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PROBLEMS OF ONLINE EDUCATION AND IMPROVEMENT STRATEGIES DETECTED IN THE FACULTY OF ENGINEERING OF THE UNAM

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Abstract: This paper presents the results obtained from a survey applied to students and professors of the Faculty of Engineering to delve into fourResearch questions: 1) causes that caused students to withdraw near the end of the school year (or a little before) in some or all of the subjects they were taking online during the pandemic; 2) determine whether compliance with the study program decreased when using the online modality during the pandemic; 3) to elucidate if the level of student learning in relation to the syllabus of the subjects studied decreased when using the online modality compared to the face-to-face modality; 4) increase in inappropriate practices by students in order to accredit subjects; 5) determine which strategies and to what extent the professors who teach laboratories or field practices have applied them to cover their teaching-learning activities.

Keywords: Distance education, online learning, face-to-face class, hybrid system.

INTRODUCTION

The school as we know it (from basic to higher education) will have to change for several reasons: a) to assume the challenges that society will pose as a result of this health contingency, b) the imminent economic crisis that will modify production processes, and, c) the experience acquired in a forced way around the use of ICT in education.

The UNAM Faculty of Engineering is not exempt from these challenges. It is a community made up of more than 15,000 students and 2,000 teachers who, during the COVID-19 pandemic, generated and tested ICT strategies and tools. The situations they faced and the effort to give continuity to the courses represent a knowledge and experience that has been documented to understand the problems of the students and the proposed solutions, and the result of which is presented in this article.

MATERIALS AND METHOD

This research was carried out by a group of 17 academics and students from the Faculty of Engineering of the UNAM, through the Project PE101321 Problems of Online Education and Proposal for Good Practices in the Faculty of Engineering of the UNAM, of the Support Program for Teaching Innovation and Improvement Projects, PAPIME. The objective of the research was to know the experience of students and teachers about their experience to give continuity to the teaching-learning processes during the pandemic caused by COVID-19.

For the analysis of responses to each of the problems, the Minitab 19 software was used and hypothesis tests were performed at a 95% confidence level. Data normality tests were performed using the Anderson Darling test (Thode Jr., HC 2002), homoscedasticity or equality of variance tests using multiple comparisons and Levene (Joaquín Amat Rodrigo 2016), finally equality tests were performed. means, ANOVA tables or Welch's method.

RESEARCH QUESTIONS

The purpose of this questionnaire was to delve into the reasons why at least 20% of the students of the 14 undergraduate degrees of the Faculty of Engineering presented five research questions:

I. Reasons that caused students to withdraw near the end of the school year (or slightly earlier) in some or all of the courses they were taking online in a semester during the pandemic.

II. To determine if the percentage of completion of the study program decreased when using the online modality in one semester during the pandemic.

III. Elucidate if the level of student learning in relation to the program of the subjects studied decreased when using the online modality compared to the face-to-face modality.

IV. Students who resorted to improper practices in order to accredit subjects.

V. Determine what strategies and to what extent the professors who teach laboratories or field practices have applied them to cover their teaching-learning activities.

RESULTS AND ANALYSIS

At least 15% of students withdrew near the end of the school year (or slightly before) in some or all of the courses they were taking online in a semester during the pandemic.

The causes of withdrawal established by the students were:

A. He was not interested in the subject

B. The person didn't like the distance or online class

C. Due to incompatibility of online class schedule

D. The person had difficulties with hardware, software, or the internet

E. For not having enough equipment at home for the whole family

F. For not having internet and going to a public place from your cell phone

G. Due to family violence problems

H. Due to personal or family economic problems

I. For having to care for a sick family member

J. For personal financial problems

K. Due to the quality of the didactic materials shared by the teacher

L. Due to the teacher's lack of preparation to use online tools

M. By the way of exposing the teacher online

N. Because the teacher did not give synchronous classes and only limited himself to sending material for the students to study

O. By the level of knowledge of the teacher in the subject

P. Due to the lack of availability of the teacher to clarify doubts

Q. Due to the difficulty of the course content

R. Due to the difficulty with the language of the subject

S. Due to difficulty interacting with other students

T. Due to lack of time to study

U. For sickness

V. For problems of stress, anxiety or depression

X. for some addiction

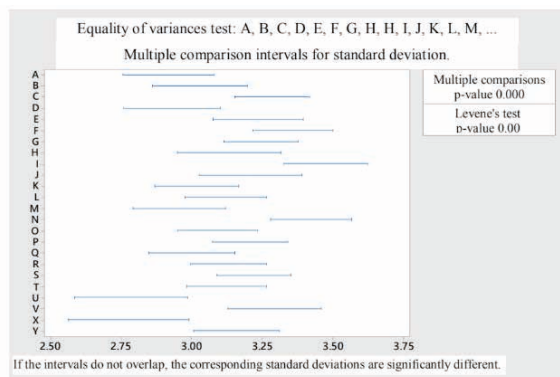Y. For not having a good grade a little before unsubscribing

Figure 1.

Figure 1 shows an example of the output that Minitab produces on testing the hypothesis of

equality of variances for each of the 23 causes, using the Multiple Comparisons and Levene methods; in both tests it was found that the causes were heteroscedastic, since p is less thanto.

The answers obtained on the causes of leave in the questionnaires applied are the following:
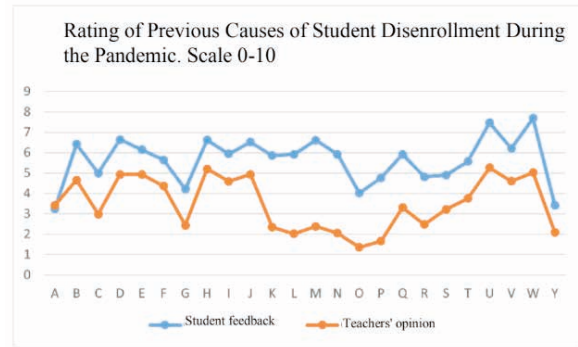

Figure 2

Figure 2 shows that the grades on a scale of zero to ten of the opinions of the students on average are higher than the opinions on average of the teachers; however, both graphs have similar shapes, so there is a coincidence in the perception that both students and teachers have.

An analysis of variance was carried out with the 23 reasons why students drop out using the Welch test, at a 95% confidence level and it was shown that the means of each level are different.

Based on figure 3, in the opinion of the students, the most common reasons or causes are X: Due to stress, anxiety or depression problems; U: Due to doubts about the possibility of accrediting the subject; D: Because you had difficulties with the hardware, software or internet; H: due to personal or family economic problems; M: because of the way the teacher exposes online.
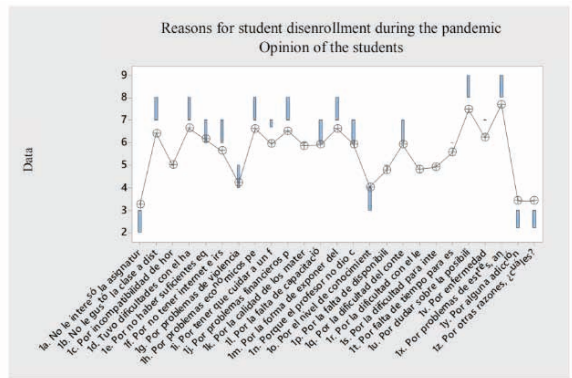

Figure 3.

In figure 4, in the opinion of the professors, the most common reasons or causes are: U: Due to doubts about the possibility of accrediting the subject; H: due to personal or family economic problems; X: Due to stress, anxiety or depression problems; E: For not having enough computer equipment at home for the whole family; D: Because you had difficulties with the hardware, software or internet.
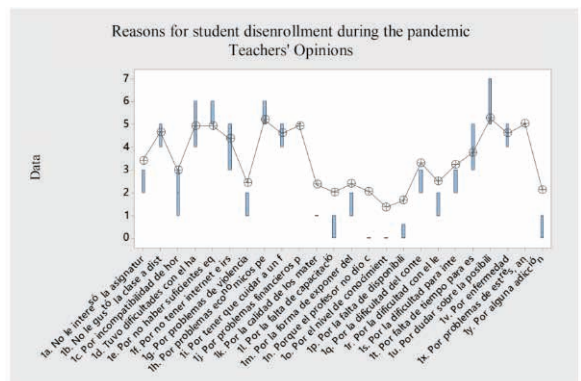

Figure 4.

II. To determine if the percentage of completion of the study program decreased when using the online modality in one semester during the pandemic.

Regarding the second problem raised, from the point of view of the students and teachers, four levels or qualifications were established on the level of student learning before and during the pandemic. The columns were found to be homoscedastic.

A hypothesis test of equality between means was carried out and it was verified that for both students and teachers the percentage of compliance with the subject program before and during the pandemic was the same.
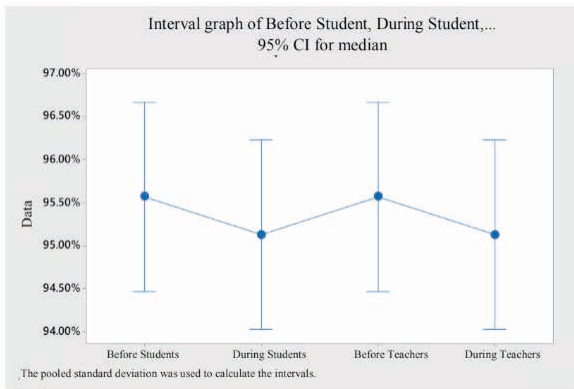

Figure 5.

In Figure 5, note that the point of view before the pandemic and during the pandemic, for both students and teachers coincide, the drop in compliance with the program was close to 0.5%, which is not representative to assume a difference, according to the calculated confidence interval.

III. Elucidate if the level of student learning in relation to the program of the subjects studied decreased when using the online modality compared to the face-to-face modality.

It was verified that none of the levels or qualifications had normal behavior. It was also proven that the levels were heteroscedastic, between before the pandemic and during the pandemic, both in the opinion of the students and the teachers.

In relation to the average learning level of the students before the pandemic and the learning level during the pandemic, Figure 6 shows that there were differences both in the perception of the students and in the perception of the teachers. It clearly shows that the learning level of the students fell by at least 18% below the level of learning before the pandemic.
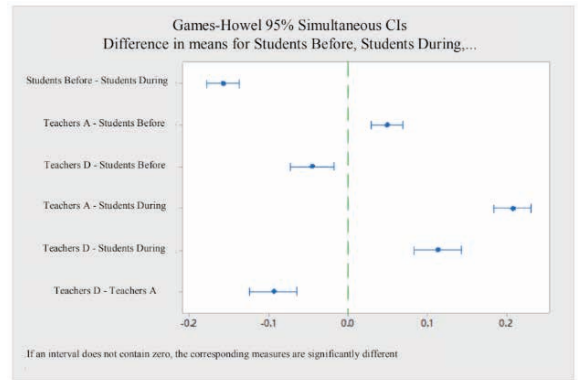

Figure 6.

IV. Students who resorted to improper practices in order to accredit subjects

The improper practices were the following:

A. Surreptitiously removing and using forms during exams

B. Share and copy test results with some of your peers

C. Communicate with someone inside or outside the classroom to help you answer the test

D. Sharing and copying homework, exercise series and extra class work

E. Hire someone to solve the exams for you

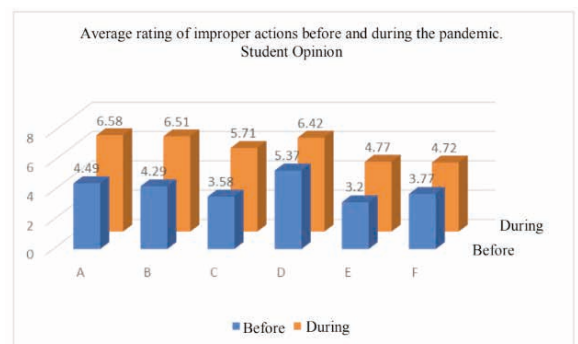F. Hire someone to solve the tasks, series of exercises and extra class work

Figure 7.

As it can be seen in Figure 7, the use of improper practices to accredit subjects before

the pandemic increased by an average of 1.67 points on a scale of zero to ten during the pandemic, which represents a 16.7% increase in use. of improper practices.

V. Determine what strategies and to what extent the professors who teach laboratories or field practices have applied them to cover their teaching-learning activities.
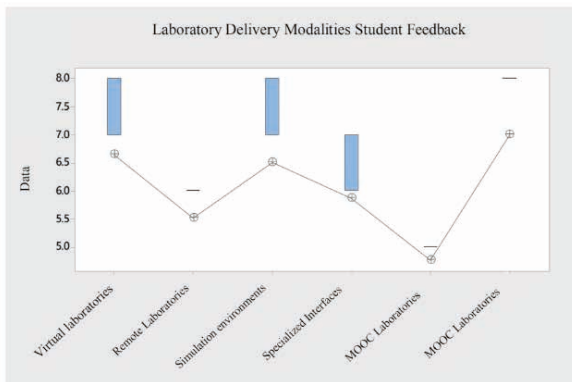

Figure 8.

Figure 8 shows the methods of teaching laboratories. As can be seen, the modalities most used by teachers were virtual laboratories and simulation environments.

CONCLUSIONS

Although the period indicated for the development of the PAPIME project has not yet concluded, it is possible to point out some preliminary conclusions:

- The Faculty of Engineering of the UNAM, through its different areas of attention to professors and students, has addressed some of the causes of deficiencies in learning and teaching.

- It is necessary to reinforce the learning obtained during the pandemic period, in addition to attending to and advising self-regulation strategies for learning that allow students to perform successfully in different ways.

- It is necessary to recover and disseminate the use of educational

practices in accordance with the incorporation of ICTs into the teaching process. For this, work is being done on the guide to good teaching practices, both online and face-to-face, based on the UNAM teaching framework and specifying its use in accordance with the planning, development and evaluation of learning.

- The exercise of teaching during the period referred to in this paper takes up the experience and ability of teachers to adapt to unusual circumstances. The good practice guide that the PAPIME project will result in is an approximation to the good practices developed by teachers and reflects the effort to share and pool strategies that are useful for teachers, both online and as in face-to-face work.

THANKS

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