Proposal of Semi Face to Face Classes for the Career of Industrial Engineer Administrator Using Technology 4.0

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Abstract: The research "Proposal of semi face to face classes for the career of Industrial Engineer administrator using technology 4.0.", analyzes the possibility of hybrid class due to the world situation as a consequence of COVID-19; in addition to dealing with articles that expose the educational sector in terms of the different careers and digital courses, unrelated to subjects such as mathematics or laboratory practice. Before the pandemic, some institutions had a digital plan, for example, The Embry–Riddle Aeronautical University in Florida. Currently, the UANL and other Mexican institutions offer their students the opportunity to expand their knowledge of various topics through the computer medium from the comfort of their homes. It is concluded that there is a possibility of offering a hybrid study plan for the *Ingeniería industrial y Administración* degrees. To find the best model to continue with the classes; there was a survey applied to teachers and students about the current technologies and their use for digitally hybrid, or face-to-face classes.

Keywords: Technology 4.0, COVID-19, Hybrid Classes

1. Introduction

The fourth Industrial Revolution has reached our times; it has been established along with the help of the technology designated as technology 4.0. This entire system is being incited by the power of interconnectivity, automation, and real-time data. Industrial Revolution combines operations, with intelligent digital technology with physical production, machine learning, and Big Data building a better-connected system. The 4.0 technologies used in the afore-mentioned industry are made up of block chain, the cloud, robotics, simulations, advanced materials, virtual reality and augmented reality, Big Data, cybersecurity, artificial intelligence, among many more.

Due to its evolutionary nature, academics, professionals, universities, and companies study the topic of Industry 4.0 throughout the world. In 2013, a definition of technology 4.0 emerged as "the technical integration of cyber-physical systems in manufacturing, logistics and the use of the internet of things." (Kagermann, Wahlster & Gelbig, 2013) However, in 2018 and after many technological advances, Industry 4.0 was defined as the instant at a machine stopped being a tool completely manipulated by man. It could now operate independently to serve the human. "Rather the machine becomes an entity that can collect data, analyze it and advise on it." (Sung, 2018). Both definitions suggest a direction where technology is more protagonist in industrial processes. However, the change from "technology 4.0 applied to industry" to "technology 4.0 applied to everyday life" is evident.

Currently, 4.0 technology is no longer exclusive to the commercial sector and is expanding to many areas of society. The ability to be interconnected and having information in the palm of the hand becomes essential for all citizens today. This causes those technologies to be developed with different objectives than those of industries. Here was born the development of interactive social platforms that serve as tools to achieve personal goals.

However, many renowned educational institutions already had curricula with this modality. This situation arises from the great demand of applicants to these institutions, young people who want to have quality studies but; are far from the school building. Here is where emerges the question of what would happen if the career was adapted to an online modality, already having the experience acquired?

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The research topic is relevant because it does connect to the current educational situation. Anyone who ever refused to take online courses out of fear of lack of self-discipline can no longer excuse themselves. Unfortunately, humanity lives a reality in which the educational situation did require to move to the digital world. This pandemic originated the need to adapt to a new system, leaving little time for teachers and students to adapt. The research aims to collect evidence from different schools that use a digital study plan for their careers and; considering this information, it can be analyzed the possibility to adapt this system into the School of Chemistry. However, the background search is not enough; it is also necessary to approach the students to find out what they want from the university. To achieve this objective; there has emerged apply a survey to teachers and students, in which the questions circulate their interest about taking classes digitally, their comfort studying from home, and the subjects of interest to take in a digital way.

In conclusion, the proposal for hybrid classes for the Industrial Engineer Administrator career; was born with the purpose of giving teachers and students a new perspective about taking classes. It is to take advantage of the experience obtained during the pandemic to enjoy the advantages of having better time management and use of the resources offered by technology 4.0. With that point clear, the primary objective of the research is to help students not be at the campus for that long, which can be translated into more classrooms available for the disposal of teachers who require them.

2. Methodology

This research is the compilation of information from articles related to technology 4.0 in the educational sector. We realized that our objective of the designed proposal is to "Build a manual for the use of technology 4.0 for the course of Engineer Industrial Administrator to standardize career learning digitally". To implement this study, we developed an analysis based on a survey that helped us to conclude with the different students and teachers; How is the experience of conducting a class digitally?

3. Results

About the survey the first question "How much do you like online classes (Teacher or Student)" The results shown in figure 1, give us an average point of interest. However, the sum of negative opinions is higher than the positive ones. This could be related to the fact that the degree is necessarily being carried out digitally and, not all students have the same attention span. Here the area of opportunity would be precisely to find a way to make online classes more enjoyable.

Figure 1. Question 1 "How much do you like online classes"

The second question "How much do you like teaching online classes (Answer if you are Teacher)? The results shown in the figure 2. as you can see the interest teachers have in imparting a class digitally. Most are on the positive side of the graph; however, not all are there. Teachers who teach digitally feel comfortable doing their work since the success of their class must depend on that. The area of opportunity here would be to train teachers to perform better in their digital classes.

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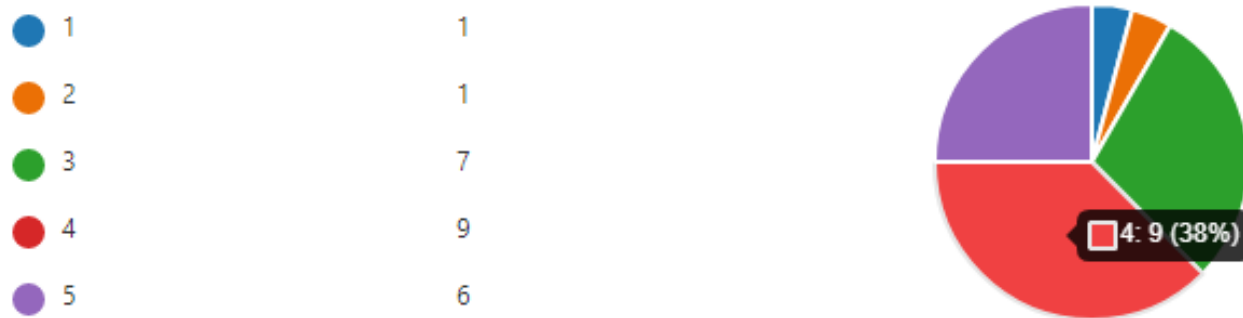|	
● 1	1
● 2	1
● 3	7
● 4	9
● 5	6

Figure 2. How much do you like teaching online classes?

The third question is about the learning. In this question we used a Likert scale, where the number 5 is the best result and the number 1 is the low result we can interpreted figure 3. The results indicated that the students don't feel good in online classes.

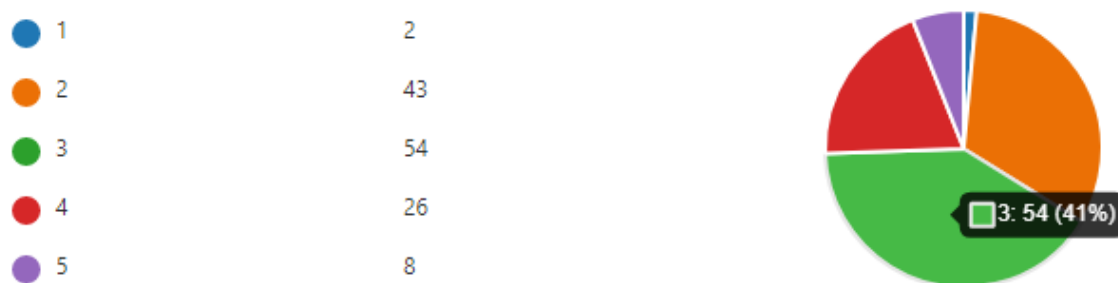|	
● 1	2
● 2	43
● 3	54
● 4	26
● 5	8

Figure 3. Learning online is good?

The fourth question is about the quality level FCQ online classes. The results can show in the figure 4, the students said that online classes are good.

● 1	0
● 2	0
● 3	7
● 4	10
● 5	7

Figure 4. Quality level FCQ online classes

The fifth question is about domain of software for the online classes. The results shown in the figure 5. In this question we used a Likert scale, where the number 1 (red color) is the lowest results and 5 (blue color) is the best result. The best software domain is Microsoft teams.

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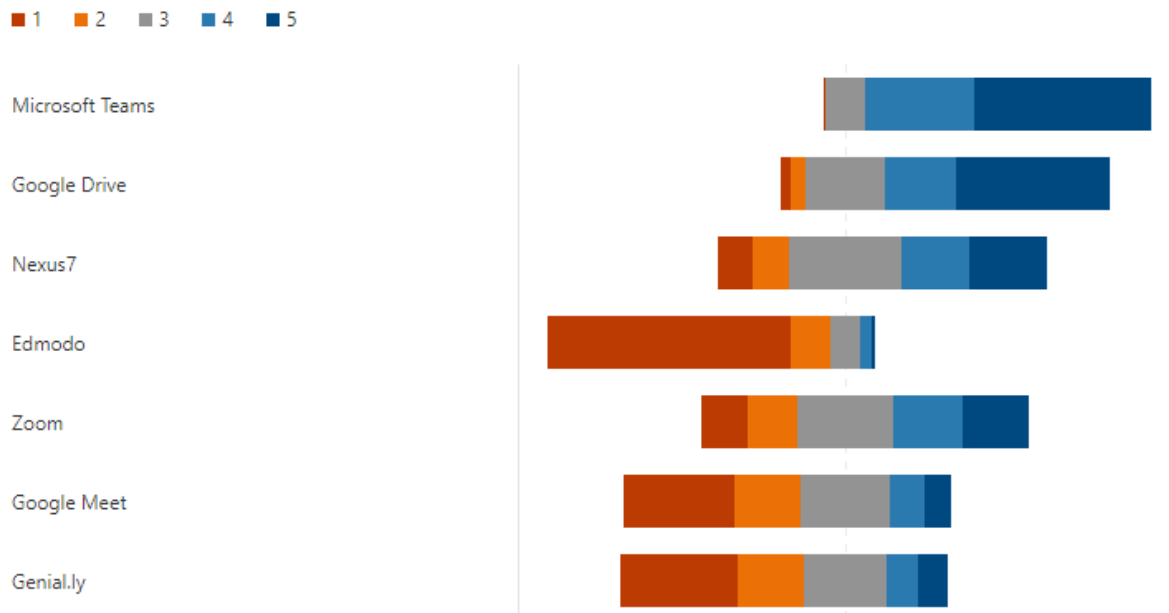2021 SISE Virtual Conference
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Figure 5. Domain of software for the online classes

The sixth question is about the student's participation. The results can show in the figure 6. In this question we used a Likert scale, where the number 1 is the lowest results and 5 is the best result. We can see negative results; so is the vital importance the teacher motivation.
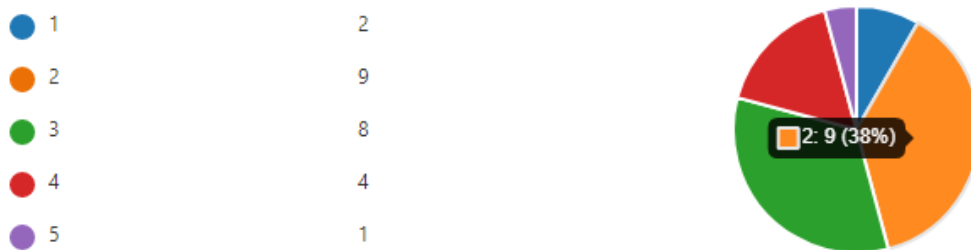

Figure 6. Student's participation

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3. Discussion

With the results obtained, the general conclusion was reached that it is not only possible to propose a hybrid education model, but that it is also feasible to make it a reality due to the general acceptance of online classes. The conclusion is considered in this way thanks to the results of two specific questions from the survey, how much students like online classes and how much teachers like teaching online. Both questions generate positive results, with 72% of students giving their opinion between satisfied, quite satisfied, and very satisfied, while 92% of teachers said the same. In addition to this, both students and teachers consider that the educational level of the School of Chemistry during the digital period has been intermediate, good, or even excellent. Of all of the participants, 100% of teachers and 92% of students give their opinion.

The survey also yielded contradictory and surprising results. An example can be the domain of the applications most used by students. There is a large area of opportunity in terms of the use of 4.0 technologies. On the part of teachers, there is a great command of the most basic applications used during the semesters of the pandemic. This opens the doors to teachers to try different applications with specific functions to carry out the activities established in class. Another example of surprising results was found in the list of potential subjects to be done in person, hybrid or digital. On the part of the students, the results are polarized, between taking subjects face-to-face or completely digital. For the teachers due to the knowledge, they have of the subjects, there is more variation in the matter of the subjects that can be carried out in a hybrid way.

The limitations found in this research were few, the greatest being the difficulty of obtaining information from students and teachers who did not have the time or interest to answer the survey. However, and thanks to the pandemic, whoever answered the survey would be able to answer all the questions. The aforementioned is because the pandemic caused a change worldwide, and all students compulsorily attended their studies digitally. Despite the existence of an active vaccination program, there is still a long way to return to the classroom. This is why the research carried out is of vital importance. While waiting for a possible return to school it is important to study and learning about the school online, particularly from other institutions that have been doing it for a long time; it is vital to the inevitable post-pandemic change. Undoubtedly the ravages caused by COVID-19 will have future implications in many areas of life, education being one of them. This situation opens up new research niches for future students, such as the academic performance of the new educational model or the psychological effects that develop in students of the hybrid educational model.

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