Uso del recurso de contenido en el aprendizaje en línea: YouTube

Resource use content online learning: YouTube

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Palabras clave
Recursos educativos en línea, videos educativos, YouTube, estadística, aprendizaje en línea, educación en línea

RESUMEN

El artículo presenta los resultados de la implementación del recurso de contenido de aprendizaje en línea YouTube en un curso de estadística a nivel posgrado. El objetivo fue verificar si el uso del canal educativo de YouTube como herramienta de recurso de contenido promueve un mejor resultado en el aprendizaje de los alumnos de la maestría en Administración Empresarial del Tecnológico de Monterrey durante el trimestre abril-julio de 2016. El diseño de la metodología consistió en compartirles a los alumnos semanalmente videos relacionados con el contenido de la materia para una mayor comprensión de este. La investigación se llevó a cabo mediante la estadística descriptiva e inferencial y se dividió a los alumnos en un grupo de control y uno experimental. A partir del segundo examen parcial, el grupo al cual se le compartieron los videos del canal educativo en YouTube obtuvieron mejores calificaciones respecto de quienes no tuvieron acceso a dicha herramienta; se concluye que hay un beneficio en el aprovechamiento académico al utilizar este recurso de contenido de aprendizaje.

Keywords
Online educational resources, educational videos, YouTube, statistics, e-learning, learning education

ABSTRACT

The article demonstrates the results of implementing the use of online learning contents found on the resource YouTube in the statistics course of graduate level. The objective was to verify whether the use of the educational YouTube channel tool promotes better results in students learning Mastery in Business Administration from the Tecnologico de Monterrey in the quarter of April to July 2016. The method consisted of sharing weekly videos with the students that farther exemplify the materials related to the subject matter for a more comprehensive understanding of these concepts. The research was conducted by descriptive and inferential statistics dividing students into a control or experimental group. After analysis, it was found that from second partial exam and on the group that had access and exposure to the shared videos on the educational channel on YouTube had better grades than those without such tool, so it is concluded that there is a benefit in academic achievement by using this resource for learning content.

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INTRODUCTION

The majority of the students have greater difficulty in learning quantitative subjects, such as statistics, even when they have the direct support of a teacher in the classroom (Rodriguez, 2004). The challenge is even greater when learning is done through distance or online education since the professor becomes a mediator and the student is self-taught and does not have his classmates to support him should he have any doubts.

The objective of learning a statistics course at the Master's degree in Business Administration at the Tecnológico de Monterrey is to pose and solve issues in the business administration setting and choose the most appropriate statistical analyses in order to facilitate the interpretation of data (transversal and longitudinal); hence, the student does not only learn how to manually solve the exercises but it is also necessary for him to learn how to use Minitab or Excel data analysis complement in such a way that the student become competitive in the labor market by mastering the technology to obtain and interpret statistical analyses. This is a pre-master's course, and for some students it is the first or second experience in distance education; hence, the difficulty for the student is two-fold: the complexity of learning new contents for the master's degree and the change of learning modality.

In our ongoing search to achieve transmitting statistical knowledge, we conducted an experiment using an online learning content resource, the YouTube educational channel for the statistics course given in the Master's degree in Business Administration online or distance education at the Tecnológico de Monterrey. 1[1]

THEORETICAL FRAMEWORK

The use of information and communication technologies (ICTs) is creating new behavior patterns in many aspects of society, including universities. Since information is currently digitalized, online resources represent one of the most common sources for learning among university students.

The characteristic of the educational model of the online programs of the Tecnológico de Monterrey is that the student participates in the construction of his own learning. During this process, the student has the support of the professor who is an expert mediator that guides and fosters the student's self-directed learning. The student has the support of the tutor professor to solve his concerns in the established didactic activities, as well as the collaboration of colleagues and the use of electronic media. Therefore, the student, by being self-taught, is responsible of the individual study of the bibliographic material, the development of tasks and exercises, beside the search and analysis of reliable information that allows documentary and field research.

According to the theory, there are two types of learning: formal and informal. The first is based on learning within the classroom and it is highly structured, while the second refers to distance or online education, thus regulated by the student (Dabbagh & Kitsantas, 2012; Marsick & Watkins, 2001). In both cases, the plan of studies of the universities should be more oriented towards competencies that aim at training the students in preparing their own learning, such as self-regulation skills, establishment of learning objectives and acceptance of responsibility (Lebeničnik, Pitt & Starčič, 2015).

Since universities do not put limits to e-learning, we would expect that students would be more active in the use of ICTs to improve their learning. Jelfs and Richardson (2013). Besides McLoughlin and Lee (2010), have found that institutions of higher education use limited forms of learning in regard to ICTs, such as course management systems, virtual learning settings and applications supported by the Web to support their plan of studies and their students; however, there are arguments in favor of resorting to these. According to Bartolomé (2008), using free resources 1[2] on the Internet, such as YouTube videos at this educational level, develops in students useful digital competencies at end of their studies and generates greater efficiency and empowerment for the tutorial action (as support for the evaluation of systems based on the control of access or contributions).

The use of videos is part of the personal learning settings used in the e-learning process in different areas (Lima, Rangel, Guimarães and Marcelino, 2016; Yellepeddi & Roberson, 2016; DelSignore, Wolbrink, Zurakowski & Burns, 2016), and the use of the YouTube educational channel has shown an ever-increasing influence on teaching and learning. In regard to teaching, professors currently require more skills given the proliferation of technological tools; the use of this channel generates an added-value professional development in the teacher (Semich & Copper, 2016), as learning involves the students in the class subject (Agazio & Buckley, 2009); furthermore, the students consider that it is an efficient way to support their learning (Tan & Pearce, 2012).

There are several platforms to share educational videos, and YouTube is one of the most accepted by educators (Snelson, 2011). The adscription to YouTube has been progressive , and currently there are 150 university centers that offer close to 20,000 videos in fields such as Law, History, Engineering and Sciences, among others (Castañeda, 2009, p. 77). At international level, universities such as Berkeley and Standford, besides the Massachussets Institute of Technology, use educational channels to improve their students' academic achievement.

In a study on Mexico, Chávez and Gutiérrez (2015) found that social networks facilitate the learning of exact sciences in higher education, and the most used are WhatsApp, with an average of 97% of students, followed

by Facebook, with 90% and YouTube with 71%. The authors recommend including the use of social networks as a learning strategy within the planning of exact science subjects.

APPROACHING THE PROBLEM

The statistics course given at the postgraduate level in the online or distance education modality at the Master's degree in Business Administration at the Tecnológico de Monterrey is learned basically through in-depth reading of a textbook; recorded classes on the topics are available every week, and before mid-term exams a live consultation is offered to clarify students' doubts on the subject. During classes, we have observed that the student, regardless of having shared information on other media, 1[3] checks the content resource of the YouTube online learning program.

The personal learning setting originates from the idea that it will be carried out in different contexts and situations, and through different learning providers. Moreover, since learning is in progress, it seeks to provide tools and to acknowledge the role of the student in the organization of his own learning (Atwell, 2007). In light of the foregoing, the purpose of our study is to identify if there is any improvement in the performance of the student (measured by grades) when the teaching team shares the content resource (YouTube educational channel) as learning tool.

METHODOLOGY

The experience took place during the months of April to July 2016. There were eight students in all; 89% were from Mexico, 6% of Colombia, 3% Ecuador and 2% Costa Rica. 1[4] In regard to the fields of studies, 58% were administrators, engineers, accountants and financiers; the remainder belongs to the areas of marketing, law, international trade, communication, architecture, among others. This means that some students did not possess any knowledge related to the subject. In regard to age, 85% of the students are between the age of twenty-two and thirty-six, i.e., they belong to the generation known as the *millennials*. Their main characteristic is to be natives of the Internet and to use technology exhaustively; the remainders (15%) are between the age of thirty-six and forty-five which indicates that they are resuming their studies.

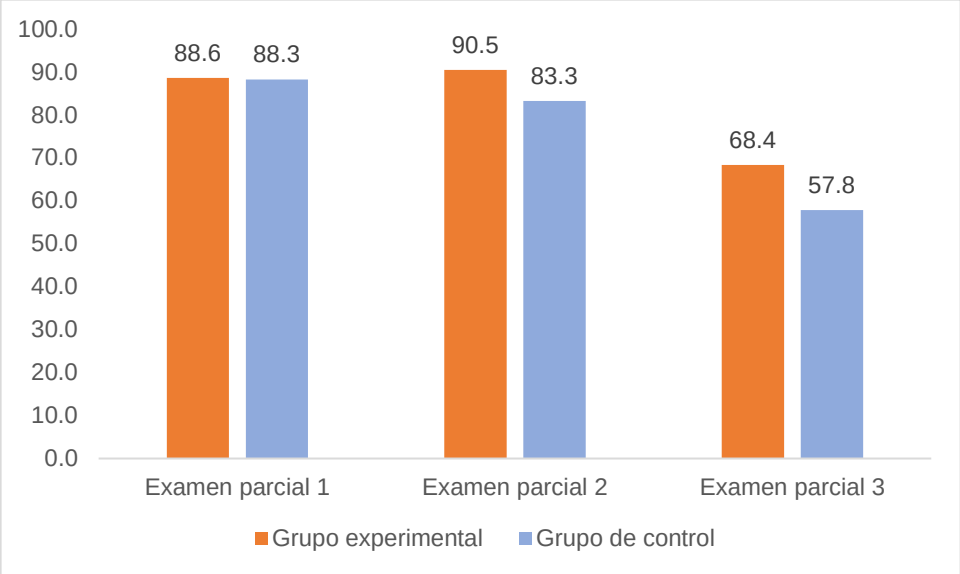
Students were divided into two groups: one experimental group with 43 students with whom we shared weekly online learning content resources through a YouTube channel as a tool additional to the course material. The control group was made up of 46 students.

For the descriptive analysis, we first obtained the point average grade of each group for the mid-term exam; then we analyzed the confidence interval of the point average grades and, lastly, we compared the

distribution of the grades of each group by means of box-plot diagrams. We also used inferential statistics and experiment design for the Levene Test to verify if the variants of both groups were equal for the mid-term exam; next, we conducted grade point average tests for the mid-term exams of the two groups through the analysis of variants (ANOVA) to identify if there were any significant statistical differences.

RESULTS

During the quarter, we conducted three mid-term exams; the point average grades are shown in Graph 1. The results of the first exam show that the point average grade in the experimental group was 88.6 and the point average grade of the control group was 88.3; hence, there is no relevant difference. For the second exam, the experimental group obtained a point average grade of 90.5, while the control group, an average of 83.3, a difference of seven points above the experimental group. For the third exam, we observed a more significant difference between the two groups: the experimental group obtained 68.4 while the control group, 57.8, which represents 10.6 points difference.



Graph 1. Average grades for the mid-term exam.

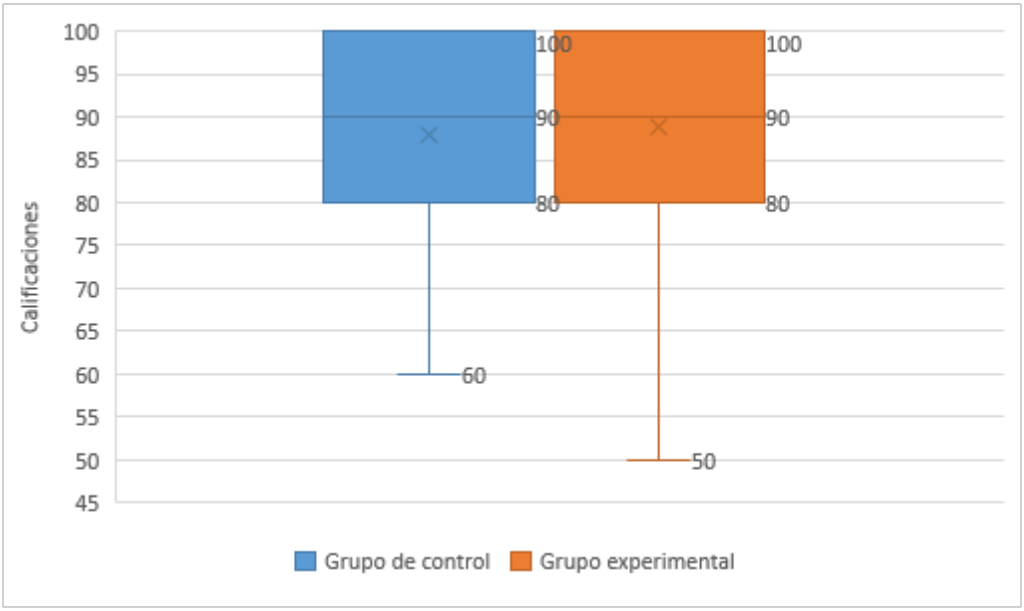
In Table 1 we analyze the confidence intervals at 95% for the average grades obtained in the first mid-term exam for both groups: we observed that the control group has a confidence interval of 84.59 to 91.93, while the experimental group was of 84.66 to 92.55. The differences in those intervals were not significant.

Table 1. Confidence intervals for the point average grade of the first mid-term exam.

	N	Media	Desviación típica	Error típico	Intervalo de confianza para la media a 95%	
					Límite inferior	Límite superior
Grupo de control	46	88.26	12.35	1.82	84.59	91.93
Grupo experimental	43	88.6	12.83	1.96	84.66	92.55
Total	89	88.43	12.51	1.33	85.79	91.06

The box-plot diagrams for the grades of the mid-term exams are incorporated to the analysis with the object of identifying and comparing the characteristics of both control and experimental groups. A box-plot diagram allows us to visualize a summary of five numerical measures: minimum value, first quartile, the mean or second quartile, the third quartile and the maximum value. Moreover, this helps to identify if there are any atypical values (Anderson, Sweeney y Williams, 2012).

Graph 2 box-plot diagrams show quartiles at 25, 50 and 75% of the grade distribution for the first mid-term exam for each group: we observed that the boxes are distributed homogeneously: in the first quartile, the students registered grades lower than 80; in the second, lower than 90; and in the third, lower than 100.



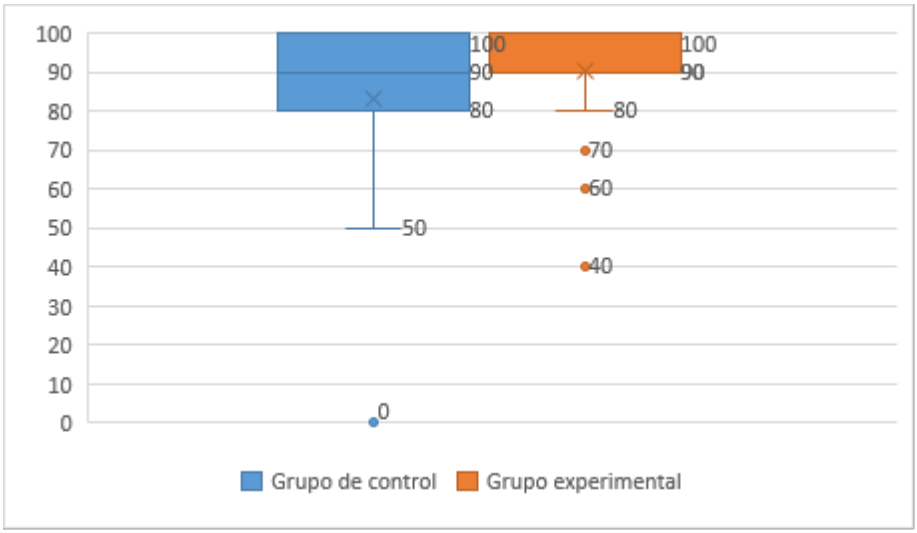
Graph 2. Box-plot diagrams of the first mid-term exam per group.

Table 2 shows the results of the second mid-term exam. The 95% confidence interval for the point average grades of the control group was 77.8 to 88.72; while that of the experimental group was between 86.55 and 94.30, which represents a considerable difference for the latter.

Table 2. Confidence Intervals for the point average grades of the second mid-term

	N	Media	Desviación típica	Error típico	Intervalo de confianza para la media a 95%	
					Límite inferior	Límite superior
Grupo de control	46	83.26	18.385	2.711	77.8	88.72
Grupo experimental	43	90.47	12.715	1.939	86.55	94.38
Total	89	86.74	16.221	1.719	83.32	90.16

Graph 3 contains the box-plot diagrams of the grades for the second mid-term exam for both groups. The experimental group had a more concentrated distribution, with grades from 90 to 100 in comparison to the control group that had a greater grade range, i.e., between 80 to 100. We identified some atypical values: the control group had one zero grades while the experimental group had evaluations of 40, 60 and 70. For the analysis, we decided not to eliminate these observations since with class subjects such as statistics, we often encounter students that, given the complexity of the learning content, have a low academic performance which is reflected in low grades or made the decision of not taking the exam, hence, said students fail the class subject or abandon the course. 1[5]



Graph 3. Box-plot diagrams of the second mid-term per group.

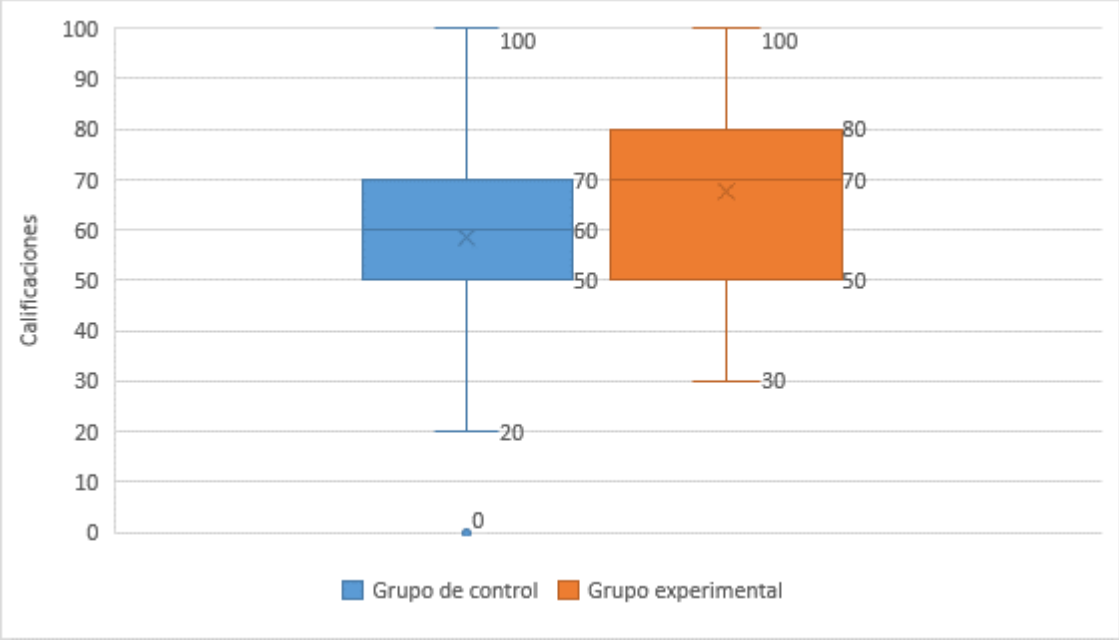
Table 3 shows the 95% confidence intervals for the point average grades of the third mid-term. Grades fluctuate between 51.57 and 64.08 for the

control group while the interval for the experimental group was between 63.13 and 73.61. We noticed that the confidence interval higher limit for the control group was practically the confidence interval lower limit of the experimental group.

Table 3. Confidence Intervals for the point average grades of the third mid-term.

	N	Media	Desviación típica	Error típico	Intervalo de confianza para la media a 95%	
					Límite inferior	Límite superior
Grupo de control	46	57.83	21.07	3.11	51.57	64.08
Grupo experimental	43	68.37	17.03	2.60	63.13	73.61
Total	89	62.92	19.84	2.10	58.74	67.1

Graph 4 shows the box-plot diagrams of the grades for the third mid-term exam for both groups. While comparing the information, we noticed that the control group scored more concentrated grades between 50 and 70, while the experimental group achieved a greater concentration between 50 and 80. The median or second quartile for the experimental group was 70, larger than that of the control group that ascended to 60.



Graph 4. Box-plot diagrams of the third mid-term per group.

The following tables contain the Levene test that allows comparing the variances of two groups without depending on said variance to have a normal distribution.

Table 4. Homogeneity of variance. First mid-term

Estadístico de Levene	gl1	gl2	Sig.
.038	1	87	.846

Table 5. Homogeneity of variance. Second mid-term

Estadístico de Levene	gl1	gl2	Sig.
2.292	1	87	.134

Table 6. Homogeneity of variance. Third mid-term

Estadístico de Levene	gl1	gl2	Sig.
.913	1	87	.342

Variances are statistically equal in the three mid-term exams for both control and experimental groups. Therefore, we conclude that the assumption of homoscedasticity has been achieved. While analyzing the results, we find that the null hypothesis is not rejected ($Ho: \sigma_1^2 = \sigma_2^2$) since the probability value 1[6] is greater than 0.05 in the three cases: 0.846 in the first mid-term, 0.134 in the second and 0.342 in the third.

Next, we present the ANOVA results per mid-term. Table 7 shows that by comparing the median of the first mid-term, the average grades of both control and experimental groups are statistically equal which means that at the beginning of the course there is no difference in providing the content resource of the YouTube educational channel to the students. In this case, we do not reject the null hypothesis ($H_0: \mu_2 = \mu_2$), since the probability value is 0.898; therefore, we conclude that the average for both groups are statistically equal.

Table 7. One factor ANOVA. First mid-term

	Sum of Squares	**df**	**Root Mean Square**	**F**	**Sig.**
Intergroups	2.627	1	2.627	.017	.898
Intragroups	13777.149	87	158.358		
Total	13779.775	88			

Tables 8 and 9 show that in the second and third mid-terms, the grade averages are statistically different; this indicates that, as the quarter is progressing, the experimental group obtained the benefit of having the content resource tool and achieved better grades, as observed in Graph 1. In the second and third mid-terms, the probability value was 0.036 and 0.011, in that sequence; both were lower than 0.05, hence the rejection of the null hypothesis of equality of the means for both groups. The grade

averages of the second and third mid-terms between the experimental and control groups are statistically different.

Table 8. One factor ANOVA. Second mid-term

	Sum of Squares	df	Root Mean Square	F	Sig.
Intergroups	1153.489	1	1153.489	4.561	.036
Intragroups	22001.567	87	252.892		
Total	23155.056	88			

Table 9. One factor ANOVA. Third mid-term.

	Sum of Squares	df	Root Mean Square	F	Sig.
Intergroups	2471.794	1	2471.794	6.685	.011
Intragroups	32168.655	87	369.755		
Total	34640.449	88			

CONCLUSIONS

According to the results, the implementation of the content resource on the YouTube online learning program for the statistics course given at the postgraduate level through the online or distance modality of the Master's degree in Business Administration of the Tecnológico de Monterrey, helped the students who had the tool (experimental group) to achieve better academic results in comparison to the group that did not have said additional resource. 1[7]

In considering the 95% confidence interval and moving into the quarter, the academic performance of the experimental group is increasing in comparison to the control group. During the third mid-term, the lower limit of the point average grade of the experimental group is the equivalent to the higher limit of the confidence interval of the control group; this shows an advantage in academic achievement.

The analysis of the box-plot diagrams carried out per mid-term to compare both student groups shows homogeneous characteristics in the first mid-term; however, in the second mid-term, the grade concentration of the experimental group is larger than the control group by obtaining higher grades that remain in the third mid-term in which the experimental group had a mean of 70 while 60 for the control group.

In considering the inferential analysis and by conducting the Levene tests to contrast the variances of both groups per mid-term, we found that the assumption of homoscedasticity is fulfilled in the three mid-terms, while in the means equality tests (Using ANOVA), the means in the first mid-term are statistically equal and the grade averages are statistically different as of the second mid-term.

In view of the foregoing results, we conclude that the grade averages are equal in both control and experimental groups for the first mid-term; after, the average increases in the second and third mid-terms in favor of the experimental group. Moreover, this difference is amplified in the third mid-term for the experimental group who has the YouTube online content resource. Besides benefiting the academic achievement, the use of this resource has advantages in regard to the administration of videos, compatibility to view them, reproduction statistics, feedback through visitors' comments, no need to unload any software to the computer to access the videos, hence, we recommend implementing it in other courses.

The contribution of this experience is two-fold; first, as an example or proposal in order for the educator to implement an online learning content resource such as the YouTube educational channel, in a quantitative subject or of any other nature and, second, to promote and to study how social networks can have a beneficial impact on the students' academic achievement. The time of study variable could be incorporated to this type of analysis in a future research to see if the students undergo any changes in behavior resulting from the use of a new learning tool, i.e., if the reading for viewing videos is interchanged or if the video consultation time is added to the student's study time. Likewise, we could analyze if the time required to do their homework shows significant statistical differences when the student has access to the YouTube online content resource.

[1] Decidimos usar YouTube porque en experiencias previas con otras opciones surgieron problemas técnicos, como compatibilidad con los equipos de cómputo, restricciones de tiempo en las grabaciones de los videos, saturación de la página, entre otros.
[2] Entre ellos, sistemas de correo electrónico personales, colocar webs públicas o privadas, blogs, videos en YouTube, chat vía Skype o Messenger.
[3] Como plataformas, resúmenes, presentaciones, etcétera.
[4] Históricamente, el curso cuenta con alumnos extranjeros, sobre todo de América Latina, por lo cual el docente debe seleccionar recursos didácticos que no tengan problemas de acceso en otros países.
[5] Aunque se eliminaran estas observaciones, los resultados concluyentes permanecen.
[6] Mide la probabilidad de cometer el error tipo I.
[7] Los resultados empezaron a ser estadísticamente significativos en el segundo y tercer parcial del trimestre.

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