

Evaluation of emotional impacts in biology students-ITBoca and their learning during virtuality 2020-2021

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Summary – Currently the disease caused by SARS-CoV-2 has forced you to work from home in an environment virtual, the educational area was no exception, as teachers learned to develop academic work in virtual classrooms by interacting with students in a distance education context.

The purpose of the research was to evaluate the emotional impacts on the students of the Bachelor's Degree in Biology and their learning during the virtuality 2020-2021 at the Tecnológico Nacional de México campus Boca del River. The methodology applied was quasi-experimental with qualitative main status, and its methodological basis was deduction-induction, explanation-understanding, holistic-analytical and synccriny-diachrony. 300 students participated, who received electronic forms with questions for the behavioral, affective and cognitive areas; which were evaluated with descriptive statistics and Likert scale of five indicators. The results were: cognitive values 56% with a tendency to disagree for increased qualification, compliance in practices, didactic strategies, autonomous learning and self-evaluation. In the emotional part with criteria of frustration, interaction, fulfillment, discomfort and disgust the tendency was again found in disagreement with 52%. Finally, in the behavioral area, 42% of students disagree with the criteria: respect, attention, interaction, satisfaction, self-evaluation and behavior changes. It is concluded that students disagree with online learning mainly because they do not have practical laboratory-field activities, do not have computer infrastructure, present connectivity problems and lack of training in ICT'S.

Keywords: impact, virtuality, affective-axis, cognitive, behavioral-axis.

I. INTRODUCTION

The origin of the pandemic in China was at the end of the year

2019, became the epicenter of an outbreak of an unknown pneumonia. Their great economic growth in their regions led to a high food demand for animal protein, including exotic animals [1]. However, the very poor biosecurity measures in their markets have allowed the transmission of viruses from animals to humans and from animals to animals [2].

In January 2020, China announces that it has identified a new type of SARS COV coronavirus, being the cause of the COVID 19 disease. The disease began to spread exponentially, the Chinese authorities assumed that they were facing a new threat. At the end of January more than 9000 cases were reported in China, in the same way confirmed cases were received in Vietnam, Thailand, Taiwan, Nepal, Sri Lanka, Japan, Singapore, United Arab Emirates, United States, Canada, Korea, Philippines, India, Australia, Finland, France and Germany [3].

In a short time the disease spread globally, due to three main reasons: Initial ignorance, air traffic and mismanagement of infected patients. As a result of the high transmissibility and dissemination in the month of March 2020 the outbreak of the disease was declared by the World Health Organization as a pandemic, with devastating effects for all members of society [4].

II. THEORETICAL BASIS

1. COVID-19: Migration to Asia and Europe, arrival in America and entry to Mexico.

Viral diseases with great scope entail in a short time the main problem of being dynamic and having cycles of repetition. This is how, worldwide in the rest of the countries, the COVID 19 disease has spread and the numbers are increasing disproportionately. Sanitary measures have been applied worldwide, which until today have been insufficient.

In Mexico and other territorially large countries, the magnitude and temporality of the COVID-19 epidemic are heterogeneous among different cities, municipalities, metropolitan areas and states. The National Day of Healthy Distance (JNSD), an extraordinary action of general health, was extended from March 23 to May 30, 2020. The JNSD included a series of temporary restrictions on work, social and educational activities whose purpose was to achieve social distancing at the national level and, with it, the mitigation of infections. At the end of the Day, these restrictions were moved to the local level to be implemented in accordance with the intensity of the epidemic and, consequently, the risk of spread of the SARS-COV2 virus.

The Ministry of Health designed a system of traffic lights for epidemiological risk due to COVID-19. [5]. Faced with this new threat, the pressing need to develop beef treatments to combat COVID 19 arose, and at accelerated marches in various countries of the world, scientists began to develop vaccines.

Today the first Latin American country to immunize its population was Mexico, complete vaccination schemes of 13,300 million have been applied.

2. In Mexico: impact on the health, trade, and education sectors.

The COVID-19 pandemic in Latin American countries showed large gaps in their productive systems and the health sector. Before the pandemic, Latin America had low growth and growing social problems. The first cases were registered in the population with better resources and health conditions, however, as the transmission of the disease progressed, it permeated more economically vulnerable sectors and with scarce health systems, presenting a greater risk of death in poor and vulnerable people due to morbidities.

Tourism, trade, manufacturing, agriculture plummet, exacerbating the economic crisis with the closure of more than 2 million companies, fall in foreign exchange, thereby deriving strong social impact increasing unemployment leading millions of additional people to poverty and extreme poverty social inequality, deterioration of human skills and productive capacities.

Among the socioeconomic effects, the contingency highlights a population with the impossibility of studying and working remotely and informal workers who lack savings. The pandemic also generated a scenario including the institutions of higher education, who were seen

forced to suspend face-to-face academic activities, in an abrupt and forced transition to technology-mediated distance education [6].

3. Communication in virtual education

In virtual education, communication is a key tool that represents the link between the teacher and the learner; but it is also the vehicle for the transmission of emotion, whose aspect is transcendent within integral education, and that without this link it would not be possible to achieve the development of skills [7]. There is a continuing demand for the design of new instructional strategies that should provide effective pathways for teaching-learning processes to adapt to new ones and their social demands [8], [9].

The demands of virtual education in the technological part, has become a condition to carry out social interrelations and reach the knowledge society, which is a requirement in the current companies [10].

4. Education and emotions the links of construction The

predominant theoretical models are related with the understanding of emotions which in turn is they intertwine the postulates of cognitivism, supported by the model of emotional intelligence, where the subject processes information to adapt to reality, guided by the thought and action; since emotional intelligence Play one paper with snake for What the subject Build y Develop the learning y the welfare personal, for the performing everyday tasks [11]. Although emotions by themselves they are not considered sufficient to educate, it is necessary What the emotion herself Convert in experience stimulating reflection [12].

5. Higher Education and ICT Supports

In Mexico, millions of students of all educational levels were forced to stop attending their schools, to avoid the spread of COVID-19.

The modality of Higher Education changed abruptly, to a distance education, so as not to affect the learning process in students. This confinement forced to leave the traditional classroom and turn teachers and students into users of technological tools (Tics), to be able to interact through remote modality and to give continuity to academic activities. Virtual education, he highlighted, the economic inequality in which millions of Mexican families live, higher level students who do not have the necessary space, environment and technology, the lack of computer and internet or having to share, if any, digital devices and the network of internet that the whole family uses [13].

This complex context and the need to continue their learning activities of the various subjects enrolled, through tasks, virtual conferences and a series of homework that are expected to be able to meet and meet these academic expectations, in addition to the uncertainty caused by the disease itself, the Economic implications such as job loss, as well as stress generated by confinement and those of youth, has caused various emotional states in students, such as anguish, fear, boredom, disappointment, frustration, dissatisfaction [14].

6. TecNM-Campus Boca del Río, Bachelor's Degree in Biology

As a consequence, the Tecnológico Nacional de México through its campuses, implemented its academic continuity plan, where it ensured the learning of students, through virtual training courses on the Moodle and Teams platforms, both for students and teachers, doing faced with the difficulty of transmitting knowledge to their students in a physical classroom. In addition, the teaching staff continued with their academic freedom, implementing other digital strategies and tools: Facebook, Whatsapp, email, Google Classroom, Google Drive, Zoom, Meet.

Undoubtedly, the TecNM Boca del Río campus responded to this challenge where the objective of offering a quality education and continuing with its teaching process is maintained, strictly in adherence to the guidelines established by the Ministry of Health and the state and federal government [15].

The Bachelor's Degree in Biology of the Boca del Río campus, is characterized by having within its academic program, assigning with a high number of practical hours, 50% in the laboratory observing and studying, tissues, cells, organisms and field practices, the student must demonstrate their skills with know-how. The theoretical contents can be followed online, but at a practical level, it has not been possible to complement the learning due to the restrictions imposed by the health contingency of COVID 19. That is why for this study by the characteristics *per se* of the career, focuses on the students of Biology the evaluation of the emotional impact by the virtuality [16].

III. MARCO METODOLÓGICO

It was a research with qualitative status, in which content analysis was performed [17], [18]. About the virtual experience of interaction of students with different technologies during the academic semester. A question was elaborated with 21 questions for the study of the

meanings of human actions and social life, using interpretation methodology, focusing on the interest of knowing the impact of emotions during virtuality. The qualitative approach is interested in understanding human behavior, from the very frame of reference of the one who acts, manages a perspective from within, oriented to discoveries, the following characteristics are described: it is part of a cultural context and a historical process of a here and now (everyday), ethical (it is described and transcribed) and is seismic (we can unveil and interpret its meanings) is dynamic, changing, is in continuous reconstruction. It is multifaceted: word, image, signs, tones of voice, spatial and temporal distributions, material culture [19].

The research question was:

What are the emotional impacts on Biology students and their learning during the 2019-2020 virtuality?

General Objective:

Evaluate the emotional impacts on Biology-ITBoca students and their learning during the virtuality 2020-2021.

IV. MATERIALS AND METHES

1. Place of study and infrastructure

El I am a student herself Made in the Technological National of Mexico, Boca del Rio Campus (ITBOCA), located in the Road Veracruz-Cordoba Km.12 C.P. 94290. Mouth of the River Veracruz Mexico; the Coordinates sound 19°5'48"N 96°6'30"W, next to the mouth of the Jamapa River. The ITBOCA has within its job offer the Biology career, which has 16 basic teachers, with six Classes three laboratories one center of computation (with four Salons y 120 computers), one center of information, a butterfly house, a multipurpose room, a aula magna and internet for student use on campus (Figure 1).



Fig. 1. Tecnológico Nacional de México / Campus Instituto Tecnológico de Boca del Río

2. Characteristic of the sample

The biology career has two specialties: marine biology option and management option of marine and coastal resources, the sample was represented by the groups that make up this career, which is constituted by 343 students distributed from 1st to 8th grade. Semester whose age range is between 18 to 24 years, and there are local and foreign students, the participating population was 90% corresponding to 300 students, Figure 2 shows a panoramic view of the campus before the pandemic.



Fig. 2. View of the ITBOCA sports field

3. Applied methodology

Content analysis of the experience and application of descriptive statistics were used for evaluation of the form [20], What herself Integrated with 21 Questions related to academic activities, it was structured in Likert questions scaled 1 to 5 ranging from very disagreement to very much agree on his statements and one of character free. Subsequently Were Analyzed the contents y herself Developed the Categories of analysis with topics for: use of cameras, combined exercises in others platforms, group interaction, evaluation and its equity for rate them; team of work for study.

The forms were divided into three areas: emotional, with eight questions based on expressing the feeling and development of each student; conductal with six questions to evaluate the social development of the student in a situation of virtuality and cognitive area with seven questions that recorded the development of knowledge.

4. Information Collection

The form was sent by institutional email and classroom platform in bulk. The collaboration of teachers and their students was requested to respond voluntarily and confidentially.

The Goofle forms tool facilitated the capture and organization of the responses; the percentage of questionnaires was 90% of the total population surveyed corresponds to 300 questionnaires.

In turn, a blog of the content was prepared that described the emotional, behavioral and cognitive impacts, and subsequently revised based on the Likert scale. The Excel tables supported the coding of the data and the "packages" were integrated, which were classified and analyzed using descriptive statistics [21], [22].

5. Teaching work

The teachers worked in a programmed way considering their class plan, where their individual strategies for the development of their chair were applied, It was authorized to use different educational platforms such as meet, zoom and classroom, (Figures 3a and 3b).

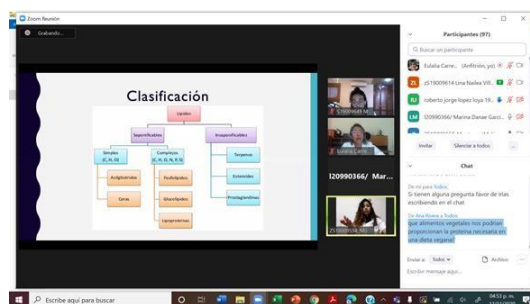


Fig. 3a. Teachers and students in ITBOCA on zoom platform

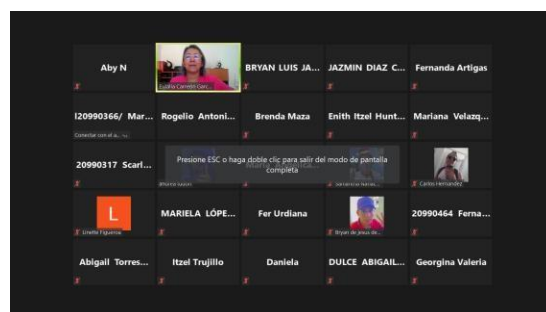


Fig. 3b. The new modality, virtual class

6. Student interaction

The students within the face-to-face modality when expressing themselves had the freedom of movement within the institution considering it part of their belonging to be in it (Fig. 4). This freedom is expressed in various ways for both students and teachers, which include participation in projects, practices, visits, coexistence between classes (Fig. 5).



Fig. 4. Interaction between students in ITBOCA by emotional impact



Fig. 5. Interaction in ornamental and compost plant projects made by ITBOCA students

7. Validity of the information

The validity of the design was based on the four points: internal validity, which allowed to have elements to know the methodology applied towards the content analysis; external validity, which considered that all forms had the same probability of being answered and forwarded, construct validity that included to students in the stage of virtuality and the validity of statistical conclusion that demonstrated the impact as general objective to be measured [22].

V. RESULTS

The response of 310 students, which corresponds to 90% of the surveyed population, observed that the form was answered by 190 women with a percentage of 61% and 120 men with 39%

1. Emotional Impact

In the results obtained from the evaluation of the emotional impact, the ranges in disagreement are distinguished with 23.10%, and in total disagreement 29.50% to the one presented in figure 6 that constitute within the emotional criterion, feelings of frustration and discomfort before the teaching in the virtuality.

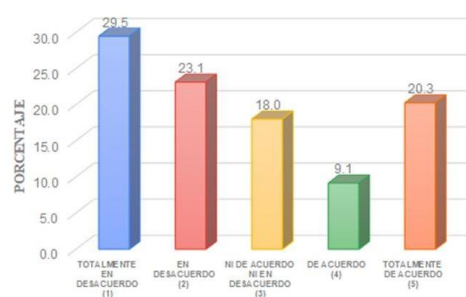


Fig. 6. Percentage of emotional impact assessment in biology students-ITBoca and their learning during the virtuality 2020-2021

Figure 7 shows the levels of satisfaction in the category of impact emotional. What corresponds to the 38,1% of the total of 21 questions asked in each form for the 310 students of the surveyed population, the results obtained show a tendency to totally disagree with 11.22% and 7.71% to totally agree, due to that students develop feelings of frustration of anxiety and shame, stating that they do not have a learning significative. No Have interaction with Fellows nor Activities Parallel during class y No Have with one space private for the development of his class.

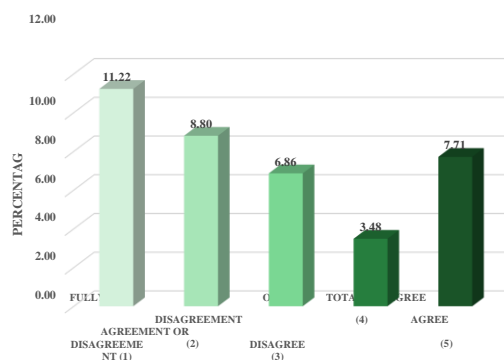


Fig. 7. Percentage of satisfaction levels referred to the emotional category in study before Biology-ITBoca and its learning during virtuality 2020-2021

Figure 8 represents the percentage of responses for the emotional category: the results show learning, team activities, side activities, back to school, tuition in line open the camera privacy inside of the form made, and where the inclination of students to disagree and disagree between 10 and 20% for every affirmation. Given of the teaching in the virtuality.

The excitement of returning to classes stands out for the scale according to 13.74% and totally agree with 30.74%; and for limited learning for the range scale totally disagree with 23.43%.

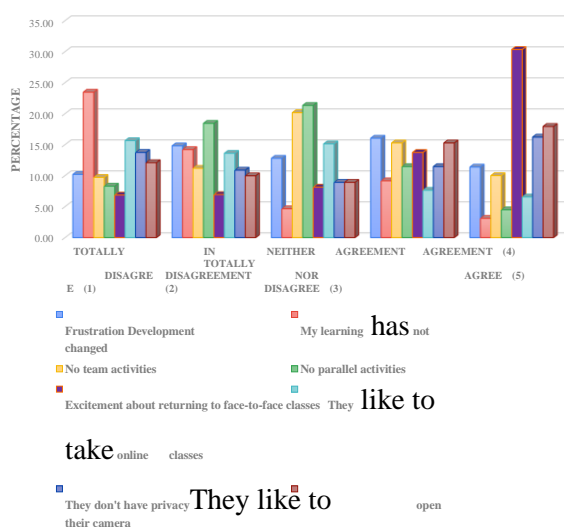


Fig. 8. Percentage of response in the emotional category in students of Biology-ITBoca and their learning during the virtuality 2020-2021

2. Cognitive impact

The results obtained from the evaluation of cognitive impact show a tendency to disagree in a value of 56.7%, as presented in Figure 9, which constitutes within the cognitive criteria everything that implies for students the fulfillment of activities and autonomous learning in the face of virtuality.

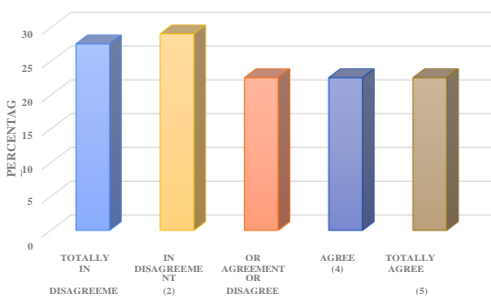


Fig. 9. Percentage of evaluation of the cognitive impact in students of Biology-ITBoca and their learning during the virtuality 2020-2021

Figure 10 presents the levels of satisfaction in the category of cognitive impact that correspond to 33.3% of the total questions included in the form for the total of students evaluated from a virtual system.

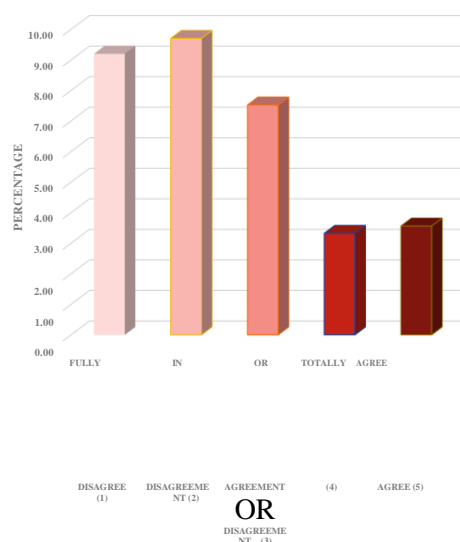


Fig. 10. Satisfaction levels referred to the cognitive category in Biology students-ITBoca and their learning during virtuality 2020-2021

Figure 11 shows the percentage of response in the cognitive impact category of total responses. One can appreciate the inclination of the students to the disagreement for each given affirmation of the teaching in the virtuality.

The knowledge for the *development of the practices* for the scale of totally disagrees with 25.43%, in disagreement 19.65% and for *I count on what is necessary for virtual classes* for the range scale fully according to 28.36% and according to 18.40%

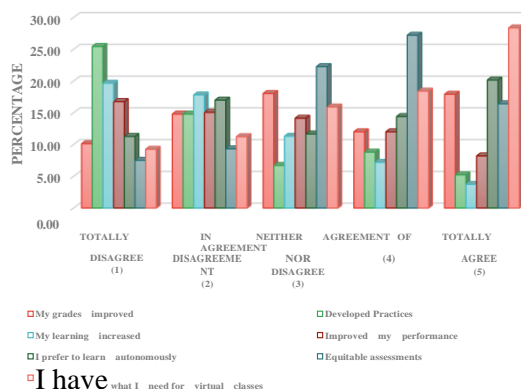


Fig. 11. Percentage of response in the cognitive category in students of Biology-ITBoca and their learning during the virtuality 2020-2021

3. Behavioral impact

The results of the behavioral impact assessment show a tendency to disagreement of 42% as presented in Figure 12, which constitute the criteria of respect and attention during teaching in virtuality.

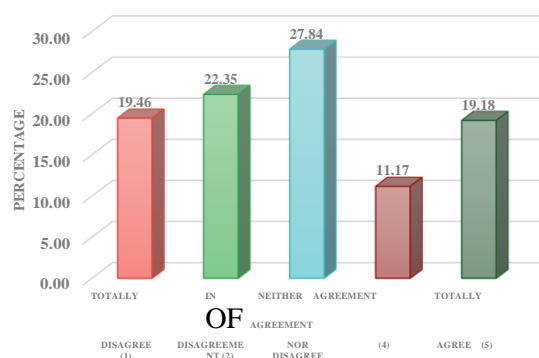


Fig. 12. Percentage of evaluation of the behavioral impact in students of Biology-ITBoca and their learning during the virtuality 2020-2021

Figure 13 presents the levels of satisfaction in the category of emotional impact that corresponds to 28.6% of their responses with a tendency to disagreement.

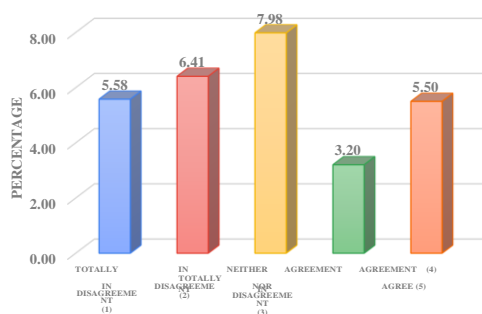


Fig. 13. Satisfaction levels referred to the behavioral category in Biology students-ITBoca and their learning during virtuality 2020-2021

Figure 14 shows the percentage of response in the behavioral category of total responses for each of the Questions Including inside of the form Made y where students' inclination to disagree is shown for each given statement where it is placed to the criteria of respect, satisfaction and changes in general in the behavior of the teaching in the virtuality.

The behavior that there were no changes at home for the scale of totally disagree with 32.06%, in disagreement 15%, although there was a group with the same percentage of 15.53% that was defined as totally in agreement for presenting behavioral changes at home. It is important to mention that 28.16% and 27.50% are totally in agreement and agree to respect the dress codes. And 29.13% totally agree with the answer to the question when I did the registration process I selected the same number of subjects.

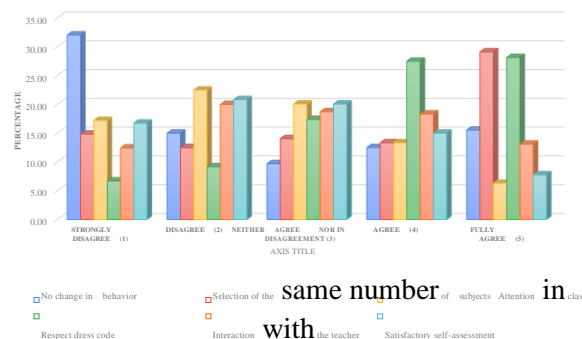


Fig. 14. Percentage of response in the behavioral category in students of Biology-ITBoca and its learning during the virtuality 2020-2021.

VI. ANALYSIS OF RESULTS

The present study is the first in the Tecnológico Nacional de México campus Boca del Río, the response rate of online surveys was high represented 90%, when generally in this form modality it turns out to be low, approximately 35%. It is estimated that the short time required for the response of the same contributed to the high response rate, playing in the same way a role the impact and uncertainty of the current context on the part of the students is important.

- Emotional impacts on Biology-ITBoca students and their learning during virtuality 2020-2021.

The results of the emotional impacts demonstrated Feelings of frustration Problems of learning invasion of your privacy, realization of and parallel activities how to attend to the cell phone and social networks at the same time, which implied that there is no concentration on their activities and one displeasure before the prolongation of the virtuality. Of agreement with the model century XXI to the implement the education line herself Put of manifest the Problem Economic of the population already No herself Could access a the Institution and enjoy its benefits, it was now necessary count with Spaces y environment in their households the inequality Economic tAlso upset the purchase of technology needed, let's not even mention shared teams to the same as the red of internet for all the family.

- Cognitive impacts on Biology-ITBoca students and their learning during virtuality 2020-2021.

The cognitive impacts showed the total disagreement on the point of improvement of grades, the non-compliance with the practical activity as a complement to the theory, which despite an equitable evaluation there were no academic performances better than those already presented in semesters

Previous. In this analysis it is important to mention that the teachers of the campus, were not organized, nor visualized what it meant to have online classes which highlighted dissatisfaction, stress and exhaustion to be during a monitor eight hours in a row. Mental fatigue was demonstrated in the free questions where the analysis of their content was forceful with requests for more time for the delivery of tasks, that is, the strategy that very few used was an asynchronous active learning without sacrificing knowledge in class generating greater empathy during the process.

- Behavioral impacts on Biology students- ITBoca and their learning during virtuality 2020-2021.

The results obtained for this study showed that there were no behavioral *changes at home, respecting dress codes and selecting the same number of subjects* and it was conclusive in their answers, not allowing to abandon their student activity demonstrating with respect the way of dressing correctly through virtuality.

It is worth mentioning that at first the teachers of the Boca del Río Campus made excessive use of video links, because they were not prepared for a more asynchronous experience; derived from meetings, the academics stressed that the results obtained were not being satisfactory, because this generated both students and students, stress, and exhaustion to be in front of a computer for several hours in a day, coupled with the non-physical interaction of the students with their friends.

Teachers have made adaptations in the courses and the time of online classes has been reduced, reinforcing itself with active, asynchronous learning, without sacrificing knowledge. It is of the utmost importance to emphasize that teachers were asked to be more empathetic and modify their evaluation process in line with the situation.

VII. CONCLUSIONS

It is of utmost relevance the immediate identification and attention of the problems such as disposition, attitude problems, lack of interest, anxiety, fatigue, boredom, on the part of the students, to make decisions relevant.

Most of the students do not reflect demotivation due to lack of computer infrastructure, however, since they do not have practical laboratory-field activities, there is no physical interaction and their social relations did not allow them to develop satisfactory educational activities.

The training in the students must be permanent and with asynchronous periods in virtual classes, to study the new elements and practice later until they master it.

The transformation of the teaching praxis is imperative, the immediate immersion, diversification and combination of digital tools, as well as a continuous training, that allow to develop innovative and very critical didactic strategies that impact on learning.

Higher Education on the Boca del Río campus requires a hybrid modality between virtual and face-to-face with more collaborative sense, crossing borders and with great opportunities to develop high quality educational content.

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