguides created and made available to the students in the YouTube channel has been carried out, in order to be able to identify the relationship between the videoguide format (duration, thematic, etc.) with the student's level of
follow-up, through the analysis of variables such as the average retention time of the audience, the number of visualizations, the type of device used by the student, and the traffic sources.

This analytic data from YouTube channel was used to identify the effect that variables as the videotutorial duration, the narration speed and the traffic sources to connect with the channel were more effective in terms of audience retention.

The YouTube channel for Thermal Engineering subject was available for students from October 2016, with 40 videotutorials, 30 of them regarding theoretical concepts and mathematical development of equations and 10 of them related to exercises and laboratory demonstrations, covering the 10 different chapters of the subject. The average duration of the videotutorials is 4 minutes.

3 RESULTS

Through the YouTube analytics tool the most relevant statistics on video tutorials were obtained, a very important factor to control in order to achieve a successful implementation of the flipped learning methodology.

The number of visualizations of the videotutorials, the time of visualization of each videotutorial and the sources of traffic have been determined as more representative variables.

In addition, it has been studied the influence that the type of device used by the student to visualize the channel affects in the audience retention.

All these statistics will allow a redefinition of the most important parameters of the videotutorials in order to design a more efficient channel.

3.1 Audience Retention

A critical aspect for a successful videotutorial channel is the capacity to retain the audience retention. The total number of visualizations reached during the analysis period was higher than 5000 (5,060), with a total time of visualization of more than 10,000 minutes (10,487 min), resulting in an average duration of each visualization of 2 minutes (2:04 min).

Table 1 shows the absolute and percentage values of visualization time, number of visualizations and reproduction average duration for each month from October 2016 to May 2017.

<table>
<thead>
<tr>
<th>Fecha</th>
<th>Tiempo de visualización (minutos)</th>
<th>Visualizaciones</th>
<th>Duración media de las reproducciones</th>
<th>Porcentaje media (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>mayo 2017</td>
<td>1,043 (9,9%)</td>
<td>548 (11%)</td>
<td>1,54</td>
<td>19%</td>
</tr>
<tr>
<td>abril 2017</td>
<td>1,017 (9,7%)</td>
<td>528 (10%)</td>
<td>1,55</td>
<td>20%</td>
</tr>
<tr>
<td>marzo 2017</td>
<td>802 (7,6%)</td>
<td>457 (9,0%)</td>
<td>1,45</td>
<td>18%</td>
</tr>
<tr>
<td>febrero 2017</td>
<td>444 (4,2%)</td>
<td>236 (4,7%)</td>
<td>1,52</td>
<td>20%</td>
</tr>
<tr>
<td>enero 2017</td>
<td>1,097 (11%)</td>
<td>495 (9,8%)</td>
<td>2,12</td>
<td>26%</td>
</tr>
<tr>
<td>diciembre 2016</td>
<td>791 (7,5%)</td>
<td>422 (8,3%)</td>
<td>1,52</td>
<td>21%</td>
</tr>
<tr>
<td>noviembre 2016</td>
<td>2,381 (23%)</td>
<td>1,062 (21%)</td>
<td>2,12</td>
<td>28%</td>
</tr>
<tr>
<td>octubre 2016</td>
<td>2,915 (29%)</td>
<td>1,202 (26%)</td>
<td>2,15</td>
<td>36%</td>
</tr>
</tbody>
</table>

During the initial month, the viewing time reaches its maximum with more than 3,000 minutes. In Figure 1 it can be seen how from the second month the visualization time tends to stabilize at a value close to 1000 minutes / month.

However, in that figure it can be seen that the average duration of each reproduction is always stable at around 2 minutes; this indicates that the first month the longer time of visualization was due to a greater number of reproductions.

Once the average viewing time has stabilized, the average duration of each reproduction remains at around 2 minutes, indicating that from the initial month the number of reproductions is stabilized.
Figure 1. Time of visualization and reproduction average duration.

This information will be useful in order to correct the average time duration of the videotutorials, from 4 minutes to a maximum of 3 minutes. This will lead to a longer average duration of each reproduction and consequently a larger percentage of videotutorial length reproduced. In this sense, figure 2 shows the average percentage reproduced for each month. It can be observed that from a maximum of 40% at the first month, the reproduced length of the videotutorials stabilizes on average at 20% of the videotutorial duration. This value is considered very low and some corrections should be done on the videotutorials characteristics. In this sense, in figure 3 both, the reproduction average duration and the reproduced average percentage of the videotutorials is represented.

Figure 2. Time of visualization and average percentage reproduced.
3.2 Traffic sources

One of the aspects that can determine the degree of follow-up and retention of the channel's audience is the nature and modality of the traffic sources used by the students to access the contents of the channel. In figure 4, the percentage of visualizations by each dispositive is represented; around the 75% of the visualizations are through personal computer of the students and around the 24% through smartphone. Most of the resting 1% is made through tablets.

In spite of this massive use of personal computer when accessing to the channel contents from the audience, it can be deducted from table 2 that it does not affect the average duration of video reproductions, that remains around 2 minutes whatever the dispositive used is (in the case of tablets, this value reach to 3 minutes).
4 CONCLUSIONS

Measuring the different audience data from a videotutorial channel is an important tool to identify the main aspects and parameters to be carefully determined when designing and editing a videotutorial. The analysis of the main visualization parameters reveals as an important tool in order to improve and adapt the efficiency of the videotutorial channel.

The percentage of reproduced duration of the videotutorial remains very low, around 20%, independently of the type of dispositive used by students or the duration of the videotutorials. For that reason, in future

The duration of the videotutorials should not be longer than 3 minutes in order to increase the average percentage reproduced.

A careful and detailed study of video duration, narrating speed and contents are next steps to study in deep the different parameters involved on the efficient design of a videotutorial channel.

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REFERENCES


