SCHOOL EMERGENCY PLAN, A SOCIALLY RESPONSIBLE VISION FOR EDUCATION IN MEXICO

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Abstract: At the beginning of 2020, the World Health Organization (WHO) declared a global health emergency due to a pandemic of the SARS-COV2 virus whose spread began in China, which generated challenges in different sectors around the world and within the most important ones. There is the educational system, educational policies and the teaching of hard knowledge of basic sciences (CBAS) through remote systems and virtual modalities. The foregoing shows the educational crisis that countries like Mexico are facing from the basic, upper secondary and higher education system, but especially in the area of exact sciences that are the foundation for generating logical - critical - reflective thinking, and emphasizing the subjects of mathematics, physics and chemistry. This text provides the so-called School Emergency Plan to assist educational institutions at different levels through remedial classes among peers with the voluntary commitment of higher education institutions for educational democratization and increase the academic level with social responsibility.

Keywords: Education, remedial classes, Basic Sciences, Peer work, social responsibility.

INTRODUCTION

At the beginning of 2020, the global spread of COVID-19 had begun, two months later the world health organization would declare it a global pandemic. The pandemic generated enormous challenges for educational systems, which revealed weaknesses, inequalities in educational opportunities within national educational institutions and between countries, which made more visible the importance of education and the way in which the pandemic affected.

For this reason, education in Mexico is facing a crisis created by the pandemic, revealing some of the deficiencies of the educational system where one of the most affected elements is hard knowledge (Basic Sciences) with almost two years of teaching online classes. For an educational system that was not prepared to work in a remote modality, there were repercussions at the different educational levels.

This document seeks to provide a school emergency program to support basic education institutions (primary, secondary and higher education) in the Sierra de Santa Catarina, specifically in the San Miguel Teotongo neighborhood. Through said program, the democratization of the education, that is; that all students have easy access to quality education.

For the mentioned program, a diagnosis was made in a first and second stage that was applied by the TecNM campus Iztapalapa III, in its new admission exam August - December 2022, which was carried out by teachers from the same institution; hard data of the knowledge of the aforementioned areas was collected.

The diagnosis reflects the deficiency that basic and upper secondary education students have when entering a higher level institution.

For this reason, knowledge will be strengthened with methodological and didactic-pedagogical strategies within the teaching-learning processes through remedial classes.

PROBLEM STATEMENT

“The new scenario imposed by the pandemic caused serious gaps in the learning process, which will affect the development of students’ cognitive and emotional skills” (Reimers et al, 2022, 25), This caused a low academic level in the knowledge of the basic sciences (mathematics, physics and chemistry) in basic education, from primary to upper secondary level and the little immediate action to reduce the gap was minimal.

The TecNM campus Iztapalapa III carried...
out a diagnostic evaluation, which was applied on May 27, 2022, where the results obtained reflected deficiencies in the aforementioned areas; This first approach allows us to know what are the areas of academic opportunity for children in basic education and young people in upper secondary education with respect to hard knowledge (basic sciences).

That is why the question arises of how to help these children and young people in order to increase the academic level in the area of interest. The little importance of the institutions in students from basic level to upper secondary level, can be seen reflected in the diagnostic exam for new admission to the TecNM campus Iztapalapa III, since the virtual classes fundamentally affected the areas of basic sciences (mathematics, physics and chemistry); which generated an area of opportunity for higher level institutions whose objective is that the TecNM campus Iztapalapa III marks the line to have new learning strategies and thus have improvements in the aforementioned areas since exact sciences are the basis logical, critical and reflective thinking.

JUSTIFICATION

Reimers et al, (2022) in the report Reimagining Our Futures Together. A new social contract for education, Published by UNESCO in 2021, it highlights the challenges of education systems in a context of growing inequalities of poverty and social exclusion, changes brought about by advances in technology. Due to the above and for this work, it is necessary to carry out a diagnosis which will allow us to know the institutional needs that reflect the low academic level from primary to upper secondary level.

The context will be identified, since it is important to know the physical facilities of the institutions (water, drainage, electricity and internet), this will allow us to know how much inequality and poverty is in the area in order to be able to implement the school emergency program. For this reason, the place of study and application is the San Miguel Teotongo neighborhood, Iztapalapa, Mexico City.

Once the diagnosis is made, the action will be carried out where the need to create links and institutional networks between teachers, students and parents arises to share programs, methodologies, didactic strategies that will serve as a fundamental strategy in the teaching-learning process. Finally, it is intended to strengthen and increase the knowledge of basic sciences (mathematics, physics and chemistry) so that the institutions of the Sierra de Santa Catarina, specifically in the San Miguel Teotongo neighborhood, are an engine of change in the Iztapalapa mayor's office.

GENERAL OBJECTIVE

Strengthen the knowledge of mathematics, physics and chemistry (Basic Sciences) through remedial courses through the school emergency plan, led by the ‘’Tecnológico Nacional de México’’ Iztapalapa III campus, which, together with primary, secondary and secondary education institutions higher education in the area seeks to increase educational quality coupled with this is intended to promote the democratization of education.

SPECIFIC OBJECTIVES

• Strengthen relationships between educational institutions from primary to upper secondary level in the San Moguel Teotongo neighborhood, to establish a link and form an academic network with social value.

• Carry out a diagnosis of institutional needs in the area of basic sciences, to define methodologies and didactic strategies within the teaching-learning
process for the subjects of mathematics, physics and chemistry.

- Assign remedial class programs, scheduling, work scheme for the period August - December 2022 and students in the last grade (semester) responsible for teaching classes.

These previously mentioned objectives were achieved with the help of the fifth systemic helix (Martinez, 2012).

Which involves civil society (Civil Association of the Corpus Christi parish of the San Miguel Teotongo neighborhood), the company (Iztapalapa Business Association), the Government (Iztapalapa Mayor’s Office), the School (TecNM-Iztapalapa III) and the Social responsibility (academic body, teachers, students and community of the Is Cruz market located in the Sierra de Santa Catarina in the San Miguel Teotongo Iztapalapa neighborhood).

**CONTEXT OF THE INVESTIGATION**

Mexico City is made up of 16 territorial demarcations. Iztapalapa is the fourth largest demarcation, covering 116 km², it is located to the east of the city and is divided into 293 neighborhoods. It is located in what was previously Lake Texcoco and due to its height it is prone to waterlogging and flooding. Its type of soil is made up of clay deposits, separated by sandy layers and superficial covers formed by alluvial soils.

The 2020 Population and Housing Census (2020 Census) which was carried out from March 2 to 27, to obtain information on these and count the population living in Mexico and inquire about its main demographic, socioeconomic and cultural characteristics.

Iztapalapa is the most populated demarcation of Mexico City, with 1,835,486 people, representing a fifth of the city’s population. It is characterized by being a young Mayor’s Office, since 32% of its population is between 15 and 34 years old. It is expected that this panorama will change in 50 years and close to 50% of its population will be older adults.

Iztapalapa faces challenges that limit its sustainable development such as social deficiencies in terms of educational backwardness, lack of access to public health services, as well as poor quality housing and
Figure 2 Hilling and territorial division of Iztapalapa

Figure 6 Mapping of intervention educational institutions in San Miguel Teotongo
Source: own elaboration with information from google maps
limited access to basic services. According to the National Council for the Evaluation of Social Development Policy (CONEVAL), 35% of the inhabitants of the Mayor’s Office live in a situation of poverty, that is, a third of the ixtapalapenses.

Regarding the educational gap, the average level of schooling is 10 years, only 22% of Iztapalapenses have higher education.

Iztapalapa has a high population density, while in Mexico City there are 6,202 people per km2, in Iztapalapa there are 15,809 inhabitants per km2. In 2020, 503,620 inhabited private homes were counted, of which 10,643 are private homes where 4 or more people live in a single room; On average, there are 3.6 inhabitants per dwelling. On the other hand, Iztapalapa has a high rate of social marginalization due to the lack of access to basic services in homes. This situation is particularly serious in the 168 irregular settlements located in areas classified as at risk.

According to data from the National Occupation and Employment Survey (ENOE, 2014), less than half of its population has a formal job. Of the 1,502,797 people that make up the total economically active population, 5% are unemployed and 95% are employed. Of the employed population, 56% receive income equivalent to two minimum wages. Almost half of the economic activity is concentrated in commerce and diverse services (45%) and a third part (35%) works as civil servant, professional or technician.

0.25% of homes lack piped water. According to the National Survey of Government Quality and Impact (ENCIG) in the eastern region, where Iztapalapa is located, the highest levels of dissatisfaction regarding drinking water (69%), drainage and sewerage services are reported. (71%). The lack of water supply has motivated the extraction of water from wells located in the demarcation, causing an overexploitation of the aquifers. In the rainy season, the wear of the subsoil is further compromised by the flows that come down from the upper parts of the hills, dragging mud and garbage.

In addition, it presents affectations in the hydraulic and sanitary networks. The drainage network, which covers 1,951 kilometers, is insufficient to contain the amount of waste, causing ponding and flooding, as well as subsidence and rupture of these networks. For this reason, it is extremely important to know the infrastructure conditions that our intervention schools have.

Compared to the rest of Mexico City, Iztapalapa presents less favorable socioeconomic indicators. Although it is home to a fifth of the capital’s residents, its participation in the economy is much less. The services sector constitutes the most important component of its GDP, and a significant number of its inhabitants must move outside the demarcation to find work. In general terms, the delegation has a high human development, but there are many contrasts inside. The social inequality of the neighborhoods in the western zone is much lower compared to the popular neighborhoods of the Sierra de Santa Catarina, one of the poorest regions of the Mexican capital.

For this school emergency plan, it will be determined to work in the Sierra de Santa Catarina, specifically in the colonia San Miguel Teotongo, where one of the main activities carried out is the “retail trade, in which close to 1,000 establishments operate, with an estimated employed staff of 1,000 people” (https://www.marketdatamexico.com/es/article/Colonia-San-Miguel-Teotongosecc-La-Cruz-Iztapalapa-Ciudad-Mexico) It is a town that covers an area of 28 hectares. (see figure 4).
Regarding the population, specifically in Colonia San Miguel Teotongo, there are 58,220 people (of which 28,205 are male and 30,015 are female. The median age of men is 25.8 years and the median age of women is 25 years. (see figure 5)

For this reason, the school emergency program will be aimed at primary, secondary and upper secondary schools where the TecNM campus Iztapalapa III will be the one that will direct the project.

Below is the location of the universe (educational institutions) in San Miguel Teotongo, Iztapalapa Mexico City, where the School Emergency Plan will be carried out (see figure 6).

The educational institutions where the intervention will take place will be Primary Education 5 and 6 grade, Secondary Education 2 and 3 grade and Higher Middle Education 1, 3 and 5 semester.

**DIAGNOSIS**

A first diagnosis was made on May 27 of this year at the TecNM Iztapalapa III campus, where knowledge in the areas of Basic Sciences was specifically measured. Said diagnosis was made by teachers from the aforementioned campus. The objective of the diagnosis is to know the deficiencies that the students of said technology present with respect to the Cbas (basic sciences), that is to say; What minimum knowledge must be required to be able to study a degree.

The diagnosis consists of 75 reagents divided as follows: Physics 10 reagents, Integral Calculus 10 reagents, Algebra 10 reagents, Chemistry 10 reagents, Trigonometry 10 reagents, Reading comprehension 15 reagents, Differential Calculus 10 reagents. This questionnaire was applied to 42 people who are profiled to enter a degree obtaining the following results. (see figure 7).

It is important to mention that for this work 15 reagents from the area of reading comprehension will not be taken into account, which is already ruled out in the results obtained.

**ANALYSIS OF RESULTS**

The global results of the diagnosis are represented as follows (see figure 8).

A second diagnosis was made on June 17 of this year at the TecNM campus Iztapalapa III applied to 42 people who are profiled to enter a degree obtaining the following results.

As previously mentioned, it is necessary to make a diagnosis of the educational physical infrastructure, to know the conditions in which the institutions are located and thus know if they have basic services. With regard to the institutions that are within the Colonia de San Miguel Teotongo, in their entirety, they have the basic service infrastructure, highlighting the supply of electricity for lighting and contacts, drinking water, evacuation of water wastewater and its facilities whose operation, both in quantity and quality, is in a general average between 75 and 99% as they are relatively young educational institutions.

According to the needs, they have internet service, but only in a controlled manner for the administration and classrooms defined for
Figure 7 Graph of diagnostic evaluation results
Source: Own elaboration

Figure 8 Diagnosis Chart, Source: Own elaboration
**Statistics**

- **Average**: 28.83 / 65 points
- **Median**: 28/65 points
- **Range**: 21 - 34 points

![Graph of diagnostic evaluation results](image)

Figure 9 Graph of diagnostic evaluation results, Source: Own elaboration
Figure 10 Diagnosis Graph,
Source: Own elaboration

Figure 11  Diagnosis Graph of Basic Services Infrastructure
Source: own elaboration

Figure 12 Students and average EST grade. No.87
Source: the own author
students, they do not have optimal internet infrastructure so that students have tools for their academic development.

Although the grade of the general average of educational institutions does not exceed 8.0 or equivalent, we can mention that Technical Secondary School No. 87 (figure 14) has a general average of 8.0 over its total enrollment of 1,257 students and a average of the last grade groups of 8.1 with a total of 354 students (just 28.16%) for the period January - June 2022, with whom the proposal for remedial classes in the area of basic sciences has been worked hand in hand (mathematics, physics and chemistry).

A second and third stage of diagnostic evaluation was carried out, none of the three underwent a remedial course (propaedeutic type), in total the sample was 22 students.

However, a fourth diagnostic evaluation was carried out on a sample of 84 new students, with the difference that they previously received an intervention from a remedial course (propaedeutic type). After the analysis of the results, an increase in the number of correct answers was observed for the different areas of Basic Sciences. An increase between 4 and 5% of correct responses compared to diagnostic assessments that did not receive an intervention.

Satisfactory data are observed in diagnostic evaluation 4 with the implementation of remedial classes.

Finally, a fifth diagnostic evaluation was carried out, again without remedial intervention, with a sample of 18 people (conditions homologous to diagnostic evaluation 1, 2 and 3).

**SUMMARY OF RESULTS**

Table 1 shows a summary of the results of the diagnostic evaluations without intervention and percentages of correct answers. Results of students with intervention (after remedial classes) are also shown.

**INTERVENTION PLAN**

Below is the intervention plan for remedial classes

**CONCEPTUAL FRAMEWORK**

Aligning ourselves with the government of the current president Andrés Manuel López Obrador in his text “Towards a Moral Economy” published in 2019, in one of its sections he mentions the right to education, where the government promised to improve the material conditions of schools of the country, to guarantee the access of all young people to quality education; however, this was not due to the pandemic that was generated in 2020. However, we as an educational institution and concerned about education are generating this document.

Now, when talking about educational quality according to the National Institute for the Evaluation of Education in Mexico, it mentions that “The quality of the educational system is the quality that results from the integration of the dimensions of relevance, relevance, internal effectiveness, external effectiveness, impact, sufficiency, efficiency and equity.” from (https://historico.mejoredu.gob.mx/directrices-para-meznorar/que-es-la-calidad-educativa/).

Casassús (1995), who includes in the conceptualization three main pillars: inputs, processes and results. According to the author, quality is intrinsically linked to the issue of equity and its basic components include: quality in design, quality in processes and quality of results.

For the Organization of Ibero-American States for Education, Science and Culture (OEI), cited by Vaillant and Rodríguez (S/A), the main dimensions of the quality of an educational system are the following:

[...] efficiency, understood as the results
Figure 13. Result of diagnostic evaluation 2 and 3.
Source: The own author.

Figure 14. Diagnostic evaluation result 4.
Fountain: own elaboration.

Figura 15. Resultado de evaluación diagnóstica 5.
Fuente: elaboración propia.
### Table 1. Summary of results.

<table>
<thead>
<tr>
<th>Diagnostic evaluation</th>
<th>Number of students</th>
<th>% of correct answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>42</td>
<td>19.52</td>
</tr>
<tr>
<td>2 and 3</td>
<td>22</td>
<td>17.95</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>18.33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>82</td>
<td><strong>18.60 average responses</strong></td>
</tr>
</tbody>
</table>

Diagnostic evaluation with intervention and percentage of correct answers.

| 4                     | 84                 | 23.06 average correct answers. |

### Table 3. Activities and responsibilities of the action plan.

<table>
<thead>
<tr>
<th>Number</th>
<th>Activity</th>
<th>Responsible</th>
<th>Tentative date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infrastructure diagnosis</td>
<td>Cbas</td>
<td>June and July</td>
</tr>
<tr>
<td>2</td>
<td>Institutional diagnosis</td>
<td>DDA</td>
<td>May</td>
</tr>
<tr>
<td>3</td>
<td>Universe (schools)</td>
<td>Cbas DDA</td>
<td>June</td>
</tr>
<tr>
<td>4</td>
<td>Sensibilization parents of family</td>
<td>institutions ed. Basic and upper secondary</td>
<td>June and July</td>
</tr>
<tr>
<td>5</td>
<td>Alliance with Faculty of Sciences</td>
<td>Cbas</td>
<td>June</td>
</tr>
<tr>
<td>6</td>
<td>Alliance with UPN</td>
<td>DDA</td>
<td>June</td>
</tr>
<tr>
<td>7</td>
<td>Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Didactic planning development</td>
<td>DDA and UPN</td>
<td>July</td>
</tr>
<tr>
<td>9</td>
<td>Evaluation of first two-month results</td>
<td>DDA, Cbas and Senior Management</td>
<td>November</td>
</tr>
<tr>
<td>10</td>
<td>Evaluation of results</td>
<td>institutions ed. Basic and upper secondary</td>
<td>December and May</td>
</tr>
<tr>
<td>11</td>
<td>Analysis of results</td>
<td>DDA and Cbas</td>
<td>January and May</td>
</tr>
<tr>
<td>12</td>
<td>Decision making</td>
<td>Senior management ITI3</td>
<td>January and June</td>
</tr>
</tbody>
</table>

Source: own elaboration
obtained in relation to the resources used in education together with the processes, organization and operation of schools; effectiveness, which assesses the achievement of the objectives of the system as a whole; equity, a fundamental dimension of the quality of education that emphasizes the achievement of good results for all students, and the impact of the results achieved in the medium and long term (OEI, 2010, p. 106).

However, the theory of the teaching-learning process was used, which is the educational process that organizes and structures teaching, seeking direct interaction between teachers and students guaranteed by the teacher through the objectives set by the methods, means, forms and evaluation.

For this work, one of the teaching-learning process methods proposed by Hernández (2022) was used: Inverted Learning, since it has the purpose of inverting the moments and roles of traditional teaching, where the lecture usually taught by the inverted teacher can be attended in extra-class by the student through multimedia tools and interactive methods of collaborative work, problem-based learning and project development.

Finally, the students providing social service from the Iztapalapa III Institute of Technology will be trained so that they can teach remedial courses at the upper secondary and secondary level, through their experience so that the constructivist model proposed by Piaget in the 19th century is applied. xx.

He understands learning as a reorganization of existing cognitive structures at each moment. That is to say, the changes in our knowledge, seen as the process where new knowledge is incorporated from experience, are explained by a recombination that acts on the mental schemes that we have at hand.

For Piaget, intellectual development is a process of restructuring knowledge, which begins with an external change, creating a conflict or imbalance in the person, which modifies the existing structure, developing new ideas or schemes, as the human develops.

Saldarriaga et al. (2016) mentions that constructivism conceives knowledge as a subject’s own construction that is produced every day as a result of the interaction of cognitive and social factors, this process is carried out permanently and in any environment in which the subject interacts.

This paradigm conceives of the human being as a self-managing entity that is capable of processing the information obtained from the environment, interpreting it according to what it already knows, turning it into a part of the subject, allowing it to carry out new mental constructions within the framework of other contexts, that is, that the student builds his own knowledge. The peer-based teaching proposed by Vigotzky was also used, since it was verified that the language and the interaction in the students of almost the same ages had greater meaning with the boys, it is not the same linguistic jargon that an older person has, advanced than a boy who walks between 20 years of age.

**INTERVENTION**

A first intervention was carried out that we named pilot test, which took place in the period of January - June 2022 where the students who perform social service at the Technological Institute of Iztapalapa III applied the remedial classes at the School Technical High School 87 Rodolfo Hernández Corso serving 36 groups of the morning shift attended by 10 technology students who are social service providers. Likewise, 21 groups of the evening shift were attended, which were attended by 5 students who provided social services.
The academic results of the intervention, when we talk about the intervention we refer to the application of the remedial classes are very evident since the Secondary School had an average grade of 60 out of 100 before the application of the remedial courses, cataloging the secondary school as one of the worst schools in the San Miguel Teotongo area. After the remedial classes of Physics, Chemistry and Mathematics that were given in the E-J 2022 period, the secondary school raised its average grade to 81 out of 100, positioning the secondary school in the fifth best in the San Miguel Teotongo area, which is our object of study. (see figure 17).

Once the pilot test was carried out at the secondary level, the Center for Industrial Technological Studies and Services (CETIS) No. 42 “Ignacio López Rayon” joined the project; upper secondary school where several meetings were held with the directors and staff leading the project in order to meet the needs of the institution. (see figure 18).

In September 2022, the start of the School Emergency Plan was carried out again with the Technical Secondary School 87 and the upper secondary school CETIS 42 for Secondary, 57 groups were addressed (1st, 2nd and 3rd grade in both shifts for mathematics, physics and chemistry) with 27 students from the TecNM Campus Iztapalapa III who performed the
intervention in both 50-min shifts; for CETIS 42, only the intervention for the first grade morning shift was addressed for 14 groups (mathematics, physics and chemistry) with 10 social service students and volunteers from the last semesters (see figure 19).

Likewise, with the support of the International Project of Research and Comparative Educational Intervention: Mexico-Spain-Argentina (MexEspArg), a pedagogical intervention is being given to the students who provide social services who are supporting the School Emergency Plan, so that they have knowledge basics of didactics and pedagogy in order to give quality remedial classes. Finally, the students who are supporting the teaching of remedial classes are reinforcing their knowledge in the areas of Basic Sciences, which is essential for Engineering.

![Figure 19. Remedial classes Source: own elaboration](image)

CONCLUSIONS

The results obtained were satisfactory when increasing the level of academic performance, presented graphically, when performing an intervention of remedial classes prior to the diagnostic evaluation 4 with an increase close to 4.5%, compared with the 18.60% average of the groups. not intervened to 23.06% of the intervened group.

It is expected to obtain better results in the follow-up diagnoses and departmental evaluations of the secondary and higher education institutions themselves, which will be intervened among peers, with the teaching of remedial classes by students of the last semesters and social service of the National Technological Campus of Mexico Iztapalapa III.

Being the Escuela Secundaria Técnica Nº 87 and the CETIS 42, the pioneer educational institutions that will be intervened for the period August-December 2022 with 57 groups (mathematics, physics and chemistry) and 14 groups (mathematics and chemistry), respectively.

For the period January - June 2023, in addition, a relative increase of 12% was obtained in the general averages of the students of the three majors of the TecNM Campus Iztapalapa III who participated in the School Emergency Plan, improving their own academic performance.

Additionally, parents have benefited financially by not having to resort to private remedial classes, since the School Emergency Plan has generated the intellectual strengthening of their children in the area of mathematics, physics and chemistry who study high school. or high school by increasing its GPA and as is the case of Escuela Secundaria Técnica 87 with the improvement of its approval rates in departmental exams, becoming one of the five best basic level schools in Mexico City.
It is clear that, if the School Emergency Plan is committed to increasing the academic level in the area of basic sciences, it also has an approach with responsibility and social value, meeting objective four of the United Nations Organization (UN) to guarantee quality education by promoting learning for all with educational democratization.

Finally, it has been achieved that university students have that sense of belonging and social responsibility in their community, making the young people more sensitive, more cooperative and participatory, whose purpose is to destigmatize the students according to their origin or socioeconomic level so that the young people of the future make a better society.

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