Volume 8, Issue 21 – January – June – 2022

ISSN 2414-4835

Journal of Social Researches

ECORFAN®

Journal of Social Researches, Volume 8, Issue 21, July – December 2022, is a journal edited sixmonthly by ECORFAN-Nicaragua. Southwest Avenue, San Sebastian – LeónNicaragua. WEB: www.ecorfan.org/republicofnicaragua, journal@ecorfan.org. Editor in Chief: VALLE-CORNAVACA, Ana Lorena. PhD, ISSN On line: 2414-4835. Responsible for the latest update of this number ECORFAN Computer Unit. ESCAMILLA-BOUCHÁN, Imelda. PhD, LUNA-SOTO, Vladimir. PhD, last updated December 31, 2022.

Journal of Social Researches

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Knowledge Area

The works must be unpublished and refer to topics of history, economics, geography, tourism, history, anthropology and sociology and other topics related to Social Sciences.

Presentation of Content

In the fist article we present *Complexity and post COVID resilience in times of war and impact on Mexican organizations*, by GUERRERO-SÁNCHEZ, Pablo, PÉREZ-MAYO, Augusto Renato, GUERRERO-GRAJEDA, José and ROMERO-TORRES, Fernando, with adscription in the Universidad Autónoma del Estado de Morelos and Universidad Nacional Autónoma de México, in the next article we present *Teaching resources an ally in times of pandemic and now in the classrooms*, by DEL CARMEN-MORALES, Yucels Anaí, DEL CARMEN-MORALES, Heidi and FELIPE-REDONDO, Ana María, with adscription in the Universidad Tecnológica de la Huasteca Hidalguense, in the next article we present *Relationships between social context and resilient personality in high altitude diving*, by VILLAREAL-ARANDA, Jazmín, PONCE-CARBAJAL, Nancy, TRISTÁN-RODRIGUEZ, José Leandro and RAMÍREZ-NAVA, Rubén, with adscription in the Universidad Autónoma de Nuevo León, in the next article we present *Automatic document classification using machine learning*, by GUZMÁN-CABRERA, Rafael.

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Complexity and post COVID resilience in times of war and impact on Mexican organizations

Complejidad y resiliencia post COVID en la época de guerra y afectación sobre las organizaciones mexicanas

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DOI: 10.35429/JSR.2022.21.8.1.11 Received January 10, 2022; Accepted June 30, 2022

Abstract

The international context of post COVID war is presented; where US treasury bonds fall, the gold standard rises, the barrel rose to $100 per barrel, with problems with the commercialization of Russian metals such as the titanium used by Boeing; that it fell in its shares as well as in most of the stock markets worldwide, and the strategic factor in fertilizers, where Morocco plays the fundamental role due to phosphate; because Ukraine produces approximately a third of the world's wheat precisely in the area that is being attacked from the beginning, with the possibility of occupied areas with Crimea leaving Ukraine without access to the Black Sea, which would cause a weakening of its capacity to commercialization of the grain and a general increase in prices, also in relation to the loss of value of the peso, and the increase in energy, in a complex and interrelated way, would cause an increase in prices by small retailers in Mexico; this is causing an increase in interest rates. Organizational resilience is proposed as a strategic element to support the leadership of organizations.

Complexity, Resilience, Post COVID, Organizations

Resumen

Se presenta el contexto internacional de guerra post COVID; donde Los bonos del tesoro de EUA bajan, el patrón Oro sube, el barril subió a los $100 por barril, con problemas con la comercialización de metales rusos como el titanio usado por Boeing; que cayó en sus acciones así como en la mayoría de las bolsas a nivel mundial, y el factor estratégico en los fertilizantes, donde Marruecos juega el papel fundamental por el fosfato; debido a que Ucrania produce aproximadamente una tercera parte del trigo a nivel mundial justamente en la zona que está siendo atacada de inicio, con la posibilidad de zonas ocupadas con Crimea dejando sin salida al mar negro a Ucrania lo que provocaría un debilitamiento de su capacidad de comercialización del grano y un incremento generalizado de los precios, también en relación a la pérdida de valor del peso, y el incremento de los energéticos, de forma compleja e interrelacionada, provocarían, incremento en los precios por los pequeños minoristas en México; esto está provocando un incremento en las tasas de interés. Se propone la resiliencia organizacional como elemento estratégico de apoyo a los liderazgos de las organizaciones.

Complejidad, Resiliencia, Post COVID, Organizaciones

Citation: GUERRERO-SÁNCHEZ, Pablo, PÉREZ-MAYO, Augusto Renato, GUERRERO-GRAJEDA, José and ROMERO-TORRES, Fernando. Complexity and post COVID resilience in times of war and impact on Mexican organizations. Journal of Social Researches. 2022. 8-21:1-11.

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Introduction

To understand complexity from organizational studies it is necessary to understand its preceding theoretical structure; the various multidicsiplinary theoretical contributions are considered from the complexity of the study of organizations (Tovar, 2021); (Guerrero-Sánchez, Guerrero-Grajeda & Perez Mayo, 2021), considering a beginning in the theory of organization from, the school of scientific administration (Ballina, 2021), human relations (Tunque, 2021), bureaucracy (Flores, 2021), behavior (Simon, 2021), decision making, contingency (Zambrano, 2021), and new human relations (Triana, 2021); to consolidate a critical vision, and an openness to new applications, and new types of organization in a postmodern and complex context, with technology, for interpretation, subjective, not only mathematical, but for non-linear contexts (Lapicki, 2021), using elements of complexity; interpretative, linguistic theory (Kronfly, 2021), organizational anthropology (Gravano, 2021), the New sociological, political and economic institutionalism (Valencia, 2021) in a post-structural way, using as basis culture, power, language, and psychoanalysis of organizations (Abril, 2021), in an ambiguous, changing context, with new forms of communication, and political structures, and diverse logics and interactions at macro, medium and micro levels, in this sense we focus on the school of contingency for the events that alter the complex behavior of the system.

Development

Strategies and complex system problems at the macro level

The interrelation of supply chains, as well as the lack of strategies such as having inventory; as a consequence of the hegemony of the Just In Time system, part of the Total Quality Management scheme, have caused crises and price increases due to the complexity of the supply chains, particularly in relation to chips, as a function of the interdependent relationships of these chains. The effect on the system is a turbulent system, explained by the Navier Stokes equations to understand the complexity of the financial system at a global level;

$$\nabla . \underset{u}{\rightarrow} = 0$$

$$\mathcal{P} \frac{\mathcal{D} \underset{u}{\rightarrow}}{\mathcal{D}t} = -\nabla p + \mu \nabla^2 \underset{u}{\rightarrow} + p \underset{F}{\rightarrow}$$

This effect caused by the time of the pandemic generated a shortage of supplies and goods on the supply side while the pandemic restrictions were being lifted and demand was rapidly restored, especially in European countries, which produced worldwide inflation, together with the strategy of countries such as the United States to curb the crisis by issuing cash, which was not spent during the pandemic and increased the volume of savings, but which soon led to a devaluation of several currencies and a greater increase in inflation; As a strategy, central banks decided to raise interest rates, making loans to retailers more expensive, particularly in Mexico.

Unexpected effects of the declaration of war

Within a context of ambiguity and uncertainty, a series of turbulent implications are recorded, complex analysis can produce positive and negative, repelling and attracting loop effects in terms of market strategies to retailers that can be explained by a construction of the interrelation of political, psychological, media, social, cultural, historical, and economic elements that affect each other as in the construction of a system of structural equations, which will have maximum likelihood through the use of least squares.

Let us consider the characteristics of a complex system to be able to interpret the relationships and consequences in local organizations in this global context

1. Complex systems have a large number of elements.
2. The elements interact dynamically.
3. Interactions are rich, any element in the system can influence or be influenced by any other.
4. The interactions are not linear.
5. Interactions are typically short-range.
6. There are positive and negative feedback loops of interactions.

ISSN: 2414-4835

7. They are open systems.

8. They operate under conditions of low equilibrium.

9. They have histories.

10. Individual elements usually ignore the behavior of the whole system where they are[1].

It is necessary to make a clarification with respect to these elements, first that there is not yet a current consensus on the concept of complexity, however this seems to be the most appropriate for the understanding of complexity in organizations, although it has two fundamental shortcomings the first is; it is not mentioned that there must be a strong dependence on the initial conditions of the system, for example in the case of the geographical relationship between Ukraine and Russia, and its production of grains and metals, or the proximity between Taiwan and China, and the production of chips, while it is true that the individual elements for example retailers in Mexico do not understand the relationship of the whole system and the relationship with the supply chains, in its complexity of interactions, but if they feel its effects on the increases in fuel prices and semiconductors, ie another missing element in this list is; the lack of understanding of attracting and repelling elements; which would reflect the adaptation or resilience to the complex dynamic, non-linear, ambiguous, and chaotic system, in the face of an asymptotic equilibrium.

Complex consequences of the invasion

Economic punishment; in the swift system, of financial interaction of banking; which causes division among NATO member countries, because the lack of interaction would produce transaction problems for themselves.

Shortage in the supply of metals necessary for industrial development and production; not only the lack of corn, because Ukraine is one of the world's largest exporters and will cause an increase in prices for retailers in Mexico, producing inflation, but also in aluminum, cobalt, copper (exported to Asia and Europe, as well as oil and gas Rusia es el principal proveedor de fertilizantes -ya sean nitrogenados o con componentes de fósforo, potasio y nitrógeno- del país. Entre 25 y 30 por ciento de los abonos que México importa son de origen ruso. Los otros grandes proveedores son China, Indonesia y Chilethat crosses the pipeline between Russia and Europe), nickel, palladium and platinum, gold (which was the first to become more expensive with the invasion), titanium (supplies Boeing and Airbus), Russia produced 27,000 tons and Ukraine 5,400 in 2021, steel (mainly to Europe), diamonds (exported to Belgium, India and the United Arab Emirates) and fertilizers:

Russia is a major producer of potash, phosphate and nitrogen-containing fertilizers, i.e., nutrients for crops and soil. It produces more than 50 million tons per year of these fertilizers, 13% of the world total.

It should be noted that Morocco has 70% of the world's phosphate reserves, and that dependence on this non-renewable element implies the sustenance of the seven billion people on the planet, in fact, in 2021, the price was raised but in the last days of December even before the invasion of the Ukrainian area with access to the Black Sea.

The international fertilizer market continued to show strong rises in recent weeks. Thus, in the Black Sea, urea reached 924US$/t, an increase of 192US$/t compared to the October quotation. Monoammonium phosphate rose to 715US$/tonne, up 30US$/tonne in the last 30 days.

Combined with Russia, one third of the world's grain is produced by both Russia and Ukraine, but both pass through the Black Sea, and the military intervention was initially intended to stifle Ukraine's trade outlet.

[1] Steve Maguire, Bill McKelvey, Laurent Mirabeau y Nail Öztas, "Complexity science and organization studies", en Clegg, Hardy, Lawrence y Nord (eds.). The Sage handbook of organization studies, vol. 1, núm. 5, 2006, SAGE Publications, pp. 165-214.

ISSN: 2414-4835

The case of trade with Russia

Russia is the country's main supplier of fertilizers - whether nitrogenous or with phosphorous, potassium and nitrogen components. Between 25 and 30 percent of Mexico's fertilizer imports are of Russian origin. The other major suppliers are China, Indonesia and Chile.[2].

Another negative effect is the fall of stock markets [3] this is a repellent effect of the system, as complex behavior, however, after the announcement of economic sanctions on Russia, Nasdaq and S&P 500 had a rise, that is, not only shows the interrelationship of markets, but, the volatility of an open system, and a social behavior, when one runs all run.

That is to say that the relationship between the supply systems under the tension of the interdependent elements of the system affect as an operator in systems of differential equations that explain the complexity of the open nonlinear system and that start from the basis of a close initial state; the political economic factors affect the financial system in a complex way with diverse resultants with negative loops explaining the behavior in the form of instability in the interdependent system, as explained under the equations of Mandelbrot as a fractal that repeats the behavior.

One point $c \in \mathbb{C}$ is a point of $\mathcal{M}$ if $\lim_{n\to\infty} \|z_{n+1} = z_n^2 + c\| \neq \infty, \;\; z_0 = 0$

Or, to put it another way, $\mathcal{M} = \{c \in \mathbb{C} : \;\; |z_n| \nrightarrow \infty\}$ being z_n the sequence defined by $z_{n+1} = z_n^2 + c; \;\; z_0 = 0$

Thus affecting the interrelated and dependent supply chains, and thus affecting the economy as for example it will happen with the lithium needed for the creation of batteries for the production of electric cars, the dependence of the production of Chips from China, Taywan and South Korea (TSMC) by the low countries as the production depends on the company ASML, so we have repellent elements that are currently related to the war and political elements between China Russia, and NATO, in this case we have the element of Nimbo Sousan which imports most of the things exported by China which is the port that handles 29 million containers and at the end of August last year before the collapse due to the Ukrainian Russian war had more than 50 ships waiting to dock.

These vacuum spaces between the elements of the system are full of energy with chaotic fluctuations of chaotic behavior between retailers in each country, so to change the behavior of the system requires a lot of energy, as has happened with the markets due to the current war. being an unstable behavior where any disturbance would push to that vacuum, that is, under normal conditions the economic system and interactions have a relatively stable behavior but when it is altered from the force or energy said system the field of action alters its concrete action, without retailers understanding the reason for the behavior of the whole system, politically not economically due to that vacuum of international power that is exploited by a single agent or actor.

The behavior of the system can be explained by the butterfly effect where a small element of the system can cause indeterminate effects, and it has to do with how well the economic actors can predict the future; let us imagine the following; that we can know all the actors both retail and wholesale of the financial system and their behavior and direction so we could define both future and past actions of the system, however when we try to determine under dynamic systems where we could define the final state if there is an attractor; however when we face the Poincaré conjecture, i.e. the chaos

$$\mathcal{S}^1 = \{(x_{1,}x_2) \in \mathbb{R}^2 | x_1^2 + x_2^2 = 1\}$$

$$\mathcal{S}^2 = \{(x_{1,}x_{2,}x_3) \in \mathbb{R}^3 \; | x_1^2 + x_2^2 + x_3^2 = 1\}$$

[2] https://www.elfinanciero.com.mx/economia/2022/03/02/y-a-todo-esto-mexico-que-le-compra-y-le-vende-a-rusia/

[3] https://www.forbes.com.mx/wall-street-se-hunde-mas-de-1-tras-invasion-de-rusia-a-ucrania/

ISSN: 2414-4835

$\mathcal{S}^3 = \{(x_{1,}x_{2,}x_3, x_4\ ) \in \mathbb{R}^4\ |x_1^2 + x_2^2 + x_3^2 + x_4^2 = 1\}$

$\mathcal{S}^4 = \{(x_{1,}x_{2,}x_3, x_{4,}\ x_5) \in \mathbb{R}^5\ |x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 = 1\}$

explained in terms of the changes in atmosphere under the lorenz idea

$$x = \frac{x' + vt'}{\sqrt{1 - \frac{v'}{c'}}}$$

$$t = \frac{t' + \frac{vx^2}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Where every small difference in initial conditions can have indeterminable effects; this is what is called sensitive dependence to initial conditions, in this sense, the movements of the elements that can be extrapolated to organizations that the loop is not always repeated, but the elements are never placed in the same state again, where even though countries and organizations have similar trajectories, they will have totally different trajectories, both in behavior and strategies, human behavior depends for its dynamic behavior is also dependent on psychology and society or groups. Let us consider that differential equations explain the behavior of economic organizations under a turbulent and chaotic scheme such as war, supply chain crises, however, we can understand that social behavior, as well as organizational and financial behavior has to do with the behavior of the environment, news and can be explained as persecution curves.

$$\frac{(u-x)\mathrm{x}'+(\mathrm{v}-\mathrm{y})\mathrm{y}'}{\sqrt{(u-x)^2+(v-y)^2}} = 1$$

Which, on a large scale, would imply the so-called synchronization effect of the system, different from the second law of thermodynamics which says that everything tends to disorder, because we can see that there are sequences of spontaneous order in the behavior of organizations, as well as in the markets.

Where the synchronization model is called the Kuramoto model.

$$\dot{\theta}_i = \omega_i + \frac{K}{N}\sum_{j=1}^{N} \sin(\theta_j - \theta_j)$$

Thus the natural frequency of movement of the retail organizations which is a coefficient related to how far it is from the rest of the organizations seeking to survive the turbulent conditions of the war pandemic and supply chain crises and the size of the organized action is determined by the strength of coupling and this is what explains the interdependence i.e. each of the individual elements of the system under similar initial conditions has effect on each other, this is what we would call isomorphism the problem is that too much synchronization could cause a crisis in the entire financial system.

The effect of the above would be an overload to the supply chain which could be considered as an attractor operator of the system of differential equations; changes in Chinese food import laws, or Russian metals, creating an entropic system; accelerated by war, which can be explained as Brownian motion.

Where it is fulfilled:

1.- The process starts at value 0.

2.- It has a continuous trajectory

3.- It has independent increments

4.- For any time with $0 \leq s < t,$

The increment Bt -Bs has normal distribution with mean 0 and variance $\sigma^2.t - s$

That is; $B_t - B_s \sim N(0, \sigma^2(t - s))$

Where the movement of organizations in particular in Mexico, retailers have the same probability of action within the system, which is favorable cases among total cases, but depends on the configurations of the actions as combinatorial; where, the behavior is explained from the magnitude that measures the number of equivalent microstates for the same microstate of a system; where a system evolves to its most probable configuration which is the one that occurs with more microstates and coincides with the one with the highest entropy and that can also be interpreted as a measure of the information lost by the evolution of a system. In the case of retail organizations, information is always incomplete (the individual elements never know the behavior of the whole), where the system is made up of many parts and also has an element of randomness.

ISSN: 2414-4835

We can thus define the system as an ecology of elements or organizations with an expectation within a given time under uncertainty, and it is under these conditions of uncertainty that we can finally explain behaviors such as the big resignation in different countries as a decision making under uncertainty, under inflationary pressures, the Evergrande debt problem, and by the 900 billion high speed trains, and the behavior in Germany in front of the shortage of materials, where German factories are investing in warehouses to store raw materials, as a response to the Just-in-Time model that has caused a lack of inventory crisis in the production of aluminum that has skyrocketed since the relationship with Russia, then retailers and producers in Germany are changing their business model, reinventing the logistics chain, but that is something that SMEs in Mexico do not have the capacity to do.

SMEs in Mexico find themselves as an open system with a high number of interdependent elements within the macro system in an environment of uncertainty, firstly due to the crisis in the supply chain and the complexity, particularly those related to technology, another element is the crisis of containers, and the increase in price, i.e. inflation due to the increase in demand; the issuance of currency, with the consequence of higher inflation and the increase in interest rates to try to control it, which is also the effect of market self-regulation, but now under a system of imbalances, which are affecting both the quantity of oil, due to the war, and of supplies and food.

The effects derived from the conflict in Mexico if the war is prolonged will be the exchange rate, price of grains, fuels and risk of disruptions in the automotive sector not only for the lack of chips but in this case for the nickel needed for the production of cars; while in the case of retailers they are making resilience strategies of online sales but depending on deliveries although under an instability of institutions and violence, as well as the rise of corruption. A possible solution would be the creation of a supply system for the poorest neighborhoods as Brazil has done by working with local respect teams with logistics training. There is still uncharted territory in Mexico that could be met with technology such as drone delivery, drone planting, drone spraying, surveillance and fire response.

In the case of Europe and in particular Germany, the cancellation of the nord stream 2 gas pipeline from Russia to Europe implies diversification using liquefied gas transported in ships and not pipelines and the production and supply from Norway (but that hits the Russian company Gasprom that invested 5 billion euros) which is a sale of 55 billion cubic meters per year, in the case of Russia, sanctions such as the blockade to the swift system has caused a collapse of the ruble and therefore increased inflation and the intervention of its central bank. While European risk premiums have risen, making financing difficult, while Russia has a trillion in liquid reserves in the central bank, however the lack of dollars coming from Russian transactions to the eurozone is what increases risk premiums, so the U.S. Federal Reserve will be forced to print money; while Russia needs dollars to buy the products needed by its population, for which it will sell its gold to China in Yuan loans to curb inflation and curb internal social instability (this is the operator effect of the loosely coupled) complex inter-organizational system. The reason why the Asian stock exchanges have risen is that with the elimination of the Swift payment system the only way out is to move to the Chinese payment system with two major settlement systems, the European-American and the Russian-Chinese. This puts at risk the role of the dollar as reserve currency; thus the SP500 will move between 4260 and the resistance of the 4400 zone, since being interconnected and interdependent, each actor in the system is not interested in the stock markets sinking. Thus the brake is the quotation of high yield bonds, with the Bank of America index, with a much lower quotation than even with the covid 19, that is to say that in reality it is a war of financial systems and interdependencies as explained with the dynamic systems, where the interdependency is not only in oil and gas but of rare earths (for a fighter plane 13 kilos are required) these are exported by China and Afghanistan; these elements are also necessary for the production of green energies, among other things to end the dependence on Russian oil and gas. The problem of the Western system is that it has deficits greater than its production, so that the debt is increasing all the time.

ISSN: 2414-4835

The problem is that they are two different and opposite strategies, printing dollars on the one hand and raising interest rates to lower inflation, this can affect the exchange rate in Mexico and transactions in retail organizations. If we understand that the war is actually targeting the dollar, in this sense it is this variable that as an operator will cause an influence on the system and effects on Mexican retail organizations.

Another problem is the legitimacy of the conflict based on propaganda and information warfare and social networks; as it is known China have blocked and controlled western social networks and have their own social networks; which have not been well aware of what is happening in Ukraine but express things like; "It would be interesting to mention that China bought from Ukraine 5% of its arable land for 2.6 million dollars since 2013, this land produces food sent to China".

This is the real problem; food, which is the typeof inflation that in Mexico reached 73% in the basic food basket on March 1st. Not only because Russia and Ukraine produce more than one third of the world's cereals, but also because Russia produces a large percentage of the fertilizers needed to avoid a world famine that would probably produce a world war, not only because of the 70% of phosphate reserves in Morocco, but because the markets pay attention to the news that Powell as representative of the Fed indicated that his only instrument is to raise interest rates to try to reduce demand and therefore inflation, but interest rates do not control the production or quantity of food that is produced, that is to say, the supply.

The complex strategic response of the system is that; China is winning with the war because Russian banks are switching to the Chinese card system (unionpay) by establishing visa and Mastercard sanctions, while walstreet is pouncing on cheap Russian corporate debt in danger of default because it speculates that the CDS credit default swaps that would occur along with the Russian state bankruptcy would have to be paid off at the same time so American banks buy for high net worth clients against the risk of Russia going bankrupt; Evraz Plc, Gazprom PJSC, or Russian railways; in response Putin orders a list of countries that have taken unfriendly actions, while sanctions contract the European economy and production Sanchez (Spain) and Vom Der Leyen (Germany) are betting on energy independence, but leaving aside the sunflower oil crisis, and a lot of speculative activity. Due to the fact that the dependence of the USA on Russian oil is 7.4% while the EU is 27% and in gas it is 41%, so the losers of the war are Ukraine and the EU.

More strategic moves

The dollar rises against the euro, sinking the ruble generates inflation in Europe, there is a shortage of dollars in Europe, if the euro rises it is harmful to economies such as Spain, also affecting Latin America, so the real enemy of the central bank is actually the bitcoin. Russia's branches are raising rates to make it more attractive to have rubles, and Blogger to companies to operate in rubles to exchange currencies, and purchase of Russian central bank treasury stock by buying rubles with promises of future payments in dollars and gold.

It collocated of events; flood of dollars from Russia until the closing of the swift and trade, so the European banks do not have access to the amount of dollars in the market, while USA had stopped the printing to lower inflation, by increasing the value of the dollar reduces the competitiveness in particular in transactions with Mexico and retailers, so the beacon is degraded in the short term, so every day is paid more than 1500 million euros per day to Russia (imports and exports and trade with Mexico become more expensive).

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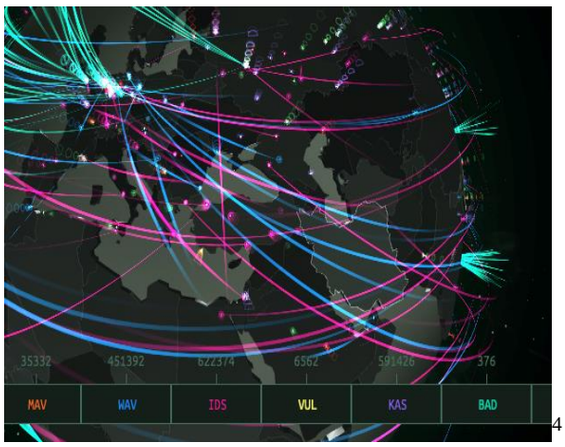
The economic war was of classical economic theory and the behavior was also of this type collapsing some sectors of the Russian economy but the Russians have managed to cushion the effect; by exchanging rubles for bitcoins, since it grew by 10% those who have exchanged rubles not only did not become poorer, but became 10% richer, thus the block Change does not need neither banks nor intermediaries. In this way, the world's exchange flows are increasing, and central banks are trying to make Russia's money come out in the form of bitcoins. If the cryptocurrencies were to be regulated and closed, this would affect not only Russia but also Ukraine, which has received 51 million.

The behavior of the stock markets is given from reports such as the US in conjunction with UK where they claim restriction of imports of Russian gas and oil, so the price of oil soars to $ 150 per barrel, and in stock exchanges such as the Ibex bounces from the report in Brussels on the intention to invest in renewables. While there is a corporate exodus among them McDonalds.
Cyberwar as a Brownian motion of turbulent flow

Figure 1



[4]

Figure 2

Meanwhile, BNP Paribas has isolated its Russian workforce from its internal IT systems as it seeks to bolster its defenses against any potential hacker attacks, in another sign of how the conflict is affecting Western financial institutions.

The French bank, which is believed to be the first major lender to have shut staff in Moscow off from its technology networks, has also put employees elsewhere on high alert for cyber threats emanating from Russia[5]. In response to the global climate, hundreds of Asian companies have arrived in Mexico. [6].

Finally, the response of Mexican companies to the turbulent flow of the organizational environment is based on strategies of organizational resilience or resilient leadership.

Organizational resilience

In 2020, the COVID-19 International Small Business Study, developed by Yale University, Princeton and UCL, reveals that 47% of Small and Medium Enterprises (SMEs) in Mexico have a probability of bankruptcy greater than 50% in the next six months, or 60,283 SMEs. The aforementioned study yields three other results of great importance such as:

1. 53% of SMEs in Mexico have laid off at least one employee due to the health crisis, compared to 55% of companies of the same size in Latin America.

[4] https://cybermap.kaspersky.com/es
[5]https://www.forbes.com.mx/bancos-europeos-revelan-miles-de-millones-de-dolares-en-exposicion-de-riesgo-a-rusia/
[6]https://www.forbes.com.mx/una-centena-empresas-asia-eu-han-llegado-mexico-parques-industriales/

ISSN: 2414-4835

2. 65% of SMEs in our country think they will have to lay off an employee in the next 60 days, three percentage points more than the rest of Latin America.

3. 80% of these companies think that their business will fully recover in the next two years, only one percentage point higher than that reported by SMEs in the rest of the region, but 9% higher than the expectations of SMEs in the USA. https://covid19sbs.org/

In view of this, Pérez Mayo et al. (2021), like many others, state that in the face of the health catastrophe, first and then the organizational, financial and other catastrophes, resilient leaders were forced to make very quick decisions with very little information and maximum emergency and uncertainty; the absence or lack of knowledge of the theories of the organizations on the part of the leaders, increased this reality. The only constant is the complex emergency and uncertainty integrated into our daily lives, they became the only certainties.

From now on, these two indicators must be taken into account and integrated into our analysis and strategic plans on a constant, permanent and lifelong basis. Organizational acceleration depends on the leader. This acceleration will allow the organization to adapt and evolve. The pandemic highlighted the structural problems of organizations, and in saying this, reference is made even to research organizations such as universities that were obsolete to explain and intervene in the face of such a phenomenon, until today, which do not mark the directions to direct the path of organizations and their human resources. The theories, the schools of organizational behavior, the theoretical designs, the paradigms, the disciplinary matrices in charge of explaining what happens with people in the companies, were absent in their major representatives: the leaders, the top management (Pérez Mayo, Roque Nieto, Romero Torres and Guerrero Sánchez, 2021). These leaders, absent of knowledge for the most part, of small and medium enterprises in Mexico (SMEs), had to lead people, ignorant of what was happening and even of what is happening, anxious about the present and the future. For this reason, the relevance of the most human part of leadership, resilient leadership, has become evident.

From the perspective of the sociology of organizations, leadership in a charismatic Weberian typology (Weber, 1992), implies a type of organization or a type of leadership in which authority derives from the charisma of the leader. This leadership is something given to us by others, who decide to follow the leader voluntarily, because they share his purpose and values.

The pandemic forced leaders to build a true narrative, capable of providing job security and psycho-emotional security, hopeful futures, making systematic decisions, managing the short term, solving the present, but with an elevated view, always looking to the horizon, to the medium and long term. The existence of successful management and interventions carried out before and during the pandemic by leaders published by the main media in the world and in those countries, such as New Zealand, Finland or Taiwan, and cases of resounding failure such as the USA or Brazil or the case of Mexico. It can be said that populist, manipulative or denialist leaderships have failed in the management of the pandemic, on the other hand, leaders who have acted with sincerity, humility and determination have come out stronger. Leaders with resilient characteristics.
Women leaders around the world have succeeded in managing this health phenomenon, such as Jacinda Ardern, Prime Minister of New Zealand; Sanna Marin, Prime Minister of Finland; Tsai Ing-Wen, President of Taiwan; Angela Merkel, Prime Minister of Germany or Katrín Jakobsdóttir, Prime Minister of Iceland, among others. And the question is, why have they managed the crisis better than their male counterparts? Surely their leadership styles, pure and simple.

Conclusions

The international situation characterized by the post Covid war is analyzed from the complexity, to the organizations, finding findings such as:

- The interrelation of supply chains, as well as the lack of strategies such as having inventory; as a consequence to the hegemony of the Just In Time system.

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- The US treasury bonds fall, the Gold standard rises, the barrel rose to $100 per barrel, with problems with the commercialization of Russian metals such as titanium used by Boeing; which fell in its shares, as well as in most of the world stock exchanges.

- The strategic factor in fertilizers, where Morocco plays a fundamental role for phosphate; due to the fact that Ukraine produces approximately one third of the world's wheat precisely in the area that is being attacked from the beginning, with the possibility of zones occupied with Crimea leaving Ukraine without an exit to the Black Sea, which would cause a weakening of its capacity to commercialize grain and a generalized increase in prices.

- The loss of value of the peso, and the increase in energy prices, in a complex and interrelated manner, would provoke an increase in prices for small retailers in Mexico; this is causing an increase in interest rates.

- Social, as well as organizational and financial behavior has to do with the behavior of the environment.

- Crisis and increase in prices due to the complexity of supply chains, particularly in relation to chips.

- The system as an ecology of elements or organizations with an expectation within a given moment under uncertainty.

- The dollar rises against the euro, sinking the ruble generates inflation in Europe, there is a shortage of dollars in Europe, if the euro rises it is harmful to economies such as Spain, also affecting Latin America, so the real enemy of the central bank is actually the bitcoin.

- Russia's branches are raising rates to make it more attractive to own rubles, and forcing companies to operate in rubles to exchange currencies, and buying the Russian central bank's own portfolio by buying rubles with promises of future payments in dollars and gold.

- The alternative of organizational resilience (resilient leadership) as an alternative to overcome this crisis.

- We find then the paradox of self-reference, as a theorem of incompleteness in autopoietic systems, and organizational dynamics as open systems, loosely coupled, organized anarchies full of rationalized myths, and dissipative structures that tend not only to chaos, but to the interdependence of complex elements indeterminable but explainable through complex dynamic systems; since any formal system is unable to prove its own consistency, being the characteristics of the system of axioms according to Alan Turing undecidable.

- To modify the system at the organizational level requires energy that at the micro level reflects the fundamental state and the first excited state that we will call the spectral gap, so some systems do not have enough energy to cross the spectral gap (at the neuronal level the synapse) and at the individual level the change in the system, and at the organizational level the change in the environment for being too small and this is the undecidable factor, this is what can generate or not the organizational resilience in a strategic behavior of maximum benefit but of limited rationality.

- Even a complete and perfect description of the microscopic interactions between individuals or organizations in a turbulent system of negative loops between the behavior of managers and the reactions of operational workers is not always sufficient to deduce their macroscopic properties in the interaction in the population ecology between organizations.

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ISSN: 2414-4835

Article **Journal of Social Researches**
June 2022, Vol.8 No.21 12-20

Teaching resources an ally in times of pandemic and now in the classrooms

Recursos didácticos un aliado en tiempos de pandemia y ahora en las aulas

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DOI: 10.35429/JSR.2022.21.8.12.20 Received January 15, 2022; Accepted June 30, 2022

Abstract

The pandemic that arose with COVID has caused one of the greatest need to transform educational systems in history worldwide, affecting almost 1.6 billion students in more than 190 countries and all continents. After this sudden change suffered in education, we must focus on the redesign of face-to-face and virtual teaching, evaluate the impact of its implementation and the necessary technological transformation of learning spaces. (Domínguez, 2020). This work aims to develop didactic material in the area of basic sciences through multimedia educational activities for counseling and reinforcement of learning acquired in class. The "Methodology for the development of educational applications in multimedia environments" was used. (Bianchini, 1992). As a result, videos and a YouTube channel were created, teachers can share these materials through virtual classrooms such as Classroom, Microsoft Teams and UTHH Virtual among others. In addition to this, teachers can generate more interactive activities with the help of digital tools such as Neardpod, Wordwall, the new strategies help teachers have a way to streamline tasks, enhance learning and thus pose new challenges to students.

Virtual classroom, Pandemic, Resources, Mathematics, Technology, Didactic

Resumen

La pandemia surgida con el COVID ha provocado una de las mayores necesidad de transformación de los sistemas educativos de la historia a nivel mundial, afectando a casi 1,6 mil millones de estudiantes en más de 190 países y todos los continentes. Tras este repentino cambio sufrido en la educación debemos poner el foco en el rediseño de la enseñanza presencial y la virtual, evaluar el impacto de su implementación y la transformación tecnológica necesaria de los espacios de aprendizaje (Domínguez, 2020). Ese trabajo tiene como objetivo desarrollar material didáctico en el área de ciencias básicas mediante actividades educativas multimedia para las asesorías y reforzamiento de aprendizaje adquirido en clase. Se utilizó la "Metodología para el desarrollo de aplicaciones educativas en ambientes multimedios" (Bianchini, 1992). Como resultado se crearon videos y un canal en YouTube, los docentes pueden compartir estos materiales mediante aulas virtuales como Classroom, Microsoft Teams y UTHH Virtual entre otras. Aunado a esto los maestros pueden generar más actividades interactivas con ayuda de las herramientas digitales como Neardpod, Wordrwall, las nuevas estrategias ayudan a que los docentes tengan manera de agilizar las tareas, potenciar el aprendizaje y así plantearles nuevos retos a los alumnos.

Aula virtual, Pandemia, Recursos, Matemáticas, Tecnología, Didáctica

Citation: DEL CARMEN-MORALES, Yucels Anaí, DEL CARMEN-MORALES, Heidi and FELIPE-REDONDO, Ana María. Teaching resources an ally in times of pandemic and now in the classrooms. Journal of Social Researches. 2022. 8-21:12-20.

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Introduction

A diagnostic evaluation was applied by means of an instrument developed by the mathematics academy to a sample of 856 incoming students, as a result it indicates that the performance is regular (6.1 points) in Arithmetic and insufficient (4. 4) in Algebra (Mathematics Academy UTHH,2018); this information has been analysed and projects the following problems: failure rates, dropout, fear of mathematical calculations and the solution of problems related to their field of application, so it is proposed the development of teaching resources, practices and projects in the classroom and available on an institutional platform, were the reasons why the work began, but in an unprecedented event the academy of mathematics decided to generate resources and make them available through a free access platform.

The Universidad Tecnológica de la Huasteca Hidalguense has ten educational programmes, which are: Engineering in Information Technology, Mechatronics, Food Processes, Agrobiotechnology, Civil Engineering, Mechanics and Degrees in Gastronomy, Business Development and Innovation, Accounting, Marketing, all the curricula of these careers have subjects related to mathematics and in academy meetings it was decided to create teaching resources to support the review of activities seen in class, Considering that the students had connectivity problems due to bad weather, the area, and their places of origin, this strategy aimed to provide the students with resources that would help them to review topics they had seen or topics from other semesters that they needed in their current subjects.

Theoretical framework

Education in times of pandemic

The current covid-19 pandemic is having a devastating effect on the health and lives of a large part of the world's population. In addition to the enormous human losses, the dire effects are already beginning to be felt on the economies of almost all countries: we are experiencing one of the greatest recessions in history.

To protect their populations and mitigate the contagions, which are multiplying exponentially, governments have recommended and, in some cases, forced their citizens to take shelter in their homes.

Among the first measures to contain the spread of the disease was the closure of schools at all levels of the education system. According to UNESCO reports, as of 30 March, 166 countries had closed their schools and universities. Globally, 87 per cent of the student population was affected by these measures, or some 1.52 billion students. In addition, around 63 million teachers worldwide were no longer working in the classroom. Faced with the abrupt and unexpected suspension of their academic activities, education systems around the world have resorted to digital media to continue their school activities. This emergency has also highlighted the gaps and inequalities in both the availability of such resources and the preparation of teachers and students for the transition to distance learning modalities. In a recent report, Brown and Salmi give an international overview of the reactions of some universities and higher education institutions (HEIs) to the transition to online education. Although many universities have closed and attempted to adopt online learning, very few are well prepared to make this change quickly and abruptly. Much confusion and improvisation has occurred, and administrators, faculty and students struggle to implement online learning widely and effectively. The transition to online learning requires effective learning management systems, video-education and conferencing facilities, and academic staff with experience in distance education.

But not all universities have accepted the transition to online education. Several faculties at the University of Buenos Aires have decided to postpone classes and reorganise the academic calendar, arguing that only face-to-face courses can guarantee quality. In other institutions, such as the National University of Science and Technology in Zimbabwe, facilities were closed until further notice, and in Malaysia, the Ministry of Higher Education suspended online education along with face-to-face activities. In several countries, students have mobilised to resist the digital transition. For example, in Tunisia, the main student association called for a boycott of digital platforms as discriminatory.

ISSN: 2414-4835

Students at the University of Chile and the University of San Sebastian (private) staged online strikes. In addition, in the UK, more than 200,000 students signed a petition demanding refunds of their tuition fees, pointing out that online instruction was not what they had paid for. (Alcántara, 2020).

School trajectories in higher education in the face of the pandemic: continue, discontinue or drop out?

In the context of the covid-19 pandemic in the world, the different public and private higher education institutions (HEIs) in Mexico closed their campuses to comply with the measures issued by the federal government, and began to implement various strategies and tools to move from face-to-face courses to online and distance modalities. This measure affected more than four million higher education students and more than 400,000 teachers. While a significant number of students have access to technological resources, many of them do not have the necessary means to make the transition. According to the National Survey on the Availability and Use of Information Technologies in Households 2019, only 44.3 per cent of the population has a computer and 70.1 per cent has access to the internet; however, this data varies across socio-economic levels. The difference in internet access between the high and low strata is 70 percentage points, and in the availability of a computer, 63 percentage points, both in favour of the high stratum. Sometimes, there is only one computer in the home, which is shared with other family members, and many of the students do not have a space for their school work. Moreover, being at home, the time available to them is fragmented between various activities, household chores and caring for other family members. In addition, although there is a belief that these students belong to the technological generation, many of them lack the necessary skills to develop virtual learning activities, as well as the self-discipline that these modalities demand, in an environment of stress, uncertainty and socio-economic restrictions derived from the pandemic.

Tools as an ally in education

a) Microsoft Teams tools

This platform is free to register, has an unlimited number of meetings, hosts a maximum of 100 participants and the chat is also unlimited (Cedeño, Ponce, & Lucas, 2020).

b) Classroom

For a personal Google Classroom account it allows 250 class members either teachers or students, 30 classes can be created per day, the number of invitations to class members that can be sent is 100 per teacher. It is a free application that is part of the programme available to the university community called Google Apps for Education (GAE). (Vélez, 2016).

c) Moodle

Moodle is an educational content management system (CMS) that enables the organisation of courses through the creation and combination of educational resources managed within the same platform, (Reynaldo, Rojas, & Paulí, 2008)

d) Facebook in education

When the main reason for the existence of a community changes from the mere exchange of information to learning and professional development, then we are dealing with a virtual learning community (Llorens, 2011), Facebook is a tool that has been used this year as a means of communication, as it consumes little data compared to other networks and is freely available on telephone plans.

e) YouTube

- It is not recommended to make videos too long, you can opt for a duration of 1-4 min, 80% of users see only the first 10 seconds and it is in this period when they realise whether the video will be useful or not.

- Include 2 to 4 times a keyword to improve the video's ranking performance. The description should contain combinations of words for the platform to display when users search for certain topics.

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- A good choice for the thumbnail photo that appears as a preview of the video should be included as a strategic part for YouTube.

- Share the video on other social networks so that it can be seen by more people.

- Personalise the channel. Add links to your website, social networks, blog.

- As is done on other social networks, you can encourage the community to leave comments by asking a closing question in the videos that appeals directly to the viewer.

- You can create a list and add all the videos of the same topic, so that every time a video is finished, another one will automatically play (Socialtools, 2017).

f) Virtual UTHH

The UTHH virtual platform is a space where students complement their training with activities in the subjects of written oral expression and socio-cultural training, in this section students can view activities, entering the platform using their institutional registration.

Students can perform the following actions: Submit assignments, view assignments and activities, view content topics, play videos, write comments.

g) Hybrid models for learning

A model that brings the two worlds together is the so-called Hybrid Model, which is designed to take advantage of the competencies that the face-to-face model of education gives the learner with the best practices of the online model. In this hybrid model, educational platforms and activities are used for online learning. These online activities are complemented by classroom activities. The classroom activities are different from the activities that would be carried out by the teacher in a traditional face-to-face system, if the so-called "flipped classroom" methodology is used. In the hybrid model classroom, the student participates by doing assignments, projects and presentations to peers. The teacher changes his or her role from that of an all-knowing guru to that of a mentor, guide and advisor to his or her students.

Classroom activities change to allow students to work collaboratively with each other in small working groups. In addition, in order to present their work to their peers, discussion of different topics is also encouraged in order to foster the development of soft skills, such as respect, interaction, tolerance and collaborative work, among others.

Many higher education experts agree that the trend in educational models and universities is towards a hybrid model with the inverted classroom methodology. It is worth remembering that due to the pandemic, teachers and their students do not have access to a classroom or physical space for face-to-face activities, which were mentioned above. However, thanks to technology it is possible to have a videoconference in real time or synchronously and in this way carry out most of the activities that take place in the classroom. (Arizona State University, 2020).

Problem statement

The creation of didactic resources for educational practices is applied to students from the different degree courses at the university. A pilot group was taken from the Information Technologies degree course, which includes the subjects of linear algebra, mathematical functions, statistics, differential calculus, integral calculus, multivariable calculus and differential equations in the syllabus. The students of the University are originally from the Huasteca region, which includes the north of Veracruz, the south of Tamaulipas, the north of Puebla and the east of Hidalgo, with a predominance of Nahuatl. It is worth noting that in an unprecedented event, classes were suspended due to the confinement caused by COVID-19 and have been taught online since March 2020, A connectivity survey was applied at institutional level to find out the availability of equipment for students and equipment, the data collected were considered for the organisation of classes, the time, the form of evaluation, the form of communication, interaction with both students and parents was determined in the academy. It should be noted that due to the nature of the course, a good percentage of the students had a laptop and the computer maintenance area of the course supported the students so that they had the necessary tools, but the internet was a determining factor due to the geographical area of the region.

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Method

The "Methodology for the development of educational applications in multimedia environments" (Bianchini, 1992) was used to create interactive digital activities for the UTHH virtual classroom, which consists of four phases that are divided into stages.

Phase: Research and analysis

It was decided to generate didactic resources through videos, considering the phases of content design, scripts, editing, publication and availability through the UTHH Virtual Classroom, a channel on the YouTube platform, and given the confinement, teachers began to use tools such as classroom, Teams, videoconferencing, which had not been explored or used in a large percentage of cases.

An analysis was carried out using a comparative table where digital tools such as Nearpod, Educaplay, Wordwall, Edpuzzle, Genial.ly, Liveworksshets, Learning apps, Proprofs, Constructor 2.0 were analysed. (Nearpod, 2020), (Educaplay, 2021), (Wordwall, 2021), (EDpuzzle, 2021), (Genially, 2020), (Worksheets, 2020), (LearningApps, 2020), (ProProfs, 2017), (Constructor, 2019), (Plickers, 2019) .These tools allowed to generate and complement students' educational practices.

Phase: Design

In this section, the standardisation and description of the typography, the design of content, scripts, the logical design of the videos were carried out.

Design in UTHH Virtual:

The following figure shows the main menu and the submenu with the sections that will make up the units, then it is described in detail what will contain identifying each section with numbers.

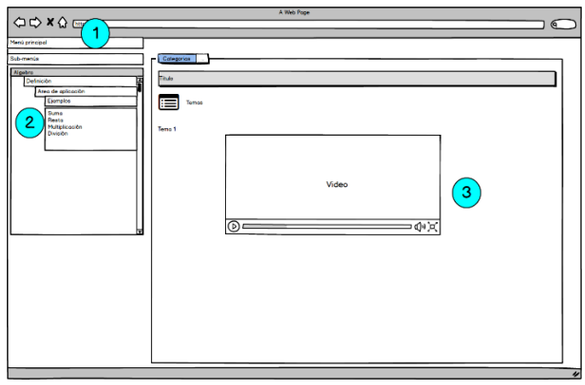

Figure 1 Sections that make up the UTHH virtual classroom
Source: Own elaboration

At the top you can find the logo.

a) Video search bar

b) Microphone icons.

c) Video upload icon.

d) YouTube Apps.

e) Notifications

f) In the centre is the space where the video in playback is displayed.

g) Inside the box are the options: Play, Pause, Autoplay, Settings, Cinema mode, Thumbnail mode, Full screen.

h) At the top you can see the name of the video, the logo and the name of the channel.

i) Like, Dislike, share, save and report reactions.

j) Subscribe button.

Phase: Development

In this stage the videos were developed, edited, recorded, multimedia production and content generation.

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Figure 2 Video on the UTHH Mathematics YouTube Channel
Source: Own elaboration

Description:

The topics were selected, taking into account diagnostic assessments, algebra line subject topics, sequential subjects, subject sheets and the mapping of all basic science subjects in the educational programmes.

Scripts were developed.

The videos were made in three modalities, video design using multimedia tools, recording of teachers explaining a topic (blackboard, whiteboard, etc.), recording of teachers explaining a topic in screen capture mode.

- Editing and evaluation of the videos.
- Creation of a YouTube channel
- Publication of videos on the platform
- Generation of content in the Virtual UTHH.

With all the previous steps in the virtual platform, a section was created on the subject, areas of application, examples taking the links of the videos generated and published on the YouTube channel, a section of practices. Initially it was only a space for review, but according to the emergency health teachers we saw the need to explore other tools such as google classroom where we generated the same content, but also like the platform offered the option to publish practices and generate evaluations, so the freedom of teaching was respected, but all make use of the videos, which are available to students, the university community and the general public. https://www.youtube.com/channel/UC3SZebAtP0pglt0uf4rylWg/

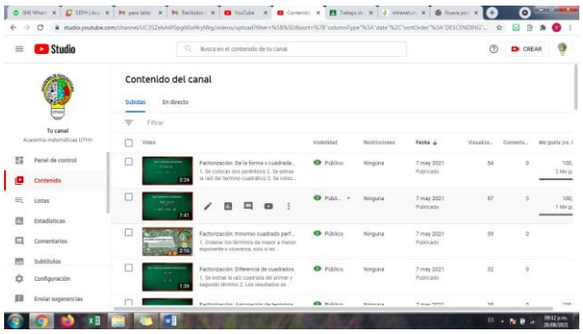

Figure 3 Content of the video sum of polynomials on YouTube
Source: Own elaboration

f) Resources

The following resources were used for the development of the project:
Editing software, computer equipment, camera (mobile phone), microphone, light ring, blackboard, whiteboard.

For the availability of resources:

- Classroom platform, Virtual UTHH platform, social networks.

Phase of: Evaluation

The videos were made available to the student community through an official letter issued by the academy of mathematics for academic management and educational programmes, an instrument was proposed to be used as a reference for points of improvement.

Results

Failure rates, students' fear of mathematical calculations, problem solving and collaborative work are aspects that Mathematics teachers face in the classroom in their educational work.

The resources were used with the students of the University, as a result, the knowledge, know-how, analysis, collaborative work, and use of mathematics and programming logic in problem solving were evaluated, based on the didactic resources (videos) created by the teachers.

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To cite an example: Operations with polynomials, the students were told the meaning of the topic, rescuing previous knowledge, then the definition, the examples were shown in videos of the operations of polynomials, it should be noted that the example of the sum of polynomials was developed in the context of requesting orders of tacos, then the teacher placed a practice through a crossword puzzle or problem solving and was evaluated. The use of didactic resources was very interesting as the following situations arose.

- If a student did not attend the virtual class session due to connectivity problems, he/she was informed that he/she had to watch the video.

- He had to watch the videos before the class: This allowed the term "flipped classroom" to be coined, which meant that the teacher had to provide material prior to the class in which the student arrived at the virtual session with knowledge of the subject and could make the most of the time to practise and resolve any doubts.

- It was advantageous for both parties: the teacher did not have to repeat the explanation and the student could use the resources when his or her connectivity problems allowed it.

- At the beginning of 2022 the fear of a return to face-to-face classes was notorious and the student community was offered the possibility of two modalities, virtual and face-to-face. The Hybrid Model was coined, which commits the student to a prior review of topics in class and brings together the advantages of the competences of the face-to-face and online models.

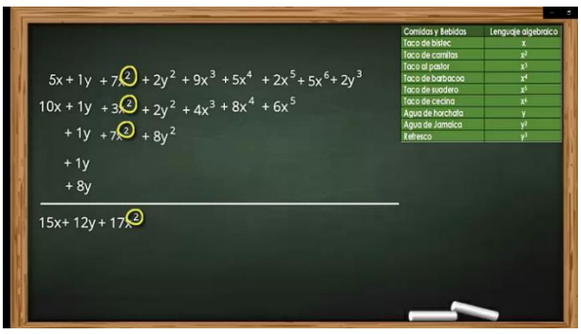

Figure 4 Video sum of polynomials
Source: Own elaboration

Figure 5 Video class on derivatives
Source: Own elaboration

In order to define the functioning of the didactic material, tests were carried out with a pilot group of third-year students of the subject of derivatives. Considering the following information:

$$n = \frac{NZ^2pq}{e^2(N-1) + Z^2pq}$$

Figure 6 Sample design formula for finite populations
Source: Based on (Bolaños, 2012) and (Murray & Larry, 2009)

n= size of the sample sought

N= size of the population or universe

Z= statistical parameter obtained using constant confidence levels:

90% equals 1.645

95% equals 1.96

95% equals 2.58

e = maximum accepted sampling error.

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Use between 1% (0.01) and 9% (0.09).

Researcher's criterion

p= probability of occurrence of the event under study

q= (1-p) = probability of occurrence of the event studied.

Data:

n =?

N= 70 students

Z= 90% = 1.645

e = 10% = 0.1

p= 0.5

q= (1-p) = 0.5

$$n = \frac{(70)(1.645)^2(0.5)(0.5)}{(0.1)^2(70-1)+(1.645)^2(0.5)(0.5)}$$

Figure 7. Sample calculation for finite populations
Source: Own elaboration

n= 34.65 = 35 Students

The questions were in relation to the following:

- Identification data (University, Faculty, subject, credits).
- Quality (Resolution).
- Audio and Volume
- Text (spelling and grammar rules).
- The relationship between image, text and narration corresponds to each moment of the video.
- Accurate and updated information based on the syllabus.
- Bibliography
- Sequential content, from simple to complex.
- Key concepts.
- Resources (graphs, charts, illustrations, examples, exercises).
- Language for target audience.
- Typographic resources and colours

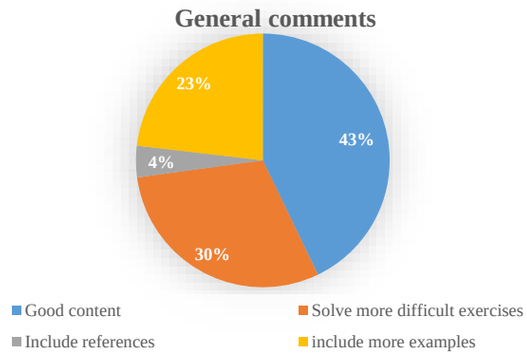

Figure 8 Recommendations for improvement
Source: Own elaboration

Conclusions

The project's objective was to develop didactic material in the area of basic sciences through multimedia educational activities for assessment and reinforcement of learning acquired in class on a platform where it is available considering the digital gaps of the region, this experience was very interesting, none of the teachers who participated at the beginning of the pandemic had used classroom, google meet and much less created a YouTube channel, it was an enriching experience for teachers, but also for students to have material that they can play at the time they want and when they have connection availability. While these are times of empathy, they are also times of change for teachers, returning to technology as an ally in teaching performance.

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ISSN: 2414-4835

Article **Journal of Social Researches**
June 2022, Vol.8 No.21 21-26

Relationships between social context and resilient personality in high altitude diving

Relaciones existentes entre contexto social y la personalidad resistente en clavados de altura

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DOI: 10.35429/JSR.2022.21.8.21.26 Received January 25, 2022; Accepted June 30, 2022

Abstract

In this study, the objective was to identify the existing correlations between the variables of the social context, with the variables of the resistant personality. The participants were 38 high divers, participants in world-class international events, 23 (60.526%) men and 15 (39.474%) women, 19 and 45 years old, participated in this competition, with an average of M = 31.39 years, and a standard deviation of SD = 6.47, of which 5 represent the United States, 3 Russia, 4 Brazil, 4 Colombia, 4 France, 1 Italy, 1 Ukraine, 2 Romania, 2 Mexico, 1 to the Netherlands, 1 to Germany, 3 to Canada, 2 to Australia, 1 to Luxembourg, 1 to Spain, 1 to Denmark, 1 to the Czech Republic and 1 to the United Kingdom. The methodology used was a cross-sectional, causal-correlational, non-experimental design. The results showed that, regarding the degree of correlation of the social context variables with the resistant personality, significant values were found in almost all the factors; the highest values being those that occurred in the variables of .641** athlete and total resistant personality, 624** Nature of training and total resistant personality and .587** Nature of training and the variable of the resistant personality of commitment . Discussion, In this investigation similarities were found with other investigations in athletes, In this work relationships were identified between practically the majority of the variables of the social context with the total resistant personality, As is the case of the variable of the social context of coach, environment and resources, athlete, nature of training and training plan. By correlating positively and significantly with a personality resistant to total stress, it is clear that the resistance to stress presented by this sample of high-diving athletes has a degree of persistence towards difficulties , truly outstanding, since they are in challenging social environments (Jaenes, 2009; Elferink-Gemser, Jordet, Coelho-E-Silva, & Visscher, 2011; Ponce 2017). Conclusion, resistance to stress is forged by various variables such as a high commitment of the athletes themselves with their preparation, but also that it is dependent on the resources available given the conditions under which they compete in this sport and Resources are of vital importance for this sport, athletes consider it a pleasant challenge for them to compete in this sport.

Coach, Sport performance, Sport spyschology

Resumen

En este estudio el objetivo fue identificar las correlaciones existentes entre las variables del contexto social, con las variables de la personalidad resistente. Los participantes fueron 38 clavadistas de altura, participantes de eventos internacionales de talla mundial, en esta competencia participaron 23 (60.526 %) hombres y 15 (39.474 %) mujeres, 19 y 45 años de edad, con una media de M = 31,39 años, y una desviación estándar del DT = 6.47, de los cuales 5 representan a Estados Unidos, 3 a Rusia, 4 a Brasil, 4 a Colombia, 4 a Francia, 1 a Italia, 1 a Ucrania, 2 a Rumania, 2 a México, 1 a Países Bajos, 1 a Alemania, 3 a Canadá, 2 a Australia, 1 a Luxemburgo, 1 a España, 1 a Dinamarca, 1 a República Checa y 1 a Reino Unido. La metodología que se utilizó fue un diseño transversal, correlacional causal, de tipo no experimental. Los resultados mostraron que, con respecto al grado de correlación de las variables del contexto social con la personalidad resistente, se encontraron valores significativos en casi todos los factores; siendo los valores más altos los que se presentaron en las variables de .641** deportista y personalidad resistente total, 624** Naturaleza del entrenamiento y personalidad resistente total y .587** Naturaleza del entrenamiento y la variable de la personalidad resistente del compromiso. Discución, En esta investigación se encontraron similitudes con otras investigaciones en deportistas, En este trabajo se identificaron relaciones entre prácticamente la mayoría de las variables del contexto social con la personalidad resistente total, Como es el caso de la variable del contexto social de entrenador , entorno y recursos, deportista, naturaleza del entrenamiento y plan del entrenamiento, Al correlacionar positiva y significativamente con una personalidad resistente al estrés total está de manifiesto que la resistencia al estrés que presenta esta muestra de deportistas de clavados de altura tienen grado de persistencia hacia las dificultades, verdaderamente sobresaliente, ya que están en ambientes sociales desafiantes (Jaenes, 2009; Elferink-Gemser, Jordet, Coelho-E-Silva y Visscher, 2011; Ponce 2017). Conclusión, la resistencia al estrés esta forjada por diversas variables como son un alto compromiso de los propios deportistas con su preparación, pero también que está en dependencia de los recursos con los que se cuenta dadas las condiciones bajo las cuales se compite en este deporte y los recursos son de vital importancia para este deporte, los deportistas consideran para ellos un desafío placentero competir en este deporte.

Entrenador, Alto rendimiento, Psicología del deporte

Citation: VILLAREAL-ARANDA, Jazmín, PONCE-CARBAJAL, Nancy, TRISTÁN-RODRIGUEZ, José Leandro and RAMÍREZ-NAVA, Rubén. Relationships between social context and resilient personality in high altitude diving. Journal of Social Researches. 2022. 8-21:21-26.

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Introduction

Sport is a health care tool, it helps people to improve their quality of life, therefore, it is of vital importance to promote mass sporting events that invite the population to integrate some physical activity (Bauman, Bellew, and Craig, 2014; Aguirre-Loaiza, Arenas, Barbosa-Granados, Agudelo, 2020) and do sport for their well-being. Physical activity and sport also provide its practitioners with problem-solving skills, with a better ability to identify a better option, since in sport they very often have to face stressful situations, typical of having to compete with others and measure their ability, so those confrontations involve better stress management and choosing possible solutions more clearly (Ponce-Carbajal, López-Walle, and Méndez, 2021a).

High sports performance involves a mental strengthening for those who practice it and also the social gains of infecting others who did not practice any sport, but seeing massive events more population joins this practice, as an extra benefit to the general population and at this point there are investigations that talk about the influence that generates an adequate social context that allows the development of excellent athletes (Ponce, 2017), and also of those athletes begin and the others who are already in training. Social contexts influence the formation of athletes, there is a research in high performance athletes where they describe factors such as family, the coach and the athlete himself, direct the development of the athlete in a very important way even up to the sports facilities or resources affect the formation of these athletes in their training and performance in some way (Ponce 2017).

The social context, being the environment of humans, influences with a different impact for everyone, talking about athletes, there are some studies that have investigated the various factors that can impact, and have been considered families, coaches, the resources that athletes have to develop, facilities, type of training, duration and characteristics of training and the athlete himself, these variables as a whole form the environment in which athletes are polishing and learning, and apparently the result is a consequence of the interaction of these factors.

In some research the most important variable is the athlete himself (Ponce 2017), in others the family, the coach and the environment and resources, as well as the intervention of the coach.

There is also another element that has its load of influence on those who begin their sports training, those who are already on their way in their training and development and those who have reached the pinnacle of sports that are already high performance, the part of the psychology of sport, athletes live a sea of emotions, which in turn can become movements or emotional changes that need to be controlled as manifested in his studies (Jaenes, Godoy and Román 2008; 2009). This researcher has as a line of research the resilient personality, which is also known as resistance to stress, this concept is integrated by three variables, control, commitment and challenge, Jaenes mentions that those who better manage these three variables, have a better stress management, therefore, they can have greater control of their emotions, therefore, they can better potentiate their skills.

The concept of the resilient personality was created by Salvatore Maddi and Suzanne Kobasa (Maddi, 2002), who were struck by the fact that some people were empowered by problems and others were diminished, but in such an intense way that they became ill, and they and their team became very interested in this topic.

Maddi and collaborators describe the resilient personality as an ability of those who have a high resilient personality, they are able to make problems their engine, their energy, an opportunity to develop, and reach personal growth, however, those who do not have this ability, fall into illness, feel threatened and have the tendency to get sick, in short, they are not very resistant to stress (Maddi, 2002; Jaenes, Godoy, and Román, 2008; 2009). Resilient personality was also studied by Kobasa, Maddi and Puccetti (1982) and in their study they mention that a high resistance to stress serves as a protector for health and therefore avoids illness, which means that practicing sport is a good opportunity to develop or increase it.

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The resilient personality has been studied in various high performance sports and confirms that athletes have a high resilient personality that allows them to have a very good stress management under difficult circumstances (Ponce-Carbajal, 2021a; Ponce-Carbajal, N., López-Walle, J. M., and Méndez, M. P. (2021b).

It is necessary to comment that both the social context and the resilient personality of high performance athletes have not been much explored and this is the only study of this topic in high diving athletes.

The objective of this research is to identify the relationship between social context variables and resilient personality in high performance high diving athletes.

Description of the method

In this research the design is empirical associative, simple correlation and cross-sectional (Ato, Lopez-Garcia, & Benavente, 2013), 38 athletes who have participated in High Diving World Series, High Diving World Cups and FINA World Championships participated. The age of the participants ranged from 19 to 45 years old, with a mean M = 31.39 years, and a standard deviation of SD = 6.47 of which, 23 were male (60.52%) and 15 female (39. 47%) of which 5 represent the United States, 3 Russia, 4 Brazil, 4 Colombia, 4 France, 1 Italy, 1 Ukraine, 2 Romania, 2 Mexico, 1 The Netherlands, 1 Germany, 1 Canada, 3 Canada, 2 Australia, 1 Luxembourg, 1 Spain, 1 Denmark, 1 Czech Republic and 1 United Kingdom.

Two instruments were used for this study, the first is a questionnaire on Perception of Factors Related to Excellence in Sport (PFED; Simón, 2009). This instrument measures the athlete's perception of the support received in the process of preparation for competition. In this questionnaire variables such as the coach, the environment and resources, the family, the athlete, and training elements such as the nature and characteristics of training were integrated. This questionnaire is composed of 54 items with a Likert-type scale from 1 to 10, where 1 refers to the least contribution, and 10 is the greatest contribution to their current training as an excellent athlete.

The second instrument is the Resilient Personality in Central American and Caribbean Athletes (PRDCC; Ponce, 2017; Ponce-Carbajal et al. 2015); it is composed of 18 items, and is composed of three variables: commitment (7 to 12), control (1 to 6) and challenge (13 to 18) of 6 items each. In other research, this questionnaire has been used as a single concept, (Kobasa, 1979; Kobasa, Maddi and Kahn, 1982), and also trifactorial with its three scale components, with the variables of control, commitment and challenge (Jaenes, Godoy-Izquierdo and Román, 2008), in both forms the properties are adequate ($\alpha>0.7$) therefore, it is used in both situations, uni and trifactorial measurement. The response scale is a Likert-type scale from 0 to 3 where 0 is "totally disagree" and 3 is "totally agree".

The Procedure, first, the Spanish and English-speaking participants were integrated in the discipline of high diving, during the Red Bull Cliff Diving World Series 2021. In the first stage of the series, contact was made with the team of organizers of this series and with those responsible for the athletes in order to inform them and request their consent to participate in the research, taking into account that participation would not interfere with the performance of the athletes. In this series 6 stops were made around the world where athletes of 18 nationalities participated. With the consent of the organization and those responsible, the questionnaire was sent electronically via digital media, via email or whatsapp, with the link, so that they could know the informed consent and could answer alone during a suitable time to answer, and we would be pending to the networks in case there is a need to explain or resolve any questions 24 hours a day, they were informed on the cover of the questionnaire that the maximum duration to answer was 20 minutes. Coaches and colleagues followed up to make sure that most of the participants had the information and to confirm that the data was confidential and completely voluntary and anonymous for their safety. And if at any time they wished to withdraw, they could do so at any time they deemed appropriate.

ISSN: 2414-4835

The statistical analyses performed were descriptive, mean frequencies, standard deviation and normality of data by means of kolmogórov-smirnov, reliability by means of Cronbach's alpha (∝) and bivariate correlations with Spearman's correlation coefficients, with the Statistical Package for the Social Sciences (SPSS) version 25.

Results

In this section we present the evidence found in this research starting with the internal consistency of the measurement instruments.

Reliability analysis of the social context

The results found for the reliability of the social context instrument showed values between .78 and .99 Cronbach's alpha (∝), which presumes an adequate fit for the sample.

	Variables	Reliability
1	Trainer	0.99
2	Environment and Resources	0.96
3	Athlete	0.83
8	Family	0.88
4	Nature of training	0.78
5	characteristics of training	0.83
Note: α >.70		

Table 1 Reliability of the social context variables

Reliability analysis of the PRDCC

The internal consistency of the Resilient Personality in Central American and Caribbean Athletes (PRDCC) questionnaire was evaluated through the ∝, considering the global resilient personality as a single variable, the result is that the internal consistency was adequate (∝ = .84), when analyzing the three variables of the PR revealed the following values of ∝: commitment with .60, control of .70 and challenge of .84, showing adequate values for the sample.

	Variables	Reliability
1	Control	0.7
2	Commitment	0.6
3	Challenge	0.84
4	Total PR	0.84
Note: α >.70		

Table 2 Reliability of the resilient personality variables

Correlations

For the analysis of the correlations between the social context variables and the resistant personality variables (see Table 3), Spearman's statistical test of correlations was used.

Table 3 Correlations between variables of the social context and resistant personality

Thanks

To the Faculty of Sports Organization, and to the Universidad Autónoma de Nuevo León, CONACYT, which, as far as possible, supports this type of research. Also, our thanks to the organizers of the serial and to FINA and in particular to the unconditional and professional support of the coach José Antonio Martínez Ochoa, founder of the discipline of high diving in Mexico, judge of the international swimming federation and talent developer, also to the athletes, and to all the coaches who participated in this project.

Conclusions

The coach is not only limited to making a training plan, his work goes beyond that, since he trains the athlete physically, mentally and emotionally.

It is worth mentioning that, in this sport, there are few coaches and this is an element that is intended to be improved, since their contribution and support for the athletes is very important.

The coach is the support to face the challenges and is the one who supports the commitment and control of the emotions of the athletes in the complicated situations they face, hence his important work.

Speaking of resources and environment, athletes perceive it is important to have the support of sports managers and administrative procedures as well as the support of the organizations to be able to access the appropriate facilities for their sport, since the conditions that this sport has to compete have different characteristics than any other, usually natural scenarios that are not accessible to everyone and are not available all the time for training, and it does condition their development and preparation.

ISSN: 2414-4835

Most do not have a coach and therefore depend on themselves or a partner to support and correct each other, therefore, the control of emotions, the training plan and to identify what is necessary to be better is a great challenge. The success of these athletes depends on their own commitment and control of emotions. Definitely these athletes are perceived as very resistant to stress because they are successful thanks to their own effort. In conclusion, the desire to perform their training no matter if I have no training depends on the desire, discipline and work with commitment to achieve sporting success.

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ISSN: 2414-4835

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ISSN: 2414-4835

Article **Journal of Social Researches**
June 2022, Vol.8 No.21 27-33

Automatic document classification using machine learning

Clasificación automática de documentos usando aprendizaje automático

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DOI: 10.35429/JSR.2022.21.8.27.33 Received January 30, 2022; Accepted June 30, 2022

Abstract

In many areas of professional development, the categorization of textual objects into predefined categories is used. In this paper we present a description of the automatic classification of documents, as well as the way in which this task is evaluated. The results of experiments carried out with a set of plain text files, corresponding to news items referring to five categories of natural disasters in Spanish, are shown. Two classifiers were built, one based on support vector machine and the classical Bayesian classifier. Different percentages of the file set were used to build the classifiers (10, 30 and 70%) and the rest was used to test the classifier. The best results are obtained for the SVM-based classifier with 99.24% of correctly classified instances.

Text classification, SVM, Bayes, Evaluation

Resumen

En muchas áreas de desarrollo profesional es empleada la categorización de objetos textuales en categorías previamente definidas. En este trabajo se presenta una descripción de la clasificación automática de documentos, así como la manera en cómo se evalúa esta terea. Se muestran resultados de experimentos realizados con un conjunto de archivos en texto plano, correspondientes a noticias referentes a cinco categorías de desastres naturales en español. Se construyeron dos clasificadores, uno basado en maquina de vectores de soporte y el clásico clasificador bayesiano. Se utilizaron diferentes porcentajes del conjunto de archivos para construir los clasificadores (10, 30 y 70%) y el resto se utilizo para la prueba de este. Los mejores resultados se obtienen para el clasificador basado en SVM con un 99.24% de instancias clasificadas correctamente.

Clasificación de textos, SVM, Bayes, Evaluación

Citation: GUZMÁN-CABRERA, Rafael. Automatic document classification using machine learning. Journal of Social Researches. 2022. 8-21:27-33.

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Introduction

Classification or categorisation is the task of assigning a set of objects to two or more predefined classes or categories. In many areas of professional development, categorisation of new objects is employed. This process is costly and time consuming [1]. The classification problem can be divided into two parts: training and classification. Learning involves the acquisition of general concepts from a set of training examples.

One approach to building a text categorisation system is to manually assign a set of documents to be categorised. In this case the hierarchies or subject areas are assigned by an expert. However, this process is usually very costly and time-consuming, since an expert is needed for each area or application in which the classification task is to be carried out, and a change of area implies the need for a new expert to define the categories or the documents that belong to each category as well as the rules that allow decisions to be made about new documents to be classified [2].

Although it is possible to build a text classification system manually, the most widely used approach today is to use information retrieval and machine learning techniques to induce a classification model, as in [3-5]. Learning-based systems are also faster to build than rule-based or language model-based systems.

Much of the research developed has been applied to binary problems, where a document is classified as relevant or not relevant with respect to predefined topics. However, there are many text data sources such as news, e-mail and digital libraries, just to mention a few, which are composed of different topics and represent a multi-class categorisation problem. In addition to multi-class classification there are other factors that increase the complexity of classification, such as some natural language features like synonymy, ambiguity and skewed distributions, which make the classification task more difficult [6].

Document classification can be seen as the task of assigning a value of 0 or 1 to each element of a decision matrix. Where the documents to be classified are represented by the set D = {d1,..., dm}, while the set of possible categories to assign to the set of documents is represented by C = {C1,..., Cm}. In this way, a value a i j = 1 would be interpreted as the document di belonging to the category c j. Figure 1 shows the scheme used for the categorisation of documents.

	Documents to classify							
predefined categories		d_1			d_j			d_n
	C_1	a_{11}	…	…	…	…	…	a_{1n}
	…	…	…	…	…	…	…	…
	C_i	a_{i1}			a_{ij}			a_{in}
	…	…	…	…	…	…	…	…
	C_m	a_{m1}			a_{mj}			a_{mn}

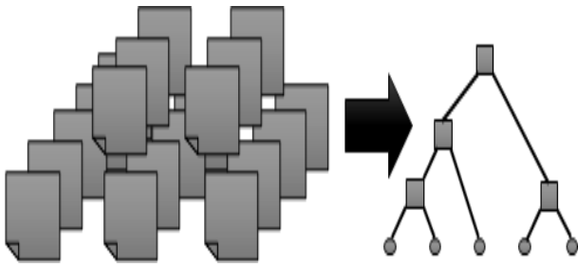

Figure 1 Categorisation of documents

In the context of machine learning, classification is one of the following two steps:

- From a set of observations, classifying consists of establishing the existence of classes or groups of data (unsupervised learning).
- Knowing the existence of certain classes, classifying consists of establishing a rule to place new observations in one of the existing classes (supervised learning).

The classification task can be carried out in two ways, the first consists of assigning exactly one category to each document, while the second consists of assigning each category to a document (each element of C is assigned an element of D). By assigning one row at a time of the matrix we have CPC (Category-Pivioted-Categorisation). It is more common to assign rows (CPC) than columns (DPC) in the categorisation task.

ISSN: 2414-4835

The rest of the article is organised as follows: Section 2 presents two of the existing classification methods using machine learning techniques: the Bayesian classifier and support vector machines (SVM). Section 3 presents the evaluation measures of text, accuracy, recall and fallout classification systems. Section 4 presents a description of the experiments performed, as well as the results obtained, and finally section 5 presents the conclusions and future work.

1 Machine learning based classification techniques

The Bayesian classifier (Bayes, 1764) is considered as part of the probabilistic classifiers, which are based on the assumption that quantities of interest are governed by probability distributions, and that the optimal decision can be made by reasoning about these probabilities together with the observed data. In tasks such as text classification, this algorithm is among the most commonly used. The naive Bayes algorithm uses the training set to estimate the parameters of a probability distribution describing the training set. The document with the highest probability is assigned the category. In this scheme the classifier is constructed by estimating the probability of each class, which is represented by Tr. Then, when a new instance ij is presented, the classifier assigns the most likely category c ϵ C, after applying the rule $c = \arg max_{c_i \epsilon C} p(c_i|i_j)$, and using Bayes' theorem to estimate the probability we have:

$$c = \arg max_{c_i \epsilon C} \frac{p(i_j|c_i)p(c_i)}{p(i_j)}$$

Considering that the denominator of this equation does not change between categories, we have:

$$c = \arg max_{c_i \epsilon C} p(i_j|c_i)p(c_i)$$

Taking into account that the scheme is called "naive" due to the assumption of independence between attributes, i.e., it is assumed that the features are conditionally independent given the classes.

This simplifies the calculations by producing:

$$c = \arg max_{c_i \epsilon C} p(c_i)\Pi_{k=1}^{n} p(a_{kj}|c_i)$$

Where p(c $_i$) is the fraction of examples in Tr belonging to class c i, and $p(a_{kj}|c_i)$ is calculated according to Bayes' theorem. In summary, the learning task in the naive Bayes classifier consists of constructing a hypothesis by estimating the different probabilities $p(c_i)$ y $p(a_{kj}|c_i)$ in terms of their frequencies over T_r.

In tasks such as text classification, this algorithm is among the most widely used [7-8]. A basic guide to the different directions that naive Bayes research has taken, which are characterised by modifications made to the algorithm, is presented in [7].

SVM support vector machines have been shown to achieve good generalisation performance on a wide variety of classification problems, most recently on problems such as text classification [9] and [10], where SVM tends to minimise generalisation error (classifier error on new instances). In geometric terms, SVM can be seen as the attempt to find a surface (σ_i) that separates positive examples from negative ones by the widest possible margin. The search for σ_i that satisfies that the minimum distance between it and a training example is maximal is performed through all surfaces σ_1,σ_(2,...) in the A-dimensional space that separate the positive examples from the negative ones in the training set (known as decision surface). The best decision surface is determined only by a small set of training examples, called support vectors.

An important advantage of SVM is that it allows the construction of non-linear classifiers, i.e., the algorithm represents non-linear training data in a high-dimensional space (called "feature space"), and constructs the hyperplane that has the maximum margin. Furthermore, it is possible to compute the hyperplane without explicitly representing the feature space. In tasks such as text classification, this algorithm is among the most widely used [7-8]. A basic guide to the different directions naive Bayes research has taken, which are characterised by modifications made to the algorithm, is presented in [7].

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2 Evaluation

Within the performance of a learning system, one of the most important factors is the measurement of the acquired knowledge that will enable the system to perform the classification task. If the learning system has access to the input and output, it is referred to as supervised learning, if it only has access to the output, it is referred to as reinforcement learning, while if it has no access to any information about the output, it is referred to as unsupervised learning. The following are the most commonly used measures of the performance of classification systems.

A system is said to learn from its experience E, with respect to some kind of task T and a performance measure P if the performance of the program in performing the tasks T, improves with experience E, according to the measure P.

To improve the characteristics of a learning system, the following factors must be taken into account:

- Exact type of knowledge to be learned.
- Knowledge representation (usually a set of weighted rules that will allow to make the assignment of the most probable category).
- Learning mechanism.

For a binary classification, typically classifiers are evaluated using a contingency table as shown in table 1 [11].

		Human classification		
System decision		Yes	No	
	Yes	a	b	$a+b$
	No	c	d	$c+d$
		$a+c$	$b+d$	$a+b+c+d$

Table 1 Contingency table for evaluation of classification systems

Each entry in the table specifies the number of decisions of a particular type. For example "b" is the number of false positives, i.e. the system classifies it as "yes", but the human expert classifies it as "no". Among the most important measures that allow us to measure the performance of classification systems we have:

Precision and Recall these measures are also used in information retrieval tasks, where they represent the proportion of retrieved documents that are relevant to a given request or query. They are defined as:

$$accuracy = \frac{a}{a+b}$$

$$Recall = \frac{a}{a+c}$$

Accuracy represents the confidence level of the classifier, usually represented as the proportion of correct classifications it is able to produce. Accuracy is measured with respect to data other than the training dataset.

The proportion of non-relevant documents that are retrieved can be obtained by means of the evaluation measure called Fallout, which is defined by:

$$Fallout = \frac{b}{b+d}$$

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Another evaluation measure used is the classification accuracy, which allows us to know the proportion of objects classified correctly and is given by:

$$accuracy = \frac{a+b}{a+b+c+d}$$

However, the contingency table has some limitations as, for example, it does not take into account the possibility that different errors have different costs, which requires more general decision theory modelling. In addition, it requires all inputs to be binary. However, it would be desirable to assign a weight to each category in the table and then discuss an evaluation approach for this case.

Another way to measure the effectiveness of a ranking system is by means of micro and macro averages. For a set of q queries and d documents a total of n = q*d decisions are taken. Micro averaging considers the q*d decisions as a single group and calculates precision, recall and fallout as defined above. Whereas macro averaging does this separately for the set d of documents associated with each query and subsequently calculates the measure of q results obtained. The difference between these two measures is that macro averaging gives equal weight to each category while micro averaging gives equal weight to each object. The two types of averages can give different results when the precision is averaged over categories of different sizes. Accuracy determined by micro averaging is called out for large categories, while accuracy determined by macro averaging provides a better sense of quality or classification across all categories.

3 Description of experiments and results

All documents must be transformed into an internal expression for text search methods to be able to use them. One of the most common representations is the vector representation where the dimension of the vector corresponds to the terms occurring within the training and the value of each individual entry corresponds to the weight of the term in question in the document. Normally the weight of these words is reflected in the semantic importance that these words have in the document in which they occur and are automatically computed by weighing functions.

The aim is to have words that are highly discriminative as classification attributes, i.e. words that allow to separate one class from another. In this sense, words that occur only in documents belonging to one class will be more relevant than words that occur in documents belonging to different classes.

These techniques tend to generate very large vectors, often with more than a thousand elements. Because of this it is common to find techniques to reduce the dimensionality of the vectors before starting the construction of the internal representation of the documents, that is, a new vector is generated with a new space in which the representation of the document is such that the new vector has a much smaller number of dimension than the original vector, an important class of techniques are feature extraction methods. Feature extraction methods define a new vector space in which each dimension is a combination of some or all of the original dimensions.

Many of these dimensionality reduction functions are based on statistical measures, e.g., chi-square, mutual information and information gain among others.

The files provided to carry out the classification task were 439 from 5 different categories, which were downloaded from the Fuerza informativa azteca website and the newspaper reforma, table 2 shows the number of files downloaded per category.

Files to classify	
Forestry	92
Inundation	87
Earthquake	143
Hurricane	76
Drought	41

Table 2 Number of files in the corpus to build and test the classifier

Figure 2 shows the diagram governing the experiments performed, on the left side is the learning part and on the right side enclosed in dotted lines is the testing part. The first thing we do is to learn the characteristics of each category so that the system is able to assign a category to a new document.

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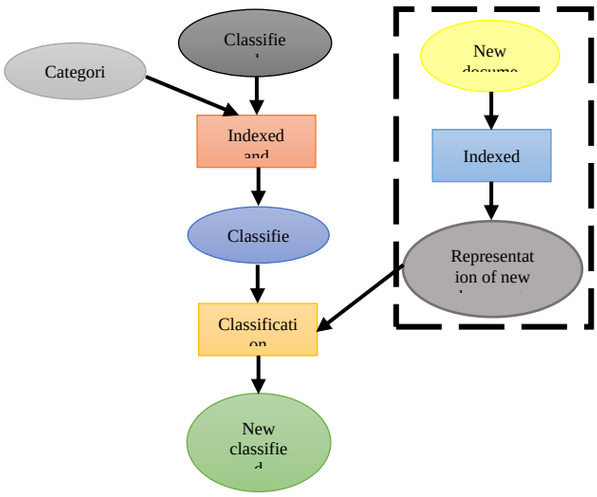

Figure 2 General diagram of the classification system implemented

As can be seen in Figure 2, the new documents to be classified go through a pre-processing stage (indexing and representation of the new documents). This stage aims to reduce the size of the documents by eliminating the parts that are not relevant for predicting the content. This is achieved by removing: HTML tags and punctuation symbols. In addition, stopwords are removed and stemming is carried out. Figure 3 illustrates this process.

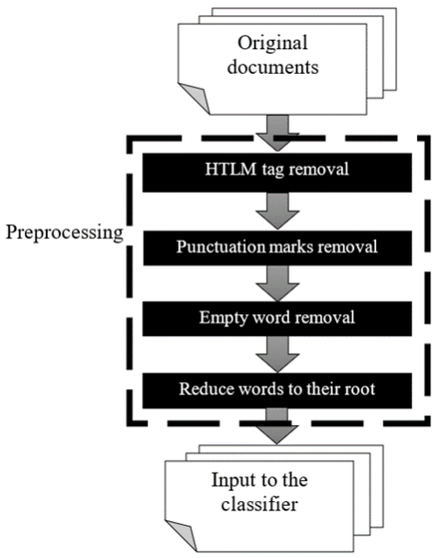

Figure 3 Pre-processing applied to new documents

Once the documents have been pre-processed, feature extraction and indexing of the documents is performed. Indexing is the representation of the documents as a feature vector. At this point all the vocabulary of the existing examples in the learning corpus was collected, resulting in a total of 60503 words and 6964 distinct words, table 3 shows the summary statistics for this collection of texts.

Summary of statistics			
Madia	8.68796669	Kurtosis	140.484965
Standard error	0.33542491	Range	625
Median	2	Minimum	1
Mode	1	Maximum	626
Standard Deviation	27.9914047	Sum	60503
Sample variance	783.518735	Count	6964

Table 3 Summary statistics for pre-processed documents

The cut-off frequency was set to a value equal to the mean plus the standard deviation (in this case 8.69+28=37), i.e. a value equal to 37, leaving only 323 distinct words that meet this condition. Below are some of the results obtained in different conditions of the classification experiments carried out with the files shown in table 2.

First, a cross-validation was performed, which consists in giving a number n (n=10, in our case), dividing the data into n parts, and for each part, building the classifier with the remaining n-1 parts and testing the first part. The process is repeated for each of the n partitions. In our case, a stratified cross-validation is performed. We call it stratified when each of the parts retains the probabilities of the original sample (percentage of elements in each class). Table 4 shows the results obtained with the SVM and Naive-Bayes classifiers implemented. For each of them, the percentage of correctly classified instances is shown. We can observe that better results are obtained with SVM, in which when performing the experiment with stratified cross-validation we obtained 97.03 % of correctly classified instances, while with Naive-Bayes we obtain 96.12 %. In the next experiment we define a percentage with which the classifier will be built and the remaining part will be tested. We performed several experiments starting with only 10% for the creation of the classifier, then this percentage was increased to 30% and finally to 70%. In all cases results are presented using SVM and NB.

	VC (n=10)		CEP		% of instances in CEP
	SVM	NB	SVM	NB	
Accuracy	97.04	96.13	94.19	85.1	10
			96.43	96.1	30
			99.24	97.72	70

Table 4 Results obtained, cross-validation (CV) and with training and testing together (CEP)

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Conclusions and future work

This paper presents a description of the automatic document classification activity. For the evaluation, a corpus of natural disasters consisting of newspaper articles in electronic format is used and is available upon request by email. With respect to the results obtained, we can observe that the number of correctly classified instances increases as more examples are used for the creation of the classifier. When we used only 10%, 94.19% of the instances were classified correctly, while with the classifier formed with 30% of the files, 96.42% of the instances were classified correctly, and finally with 70% of the files as part of the classifier, 99.24% of the instances were classified correctly. These results show the relevance and feasibility of the proposed methodology.

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What is your added value with respect to other techniques?

Clearly focus each of its features

Clearly explain the problem to be solved and the central hypothesis.

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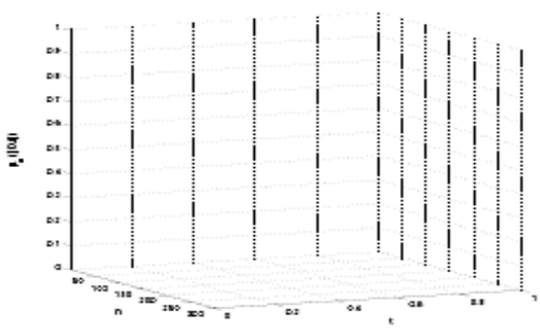

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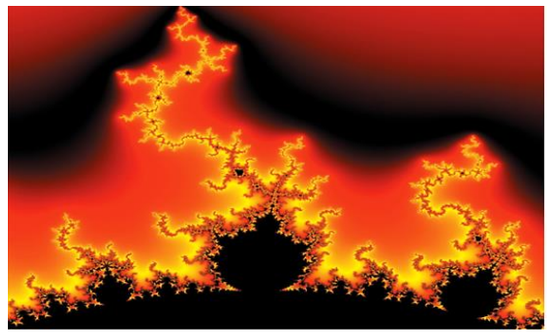

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2414 4835
ISSN 2414 - 4835
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