La percepción de estudiantes del Instituto Tecnológico Superior de Poza Rica (ITSPR) ante factores que intervinieron en su Rendimiento Académico durante la cuarentena del COVID-19

A percepção dos estudantes do Instituto Superior Tecnológico de Poza Rica (ITSPR) diante dos fatores que interferiram no seu Desempenho Acadêmico durante a quarentena da COVID-19

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RESUMEN
En este trabajo se describen los resultados y análisis de la investigación realizada en una

muestra de 758 alumnos de Ingeniería de Sistemas Computacionales (ISC) del Instituto Tecnológico Superior de Poza Rica (ITSPR) que durante su trayecto escolar sufrieron la cuarentena COVID-19 del periodo de marzo de 2020 hasta enero de 2022. El objetivo del trabajo consistió en evaluar factores pedagógicos, estrategias educativas, evaluación, factores psicológicos, la focalización de contenidos y factores fisiológicos, que pudieron incidir en el rendimiento académico de los alumnos de la carrera de ISC del ITSPR; quienes previo al COVID -19, ya incursionaban en la modalidad presencial y manejo de TICs. Los resultados obtenidos surgieron de una encuesta virtual que recopiló la información de los factores mencionados anteriormente; su análisis se desarrolló en Excel y en la plataforma de Office365. Se encontró que el rendimiento académico de los alumnos de ISC presentó un impacto positivo a pesar de los resultados de los factores evaluados. Se concluyó y pone en evidencia el diseño de nuevos paradigmas y programas enfocados al aprendizaje autónomo con estrategias que fortalezcan las modalidades virtuales tanto en docentes como en los alumnos, así como el establecer enfoques centrados en el control emocional, estrés y aspectos de salud. Finalmente resulta imprescindible que los docentes integren experiencias vividas en las aulas virtuales para evaluar los aciertos y desaciertos; y que contribuyan a generar planes de acción en el desarrollo del aprendizaje bajo nuevos paradigmas virtuales.

Palabras clave: COVID-19, rendimiento académico, aprendizaje virtual, evaluación de aprendizajes, entorno virtual, TICs.

RESUMO

Este artigo descreve os resultados e a análise da pesquisa realizada em uma amostra de 758 alunos de Engenharia de Sistemas de Computação (GISC) do Instituto Tecnológico Superior de Poza Rica (ITSPR) que durante sua jornada escolar sofreram a quarentena COVID-19 de março de 2020 a janeiro de 2022. O objetivo do estudo era avaliar fatores pedagógicos, estratégias educacionais, avaliação, fatores psicológicos, enfoque no conteúdo e fatores fisiológicos, que poderiam ter impacto no desempenho acadêmico dos alunos do curso ISC da ITSPR, aqueles que, antes da COVID -19, já estavam envolvidos na presença e gerenciamento de TICs. Os resultados obtidos vieram de uma pesquisa virtual que coletou informações dos fatores mencionados acima, cuja análise foi desenvolvida no Excel e na plataforma Office365. Constatou-se que o desempenho acadêmico dos alunos do ISC teve um impacto positivo, apesar dos resultados dos fatores avaliados. O projeto de novos paradigmas e programas voltados para a autoaprendizagem com estratégias que fortaleçam modalidades virtuais tanto em professores quanto em estudantes, assim como a criação de abordagens voltadas para controle emocional, estresse e aspectos de saúde, foi concluído e comprovado. Por fim, é essencial que os professores integrem experiências vividas em salas de aula virtuais para avaliar sucessos e fracassos; e que contribuam para gerar planos de ação no desenvolvimento do aprendizado sob novos paradigmas virtuais.

Palavras-chave: COVID-19, desempenho acadêmico, aprendizagem virtual, avaliação da aprendizagem, ambiente virtual, TICs.

1 INTRODUCTION

The COVID-19 undoubtedly represented an abrupt irruption into the daily life of the entire world and led to facing unexpected realities, adopting changes that were observed distant, or simply exclusive for generations that were born with the digital age.

However, the world never imagined that technology witnessed of themes close to a science fiction movie, where realities were shown and broke the face-to-face scenarios due to the total or partial dependence on technology during the COVID-19 lockdown.

The educational sector launched teaching plans at all levels supported by sessions conducted through virtual classrooms and television. The foregoing implied that third world countries faced great challenges such as their prevailing technological lag, the response of their economy and from another perspective, the need of do not to stop educational training, thus opening a panorama full of concerns, absences, and expectations.

However, despite the controversy that this challenge generated, efforts by the government, private institutions and families were articulated in search of fulfilling the commitment to reactivate education through digital pedagogical alternatives. These strategies were used optionally as didactic support tools and represented the only unifying means of education, simplifying face-to-face activities and introducing a new replacement scheme. This scheme considered teachers by videoconferences, whiteboards by virtual scenarios, school by homes, printed material by digital material, verbal communication by social networks, design of practices by virtual environments and simulators, among others.

Today, given the recount of the damage to higher education during the isolation period due to COVID -19, both strengths and weaknesses were presented in learning, changes in attitude, habits, and skills on which work continues to develop its potential, above all, in those technical areas where the development of practical skills is the essence of the training.

From this context, the objective of the work was to analyze how pedagogical, psychological, and physiological factors such as educational strategies, learning evaluation, stress management, content focus and screen use, intervened in academic performance of the students of the career in Computer Systems (ISC Spanish acronym) of the Higher Technological Institute of Poza Rica (ITSPR Spanish acronym), who prior to COVID -19 used virtual and ICT modalities.

The students evaluated were the sample with the greatest sensitivity to perceive learning differences and detect cognitive absences between both educational modalities through the application, interpretation, and analysis of data from the applied survey.

1.2 THEORETICAL FRAMEWORK

Academic performance tends to reflect the ability and skills that students generate in their knowledge construction processes. These processes usually are presented in levels of

complexity that make a difference on the learning acquired. Academic achievement is generally measured through the grades obtained with a quantitative assessment. The results show the subjects approved or failed, desertion, and the degree of academic success (Vélez Van and Roa, 2005).

Several theories agree that every student goes through various reasons that may intervene in their academic performance, from aspects that are related to the Institution where they study and those related to their person. In this sense, it is important to identify the type of influence of factors associated with the success or failure of the student, that is, the causal factors and the personal, social, and institutional mediations that are implicit in their performance. (Castejón and Pérez, 1998).

Higher education, as mentioned in the OECD Report (2020), presents indicators on technologies used, possible effects on the health of teachers and students, economics in the future of higher education, among others. However, the relevant aspect of achievement is not evaluated. Thereby affecting the quality that future graduates of higher education programs will have.

Miguel Román (2020) in his article mentions another important aspect and takes up the technology-education-educational quality divorce "...this reality shows that scholars of learning and knowledge technologies (TAC Spanish acronym) have underlined, that current education is in crisis because there is a mismatch between technological advances, curricula, methodologies and the needs of students."

It is difficult to determine what are the factors involved in successfully achieving a high level of school achievement. However, throughout this article three study factors are exposed: pedagogical, psychological, and physiological, which were subjected to an assessment based on the results of academic performance (Arias et al., 2021).

Pedagogical factors on the other hand, are those associated with the correct application of teaching with social actors such as teachers and students in the process, as well as the procedures, methods and didactic instruments that favor the development of learning (Seegers, 2020; Teles, 2020; Flores 2022).

Physiological factors are usually related to the physical structure of the student, such as sight, hearing, back, among others (Ávila Yax, 2010). Which usually repress the optimal brain´s functioning. Finally, the psychological factors in basic mental functions, and that maintain a close relationship with emotions. Some studies suggest that when a negative emotional state is experienced, the amygdala often creates a lower reaction in the brain (Willis, 2010; Mares et al., 2021).

Some education specialists insist that reinforcing study habits among students makes a difference in their academic results. According to Torres et al. (2009), the study habits that improve the academic performance of students in higher education stand out: time management, cognitive abilities such as memory, attention, concentration, reading comprehension, class notes, writing, self-concept, motivation. The will, interpersonal relationships, and teamwork.

From this perspective, these skills could reduce the strength of those factors that oppose good academic performance. Therefore, it is analyzed in which sense the factors associated with virtual teaching were determinant in academic performance.

2 METHODOLOGY

The methodology considered a systematic review of literature related to COVID-19 and their impacts on higher education. Available web resources were also consulted, which provided a referential framework for the delimitation of variables related to the generational cohort such as sociodemographic, pedagogical, technological, and physical-ergonomic aspects. A descriptive, retrospective cross-sectional design was used that made it possible to identify the problems organized in the sections of the instrument designed to electronically interview the target population, students of the ISC (Spanish acronym) program in the period of December 2021. The response variable was the percentage of achievement of the students of the evaluated cohorts.

The survey Forms designed in Office 365®, considered a mixed questionnaire with 13 items on Likert scale, 9 multiple choices, 12 single selection and 4 open questions. With a total of 38 items the survey was divided into six sections: General identification data of generational cohorts, pedagogical strategies, evaluation, didactics and ICTs, physical-ergonomic aspects, and general features. Some items in the questionnaire were multiple-choice and open-ended, where the student had the option of selecting information or responding freely. Figure 1 shows the screen image of the instrument used, available in Annex 1. The questionnaire validation considered a pilot test with ten students for validation, this because the existing pandemic conditions and problems associated with various causes such as communication failures. Cronbach's alpha was estimated using Excel to assess the internal consistency of the survey as shown in Table 1.

Table 1.- Cronbach's alpha consistency coefficients

Cronbach´s Alfa	Internal Consistency
$0,9 \leq \alpha$	Excellent

$0,8 \leq \alpha < 0,9$	Good
$0,7 \leq \alpha < 0,8$	Acceptable
$0,6 \leq \alpha < 0,7$	Questionable
$0,5 \leq \alpha < 0,6$	Poor
$\alpha < 0,5$	Inacceptable

Source: Adapted from https://statologos.com/spss-alfa-de-cronbach/

Once the instrument was validated. it was determined to apply the questionnaire to the 2016 to 2021 cohorts with a population of 758 students. A 90% confidence interval and an α error of 5% of the sample size were estimated by the equation 1.

$$\text{Sample sizing} \quad = \quad = \frac{\dfrac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\dfrac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Equation 1

The ordinal Likert scale measured intervals of qualities (Aristizábal *et al.,* 2003). The results obtained were evaluated through descriptive statistics, representing the results of the Likert scale of the questions asked. These results were graphed using the Forms system and Excel. Each item was interpreted according to the results obtained.

Figure 1. Forms survey in Office365®
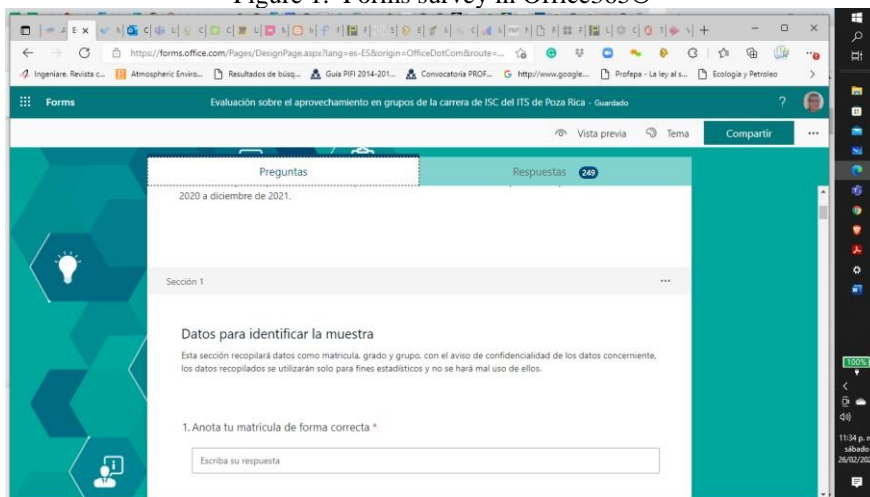
Source: Author

3 RESULTS AND DISCUSSION

The sample size was estimated with 90% confidence and an α error of 5%, for a population of 758 students from the 2016 to 2021 cohorts. The survey was applied in a total of 201 students. The following paragraphs describe the interpretations by areas of analysis of the applied questionnaire. The Cronbach's alpha of the estimated internal

consistency is shown in Table 2.

Tabla 2.- Excel estimation of the Cronbach's Alpha in the Likert section.

Variations origin	Sum of squares	degrees of freedom	Average of squares	F	Probability	F Critical value
Between groups	123.5866	12	10.2988	10.2891	3.3214E-20	1.75517
inside groups	3227.0361	3224	1.0009			
Total	3350.6227	3236				

Cronbach´s Alpha estimation of 0.9; Source: Author

This estimated value of Cronbach's alpha and in accordance with what was described in the methodology indicated excellent internal consistency.

3.1 DIDACTIC STRATEGIES

Didactic strategies can be understood as processes of a series of activities that favor the logical and reasonable understanding of a certain topic to build the construction of knowledge in the long term. According to the results table, only 48% of the representative sample agreed that the didactic strategies applied occupied a relevant place to create a learning space in the thematic contents of each subject. This percentage level reflects a marked division of opinion among students regarding the strategies used in the virtual classroom.

Being selected in the survey the most used techniques such as the collection of information on web pages 80%, learning projects 65% and video conferences 63%. It should be noted that the learning contribution generated by these techniques is related to the assimilation of knowledge and the optimal follow-up of indications. On the other hand, the least used techniques were forums 13%, directed search guides 21% and class debates 24%, which are necessary in the projection of the search for identity and its expression.

According to the results, it was detected that the didactic strategies used by the teacher had a strong inclination to direct learning towards a classic model of teaching in virtual classrooms, leaving aside exploring creativity and critical opinion. In the virtual teaching model, the student's participation towards learning in the classroom is strengthened, encouraging them to assess their own evaluation scale reflectively, autonomously, and critically, thus leaving the teaching work as a guide for the construct of student knowledge (Jiménez Reyes et al. sf.) as illustrated in figure 2,

Figure 2.- Student-centered virtual teaching model;
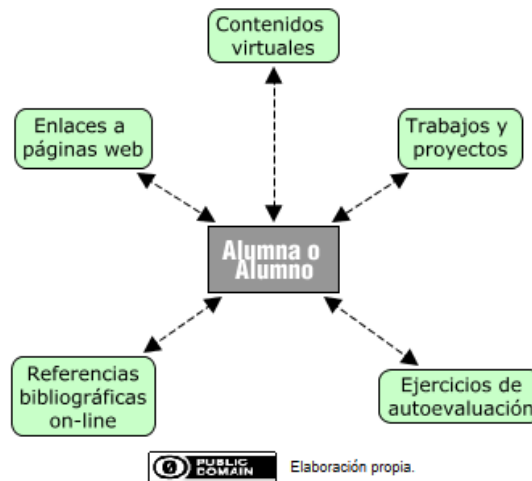
Source:
https://exelearning.net/html_manual/cursomaterialesfp/1_contenidos_aspectostecnicosensenanzavirtual/12_el_modelo_de_enseanza_virtual.html

Given this perspective, it is important to design an action plan based on significant learning and the mental process of the person who learns, through the previous knowledge connected with the new ones in a non-arbitrary and substantive way; that requires the willingness to learn and significant impact material (Rodríguez Palmero, 2008).

The aim is to assimilate new learning with existing knowledge patterns, and in this way the student perceives himself as the author of his own learning, supported by guided activities where it is required to understand, analyze, and stimulate the imagination. According to Moreira (Moreira, 2005) … "Learning significantly also requires a critical attitude that favors decision-making and enables the questioning of relevant questions".

Achieving meaningful learning is a cognitive task of the one who voluntarily undertakes the mental exercise (the student), however, as teachers we share responsibilities in this exercise, since we are the ones who design the learning conditions and motivating strategies so that this learning relates to previous knowledge, supported by state-of-the-art technology (Asusbel, 1986).

It is important to encourage self-sufficiency in the student, forging in them the implementation of a comprehensive education supported by proactive, reflective, and creative learning. Making them aware of their way of thinking, acting, and expressing the future commitment of professional work, seeking to modify behaviors and achieve achievements that do not depend exclusively on teaching indications.

3.2 DIDACTIC EVALUATION

Didactic evaluation is understood as a compendium of processes or criteria that indicate the assimilation of educational learning from different contexts. In the measurement of this variable, it was found that 72% of the students agreed with the types of evaluation applied by the teachers virtually. The most used forms were the rubric 70%, the score 60% and the summative 33%, which are evaluations oriented to the fulfillment of cognitive goals. On the other hand, self-assessment with 24% and co-evaluation with 14% were observed among the least applied evaluations. Besides, these latter are related to the exercise of autonomy-responsibility.

According to this perspective and based on obtained results on evaluation processes, it can be said that teaching in virtual classrooms was aimed at measuring the level of student performance, through criteria and indicators of theoretical competences, supported by procedures, strategies, techniques, abilities, and skills, complying with this with the educational objectives.

Despite the achievement achieved, it is suggested that the teacher does not ignore the importance of integrating introspective evaluation (self-evaluation), or the analysis of recognition between peers and (peer evaluation) into their Didactic Evaluation. Falchikov (1986) finds that self-evaluation and peer-evaluation motivate thinking, increase learning and student confidence. For this reason, it must be kept in mind that at the educational level these evaluations encourage the student, contemplate their feelings, and invite them to reflect on their strengths and weaknesses through the exercise of ethical judgment, generating a space of trust between teachers - students.

3.3 FOCUS ON CONTENT

Following up on the measurement of the content focus variable, the data shows that 48.6% of the students presented a lack of interest in the thematic contents that were exposed in class, this shows the lack of knowledge about the pedagogy applied in virtual classrooms for capture the attention of the students.

The tendency to decrease interest in virtual classes is undoubtedly explainable from two perspectives: technological and strategic. In the technological perspective, it is considered that the video conference platforms proposed by the ITSPR are very limited in software. There is no precise control through real-time monitoring, which evidences the physical presence of the student. Finally, considering that the groups range from 40 to 60 students per virtual classroom, there is a high probability that students alternate their classes

with other activities that stimulate them to be in front of the screen, or that they simply are partially or totally absent. On the strategic side, it is up to teaching to develop areas that reinforce the contents of the subject with motivating tasks that lead them to analyze the information, because "only the person who thinks learns" (Willis, 2010). One of the main objectives of education should be to create emotionally positive and collaborative educational environments, something that will help to remember, and will also foster a teaching process associated with joy and happiness (Gray & Parkinson, 2015).

Analyzing the successes of the video games as a stimulator of the ability to concentrate on the content, it would be relevant to propose a motivating learning plan based on the video game teaching processes, creating attractive experiences that raise the spirit of learning, where standards are established, the participant is involved, an environment of trust is developed without fear of error. Challenges are presented through a difficulty curve, and rewards are given. Therefore, given the uncertainty of COVID19, it is permissible for innovative spaces to open in the educational area that excite and motivate virtual teaching, combining laughter, curiosity, challenges, and prizes, breaking with some traditional formal schemes that make more complex experience of connection with the brain.

According to experimental studies from the University of Kansas (Alamni, 2018), the use of video games favors the development of participants' visual selective attention, which refers to the brain's ability to focus on relevant visual information. while suppressing less relevant information, so people who excel at visual selective attention can focus their attention and block out distractions, they find themselves using their brains more efficiently (Alamni, 2018).

Educational environments should be characterized by showing joy and laughter every day, in addition to combating stress and negative emotional states. Laughing is one of the best ways to promote positive interaction with others (Gray & Parkinson, 2015). This moment is a good opportunity to redesign the ways of assimilating knowledge. In this way, the student will be the protagonist of his own learning, contributing to centralize knowledge.

3.4 STRESS MANAGEMENT

In the educational field, emotions represent a decisive learning factor. Stress affects memory and learning processes and when a student is stressed or anxious, the amygdala in response blocks the absorption of sensory stimuli (Willis, 2010; Schwartzmann, 2005). According to the results, between 40 to 45% of the students surveyed were affected by the loss of a family member or by the dismissal of a family member's job, situations that

undoubtedly destabilized their mental state or familiar economy, leading him to decrease attention in class. In the same way, 69% of those surveyed associated stress with the development of some incipient disease due to sitting in virtual class sessions.

Given the presence of a high percentage of health problems related to stress, it is important to assess that there are two types of stress, the positive (adrenaline) and the negative. The results indicate that 33.3% of the population studied could have experienced a type of positive stress, related to pleasant situations, the motivation and attitudes that drive to achieve a goal. On the other hand, 66.6% of the sample indicated that they could be experiencing understandable negative stress due to the uncertainty of health conditions and educational risks; associated with fears, confusion, frustration, among others. Seen from this perspective, stress and pleasure influence the way the brain learns. In conclusion, students who experience positive stress experience significant learning. On the contrary, students exposed to negative stress do not achieve significant learning and their learning is blocked (González, 2006).

According to González (2006), stress "is a sensation of both physical and psychological tension that can occur in specific difficult or unmanageable situations." Likewise, 2 out of 3 students presented a high tendency towards muscular discomfort, highlighting neck pain, middle and lower back. In general, it can be argued that there was a diversity of palpable emotional situations during the virtual classes, which could limit the development of the students' learning of computer systems.

Add to these problems, the absence of physical interaction and visual contact that could represent fears, confusion, frustration during classes. Opening a barrier between the student and the teacher by maintaining the freedom of reciprocal communication in the event of doubts. Therefore, it was emerging that the necessary conditions were generated to open channeling courses for good stress management with qualified personnel, helping students with this to gain knowledge, ideas, strategies and generate self-confidence.

3.5 SCREEN DISPLAY

The computer system represented the cognitive connection tool par excellence during the COVID-19 pandemic. Studies converge in affirming that the use of technological devices for long periods of time brings with it significant and irreversible ocular effects, such as visual fatigue from the blue light emitted by virtual screens.

According to the evaluated results, the screen display variable was assessed through health and vision aspects, where 74% presented tired eyesight, 58% headaches and 26.5%

blurred vision. It is important to pay urgent attention to the visualization variable due to the impact that digital life has on sight, since it represents the evidence to filter knowledge into memory.

Under this perspective, it is useful to evaluate alternatives for the ocular health of students, anticipating situations that may generate affectations in the future. Among the alternatives, the following stand out: technological, medical, or educational, which are within the reach of the population and favor the visual experience of access to the screen. Considering educational measures, the reduction of visual tension remains in the hands of the teacher. This latter being the mediator in the teaching-learning processes, and it is his responsibility to design the material to be exhibited using several educational strategies, which contribute to propose alternatives of understanding and systematization of contents. For this reason, it is suggested that teachers establish interactive activities, where attention to the screen is combined with the practical development of other activities. Table 3 shows the summary of the results of the answers provided by the surveyed students of the ISC career of the ITS of Poza Rica.

Table 3. Summary of Results

| Evaluated Aspect	Assessment
Didactic strategy	The surveyed sample stated that they "Agree" in the didactic strategy used, yes supported the student in his use. The six most representative with the highest scores were: Gather information on the web, learning projects, video conferencing, preparing summaries, making presentations, and Making infographics.
Didactic evaluation	From the sample surveyed, it was found that students stated that they were "Agree" and "Totally agree" in the evaluation used, reflecting the student's achievement. The 3 most representative for their score were the evaluation by rubric, by score and summative evaluation. 54% of those surveyed stated that their qualifications could have been better if they had been in person; 36.6% of those surveyed prefer to continue in a hybrid way, 29.7% in person and 33.7% virtually and remotely.
Physical discomforts and associated stress	Considering stress-related and physical discomforts, it was found that: Eyestrain with 185 points was the most indicated and headache with 144; Neck pain with 145 points, Back pain in the lumbar region with 126 points. Associated with stress with 172 points and Excessive exhaustion with 110 points. Regarding whether interest was lost, 48.6% stated that it did occur and 51.4% answered No.
Impact of COVID-19 on households	41.4% of the respondents suffered from this disease in relatives at home. 45% of those surveyed stated that they had suffered layoffs or lack of employment that affected the economy at home because of the pandemic and confinement. 48.6% of those surveyed responded that they had supported the economy of the house by working.
	The equipment and internet available by the students affect the use, it was found that 74.7% of the respondents answered that they had equipment available for their virtual classes: Laptop used with 138 points, Cell phone 120 points and they worked in the dining room of home mainly.

	The available internet was mainly coaxial cable with 137 points, fiber optics 72 points and cellular 51 points. The most used speed was 20 Mbps or less with 175 points. The type of internet service was prepaid with 167 points, spending an average of $200.00 MX pesos or less per month for this purpose, with 149 points. The family that shared equipment answered with 124 points having enough equipment in their home for their use.

Source: Applied survey

3.6 PERFORMANCE OF STUDENTS IN COHORT SAMPLES

As an important part of this work, the records of the subjects taught in the cohorts evaluated through the questionnaire were analyzed. Figure 3 shows the approval and failure rates of students in the Computer Systems Engineering educational program.

Figure 3. Performance of the students of the participating cohorts
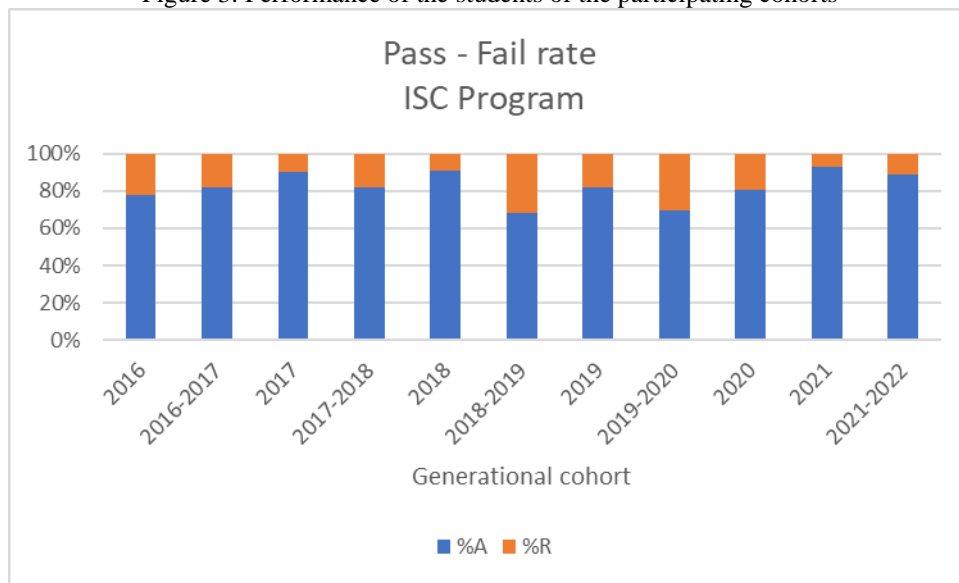
Source: Author

As can be seen in the graph, the failure rates are low in the cohorts analyzed and that answered the survey, however, considering the cohorts where there was no pandemic from 2016 to 2019, the failure rates range from 9.0 to 32.0%, These generations have the particularity of having been in person for most of their course.

At the start of the lockdown in December 2019, the incoming generation and those coming from some previous cohorts show failure rate percentages of 10.0 to 30.0%. It was observed that the effect of the pandemic, at least in the percentage of failure, denotes downward values in percentage points, this perhaps, generated by the familiarity that students have had throughout their training with computer technology, coupled with to his impetus to get ahead.

In the results of the use, it is observed in the students who entered cohorts before the pandemic, maintain their use percentages during the pandemic and improve some

percentage points, a behavior that is denoted in the generations that started in 2019 to 2021. It is also observed in the last two cohorts that the percentages of the failure rate decreased with values of 7.0 and 11.0% respectively.

4 CONCLUSIONS

According to the answers, their interpretation, and the analysis of the results of the factors that affect academic performance, it was possible to identify that the educational experience of the ISC students of the ITSPR in the lockdown period of COVID-19, shows the need to design new paradigms that aim to form autonomous learning spaces. Therefore, it is emerging to integrate all the experiences in higher education applied during this period, to propose work strategies that strengthen online and hybrid education.

Seeking to strengthen the virtual modality, it is necessary to train the teacher to interact with digital elements that favor the experience of meaningful online learning. Creating optimal learning conditions that lead to generating a cognitive-critical exercise in the search for significant ideas.

At this time, students still need the teacher's encouragement to learn, however, they are in a phase where they can build their own knowledge. For this, they require the presence of a guide who provides them the didactic tools to interact online with solid foundations and in accordance with the demands of autonomous productivity that students require.

The academic performance of ISC students had a positive impact on the dynamics of online learning. Therefore, according to the results of the present study, it can be assumed that academic performance was not determined by the factors associated with the contexts that the students lived during the COVID-19, but rather that it could be the result of both the skill in the use of technology and the compilation of efforts made to achieve the proposed educational goal.

The interpretation of data focused on the contents showed certain dispersed attitudes, with tendencies to frustration for not understanding the thematic contents, because of the poor vision of the student to solve their doubts in virtual classrooms. Fractures that serve as a bridge to increase autonomy in learning, through the search for answers to their cognitive absences.

It is necessary to strengthen the esteem of the students, through professional training courses that contribute to the management of emotional control, in order to avoid that the emotional factor does not limit their learning process, and at the same time, consolidate a mentality under certain stress conditions, or where appropriate, in the event of any health

event, or other aspect that requires physical isolation.

Finally, It is essential that teachers integrate the experiences lived in virtual classrooms during the lockdown to evaluate the successes and failures that contribute to generating action plans in the development of learning and to strengthen academic performance in virtual classrooms.

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ANNEX

Annex 1 Survey

Ítem	Pregunta
1	Nombre
2	Matricula
3	Grupo
4	¿El curso tomado te dejo en claro la estrategia pedagógica utilizada?
5	¿La estrategia utilizada te permitía hacer lecturas anticipadas para comentar o debatir en aula virtual?
6	¿La estrategia utilizada te permitía hacer lecturas anticipadas para comentar o debatir en aula virtual?
7	¿La estrategia utilizada en los tiempos planeados te permitió aprender sobre los temas?
8	¿La estrategia utilizada permitió que administraras tus tiempos personales de manera eficiente?
9	¿La estrategia utilizada permitió que eligieras materiales que apoyaran tu comprehensión?
10	¿La evaluación por el docente dadas las situaciones derivadas por el SARs CoV2 consideras fue justa?
11	¿El docente dejo en claro el proceso de evaluación?
12	¿La evaluación por el docente dadas las situaciones derivadas por el SARs CoV2 consideras fue justa?
13	¿Consideras que lo aprendido refleja los resultados obtenidos de tus evaluaciones?
14	¿La evaluación por el docente dadas las situaciones derivadas por el SARs CoV2 consideras fue justa?
15	¿Consideras que lo aprendido refleja los resultados obtenidos de tus evaluaciones?
16	Finalmente elije cuales estrategias te dijo el docente que utilizó en el aula virtual, elije las que consideres se utilizaron.
17	¿El docente dejo en claro el proceso de evaluación?
18	¿La evaluación por el docente dadas las situaciones derivadas por el SARs CoV2 consideras fue justa?
19	¿Consideras que lo aprendido refleja los resultados obtenidos de tus evaluaciones?
20	El docente menciono procesos relacionados con; Selecciona las opciones
21	¿El docente dejo en claro el proceso de evaluación?
22	¿La evaluación por el docente dadas las situaciones derivadas por el SARs CoV2 consideras fue justa?
23	¿Consideras que lo aprendido refleja los resultados obtenidos de tus evaluaciones?
24	El docente menciono procesos relacionados con; Selecciona las opciones
25	Durante tus sesiones de clase sentiste alguno de estos malestares visuales
26	Durante tus sesiones de clase sentiste alguno de estos malestares físicos

27	Tuviste alguna de estas enfermedades por el estar sentada en tus sesiones
28	¿En algún momento perdiste el interés en tus clases virtuales? Si la respuesta anterior es SI o NO anotar brevemente el ¿Por qué?
29	¿Tuviste en todas tus sesiones el equipo necesario para tus clases?
30	¿Qué equipo tuviste disponible?
31	¿Tuviste internet de compañía disponible por medio?
32	¿Qué compañía te dio servicio?
33	¿Cuántos megas tienes disponibles?
34	¿Tu servicio de internet en tu celular es de?
35	Si usabas internet por celular ¿Cuánto gastabas al mes para tomar tus clases?
36	¿En tu hogar se contaba con suficientes equipos para los miembros de tu familia?
37	¿Tuviste que trabajar para apoyar a los gastos de tu hogar para tus clases en línea?
38	¿Algún miembro de tu hogar se enfermó por SARs-CoV2?
39	¿Algún miembro de tu familia sufrió despido o trabajo intermitente por el SARsCoV2?
40	¿Consideras finalmente que tus calificaciones pudieron ser mejores si hubieras estado en sesiones presenciales?
41	¿Fuiste objetivo al contestar las preguntas del cuestionario?
42	¿Qué opción prefieres que siguiera para continuar tus clases?

Source: Author