Utilizing Information Mobile Technology to Prepare the Nation's Responders for a Natural Disaster Events: Training chapter

Jalil Fallad[1], Eva Judith Hueso[1], Blanca Rafaela Silva[2]
[1]University of Guadalajara
[2]Universidad Autónoma Metropolitana
Email: jfallad@cucsur.udg.mx, jhueso@cucsur.udg.mx, rbsl@correo.azc.uam.mx

Abstract: Mexico is a country with enormous amount of volcanoes due to a very active pacific plaque that makes a real possibility of nationwide for Earthquake; Volcano and Hurricane events became significant. Mexican Government Agencies such as Protection Civil (Civil Protection) and CONAGUA (National Council of Water), has determined that training emergency response teams will be needed to serve the Mexican civil population in such kind of events. There is an urgent need to identify those that currently have the proper background and are able to can undertake specialized training to assist provide support if such an event should occur. In order to put a program together quickly, the existing infrastructure must be utilized. Once a foundation in a single location has been established, this training program can be replicated to others locations. This is a huge task that must reach every corner of the country regardless of local resources. The best tools available for this job are those are the new Information Technologies and the emerging mobile technology along with the new social network culture whereas every day at every time, regularly people might be connected through their desktops, laptops, cellphones or tablets and participate on their own social networks.
Keywords: natural disasters, instructional technology, mobile technology, social networks.

I. Description of Model

This paper propose a model that might be used in order to train the vast number and variety of Emergency Response Personnel (ERP) needed in the event of such as Earthquake, Volcano eruption or a hurricane events including flooding and wild fires.

In order to conduct this task, the Mexican territory should first be divided into six regions: Northeast, Southeast, Southwest, Northwest, Central and South. According to the Mexican Civil Protection Agency in each of these regions already contains readiness level 1 disaster' medical assistance teams directed by the Secretary of Health (SH) and Mexican Army Natural Disaster Program (DNIII Program) under an umbrella program known as the National Disaster Prevention System (NDMS). These regions will be created as indicated by the following map. (See Figure 1).

Figure 1. Location of 6 different Mexican regions and its the states that are part for each region.

Universities from each state (public and private) might be the backbone of the training delivery. These educational institutions will initiate the training program and establish the required training facilities. Following this initial phase these institutions will support other educational institutions and government agencies to ensure the integrity of the training process. Site selection is based on the combination of existing medical capabilities, communications infrastructure and emergency medical personnel such as the National Medical Response Teams (NMRT) for natural disasters.

These universities must be in close proximity to Level 1 medical response teams and can utilize Internet 2, the fastest and most reliable Ethernet connection.

Each institution also has the learning technology and education departments necessary to assist in coordinating such a large project. For certain aspects of the data transfer secure satellite links will be used to ensure the system can not be compromised.

By identifying and using established facilities rather than building from the ground up there should be a significant savings in costs and time to implement this project. The initial phase will align at least five hospitals and one university in each region with one hospital designated as having the lead role. The universities will manage classes offered over the Internet and provide the technical and facilitation expertise for their region. Each university will have five *Supporting Delivery Centers* (SDC) for a total of thirty centers across the country.

In the second phase, the main public university in each state of the country will replicate the same training process in their state and local government agencies. Public facilities such as libraries and schools may provide the necessary computer pods and personnel as the training cycle progresses out from the initial core participants. Every effort will be made to bring the instruction process to the participants so they can continue providing valuable services to their communities (See Table 1. and Figure 2.)

Table 1. Initial Regional Universities and Hospitals

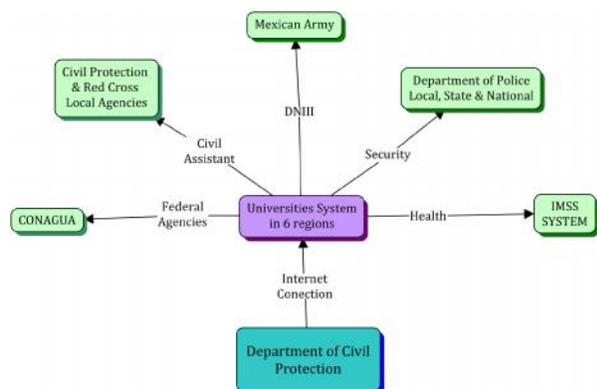| Region	Lead University	Lead Hospital
Northeast	University of Nuevo Leon	IMSS
Southeast	Autonomous University of Yucatan	IMSS
West	University of Guadalajara	IMSS
Northwest	Autonomous University of Sonora	IMSS
Central	National Autonomous University of Mexico	IMSS
South	Autonomous University of Oaxaca	IMSS

Figure 2. Phase One Physical Structure.

II. Strategy Overview

The basic strategy for the training process is using replication. Each Supporting Delivery Center (SDC) in each state will study the initial set of courses, once they finish the full set of courses they will teach them to another six delivery centers. This will be replicated until the training process is completed for all the SDCs. It is important to note the universities involved in this project are the main coordinators but it is the government agencies that will be the facilitators. This training process is designed such that past trainees can carry out the training process while not taking away from their jobs and duties. (See Figure 3.)
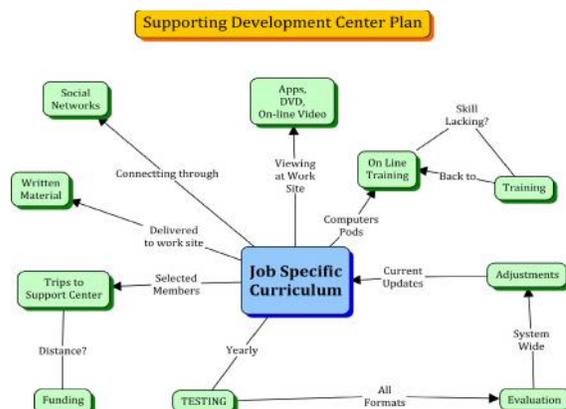

Figure 3. Supporting Development Center Plan

The learning material will be delivered by Centra and/or Scopia Software using a virtual classroom environment since these software are capable of delivering diverse materials to large numbers of people using multiple tools such as audio, video, simulation software and e-materials among others. Also, social network communication technology such as Hangouts and WhatsApp can be used with not restriction for new or other existing communication Apps.

We calculate that in 6 months all of the required training can be accomplished. This is assuming that three months of training, on average, are enough to cover all participant's skills acquisition needs.

III. Mobile Information and Social Network Technology Considerations

Transactional Distance

In order to avoid a "communications gap" [1] and facilitate the switch from traditional to virtual mode, some special activities will be required before the core training can be carried out. These activities will be comprised of a short course where participants learn virtual mode training principles and how to use specific software, Apps and Internet tools. Separate

lengthier activities will need to be performed to convey the course's core content.

In order to generate a feeling of community, or belonging, various activities will be required of the participants during the early stages of training. In an effort to reduce the transactional distance [2] and develop the critical volume of dialog necessary for a successful program, trainees will have to participate a minimum amount yet have some degree of freedom to determine the pace and implementation of the course.

Interaction

While learner interaction with traditional methods of teaching has been refined over the ages the distance learner, being relatively new, is not as well known (Anderson, 2003). Each of the learning SDCs will construct their own strategies for interaction and learning based on regional and local

the training will require the participants to take advantage of recent developments in technology it will be important for them to understand the student-technology interaction. This critical interface as reported by Gunawardena & McIsaac [3] will be nurtured and taken into consideration during the first few meetings. These early sessions will be of a face-to-face nature with qualified training personnel provided by the regional university and replicated by the Universities in each state.

Each participant will have to test out of this session. Those that fail to show adequate proficiency will be allowed to review the material on a self-study basis and be retested. If they fail to pass the test a second time they will have to wait for another training cycle. (See Figure 4.)

These first two meetings in addition to the three meetings during the course, as already mentioned,
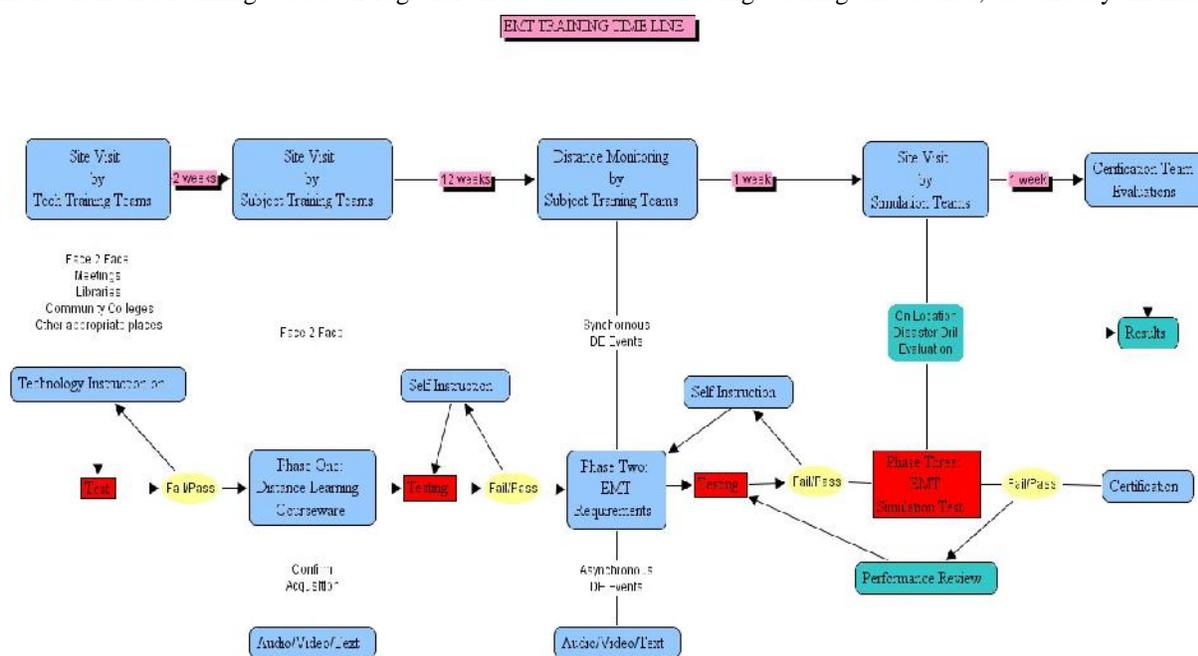
Figure 4. EMT Training Time Line

cultures thus allowing for a variation in beliefs and values. Opportunities for student-teacher interaction, student-student interaction as well as student-content, as defined by Moore [2], should be identified and taken advantage of using different tools provided by the technology. More feedback activities can be created using Virtual forums and Networking sessions along with Social Network Software such as Facebook and others Content Media Service (CMS) Apps. The schedule for these sessions can be decided by the local SDCs, giving them some autonomy. The orientation to the program should take place during the first and second weeks of the sixteen-week course and will provide instruction for the use of technology and any other matters that are pertinent. Since most of

will leave eleven weeks for distance learning course material. The participants will have to show their ability to communicate effectively using the technology before they will be allowed to continue with the course.

Social Presence

There will be several, at the will of each SDC, face to face meetings for discussion and demonstration of triage techniques and other medical training matters for "hands-on" field practice and drill and practice tasks. There should also be a specific time each week to discuss questions with an instructor as well as asynchronous communication available for

questions and problems that come up during the week.

In order to ensure that the learner has a satisfying experience a certain degree of intimacy must be generated. Learner satisfaction can be traced to interactivity and collaboration between learner and instructor, learner and learner and also the quality of reflection required of the learner [4]. Activities will be designed into the program to monitor the learner's level of satisfaction as the program progresses.

Diverse Learner

For the EMT module the learners will consist of emergency medical personnel, (paramedics and military medics) supervised by doctors and nurses as well civil protection and firefighters. They live in rural as well as urban areas, are 24 to 65 years of age and are roughly evenly split between males and females. They range in experience from two years to thirty years. The less experienced will be assigned to the more experienced personnel for mentoring and supervision. The knowledge each participant brings into the training sessions about the subject matter will vary greatly. Modules will be constructed so that individuals can jump to the appropriate entry point so more skilled individuals will not feel their time is being wasted. A "testing out" process will be available online for this purpose. (See Figure 5.)

Figure 5. Training Overview

Accommodating Individual learner needs

Delivery of course instructions will be through asynchronous communication to allow for various schedules and learning speeds. There will be instruction offered in Spanish and English and any other languages needed. Cultural differences must also be considered especially with language and values and communication styles where appropriate. Learning styles should be considered when developing curricula to accommodate as many styles as possible. There is several factors when designing a DE course that need to be considered [5] and these

are: structure, process, mediation, community building and institutional support

Learner Support

Collaborative activities: The EMTs will be given a variety of scenarios for each of the different types of disaster events. They will need to learn how to care for each of the types of injuries, what to provide for the injured, which injuries should be addressed first and where to take the patients. They must provide quick decisions concerning transport of the injured to the appropriate facility. Field practice and training sessions will require some face to face meetings at regional hospitals to get the feel for a real emergency situation.

The rationale already provided for the selection of technology is based on facilitation of communication as well as the teaching and learning process of the individuals involved. The need to communicate with thousands of EMT´s across the country makes the use of Internet 2 communication and web technology by Centra software or other Software that be available in universities in each state in order to be best way to reach and teach the learning population. The use of streaming audio and video for teleconferences as well as stand alone videotapes or CD's would also be helpful for those lacking the capability to "attend" a conference at a particular time in asynchronous mode. Stand-alone instructional aids can also provide more detail and allow for repeated viewing by the participants.

The role of the instructor is to facilitate the learning process as well as provide information concerning how to respond to a wide range of threats – including collapsing buildings with great people concentration such as school, apartment buildings, churches, local markets, etc. Other events included are treatment of injuries and consequences of those injuries to people. The instructors will be able to meet with the medical experts at the universities and hospitals to enrich their understanding of the program.

A curriculum will be developed from a central committee so that everyone is presented with the same information. Any changes that need to be made will pass through this central committee in order to keep the many different training centers in synch with each other. The instructor will also use assessment instruments to assess the learning of the participants that are developed by a central curriculum committee. Overall, the instructor will guide the learners in their pursuit of knowledge by providing opportunities for collaborative and individual learning through guided readings and discussion as well as individual and small group projects designed to promote student-centered learning and problem-based learning

thorough scenarios that pose various problems throughout the course.

An electronic version of a complete set of supporting material will be posted in an Electronic Library available in the training Website. With this action, we can guarantee that all participants will be able to reach them in a synchronous as well as asynchronous mode in a reliable and effective way.

Strategy of delivery

Since this project is a high priority, the funds are should be expected to be made available by congress and government agencies such as Natural Disaster III (DNIII). As with all government programs this one will be under review on a yearly basis and must be shown to be cost effective. There is always the possibility that another project or need will come along that competes for funding so it is imperative that costs be analyzed and justified at all times. To maximize the return on training funds we propose a chain reaction strategy, which means that the successful trainees will become the trainers. The learning and supporting material will be delivered using different media such as printed material, DVD, Mobile Apps and CBL software (tutorial and simulators). The delivery of CBL instruction will be made primarily by e-mail using Internet accessible modes of instruction including discussion rooms and individual question and answer sessions in real time with instructors.

Instructor support

The medical doctors and other health experts in the field emergency events will collaborate with each regional university in order to provide the necessary information concerning the effects and aftermath of those events. All information will be shared in the form of parallel courses that will be required for the EMTs. Emergency medical technicians would be the recipients of this training program because they would be on the "front lines" of any emergency and would be required to make correct decisions very quickly.

Training will take place at each lead regional university and lead regional hospital with triage and mock medical emergencies taking place simultaneously as if the situation was really happening. Doctors and senior nursing staff will supervise these exercises.

IV. Course Design

The design of the course is composed of four modules to respond to each type of emergency situation, i.e., Public Health, Public Safety, Public high amount of people Evacuation strategy and, Search and Rescue situations. Each module is

independent from one another and thus can stand-alone, however the intent is for the modules to be consistent with each other so as not to have any conflicts in instruction or procedural application of training. Each module will include content about the subject matter as well as strategies about organizational reactions for an event. While each module will have different content they will each revolve around testing. Each SDC will be able to choose any one module to work with and when that module has completed the SDC will be able to choose another module. This will accommodate the local needs for each SDC in case it is determined that one threat is more likely to occur than another. When a SDC has completed the entire set of instruction (all modules) and successfully passed all exams then that SDC will be able to replicate the course by choosing another 5 sites that will contains five SDCs.

While there is not total agreement on what an ideal online class consists of there are some guidelines [6] that will be followed. Every effort will be made to ensure a high quality of material. Online text will be of original electronic documents, no copies, and critical text will all be available in hard copy. A course outline and study guide will help the student stay on track and allow them to manage their progress. Each module will have a clearly defined assignment with timely feedback from the instructor. There will be several avenues for communications both synchronous and asynchronous. (See Figure 6.)
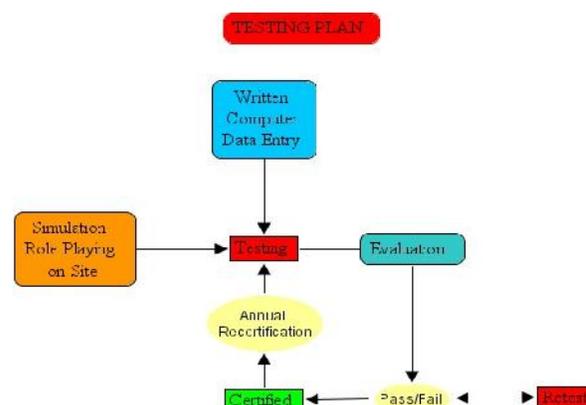

Figure 6. Testing Plan

Description of the module

Each module will comprise a portfolio including activities to be done in the local site, SDC, as well as in Internet.

Participant's characteristics

They primarily work in the medical health fields including; Medical Doctors, military medical practitioners, nurses, and EMTs, as well as security sectors such as law enforcement and firefighters. The characteristics of the participants should include:

1) A sense of responsibility, discipline and confidence.
2) Able to handle critical situations on their own merit and by teamwork.
3) Ability to work in an interdisciplinary environment.

About participant communities

The participants will be prepared to:

1) Carry out critical duties based on the knowledge acquired from the training program.
2) Be able to propose independent logical solutions for any specific problem.
3) Be able to transfer this knowledge (from #2) to increase the training level of the communities.

Instructional Goal for Project

All participants that are attending this set of courses will be able to efficiently and effectively use the information to provide emergency medical and technical assistance in the event that any of the aforementioned disasters take place to benefit their community and country. In an effort to make the virtual training as real as possible [7] there will be simulations incorporated into the lessons. To enhance the realism, audio and video will be used to simulate putting the student into what would be a life-threatening situation in the real world.

Class restrictions

This set of courses may involve people that have never taken this style of DE for training before. For effective learning to take place the audience cannot be over of 200 people for each site. Ideally 80 participants for each SDC with two groups of 40 participants would be the maximum size for a single site. Our biggest concern is that the coordinator for each SDC be able to ensure their participants get quality feedback. To accommodate this requirement, class size limits are lower than the technology will allow. Also to guarantee adequate lab time (WEB and Tutorial) for all participants in each site group size will be restricted. The Coordinators for each SDC will also be medical doctors as well-qualified nurses, they will work close of them.

Costs of the Project

Costs of the project will be calculated by the following formula [8]:

$$\$ = \frac{t}{(h)(n)}$$

Where:

$\$$ = the cost per student contact hour

t = the total costs of material (text, program, etc.), including overhead, production, and delivery

h = the average number of hours spent studying those materials per student

n = the number of participants studying the material over the life of the course

Learning Strategies

The hoped for outcome of this training program is that the participants assimilate as much of the new information as is possible. Each student will need to "construct meaning" [9] for themselves. The pragmatic pedagogy of John Dewey insisted that in order to learn one had to experience [10] and then had to make that experience their own.

For this set of courses we have chosen two kinds of learning strategies [11]; (1) Collaborative Problem Solving which includes learning strategies such as; *Pooled Data Analysis, Parallel Problem-Solving, Simulations* and *Social Plans* and, (2) Information Sharing Strategy including *Information Exchange, Keypals, Sequential Creation* and *Global Classrooms*. The purpose for using these strategies will be for the participants to gather information from real life activities about the subject matter, process the data, and develop appropriate organizational reactions.

Collaborative Problem Solving

Pooled Data Analysis. Participants will respond to a survey about their knowledge concerning the appropriate response to an attack using any or all of the weapons already described. The participants will share their own information with other sites and compare it.

Parallel problem solving. A problem will be post for a Site and their own Cells will propose an agreed upon solution for the particular subject matter. This activity will hopefully challenge the individuals and require "*Megacognitive Awareness*" [12] when crafting a solution.

Simulations. Local, state, national and international events will be simulated and the site's Cells will provide their own insights about how best to deal with those emergency situations.

Social Plans. Each Site will carry out a set of social activities, i.e., town hall meetings, surveys and open forums in order to observe social reactions about training activities or the emergency situations should they occur.

Information Sharing Strategy

Information Exchange. All participants will be involve in exchanging information about their findings and resulting insights about the subject matter.

Keypals. Participants from a SDC will share their strength with other members of their Site.

Sequential Creation. Participants will create their own meaning in a collaborative way about the subject matter.

Global Classrooms. The participants of a single site will work as one in order to design and create their own strategies about subject matter.

Table 2**.** Resource Analysis.

ITEM	DESIGN	DELIVERY	
		ORIGINATION	REMOTE
PERSONNEL Instructional Designer Programmer Graphics Designer Facilitator	YES YES YES YES	YES YES	YES YES
CAPITAL OUTLAY Video Studio Computer stations Audio-Video Rooms Apps	YES YES YES YES	YES YES YES YES	YES YES YES YES
MATERIAL Hard-copy materials CENTRA Software Design courses Internet connections and support	YES YES YES	YES YES YES	YES YES YES
FACILITIES Rooms conditioned for educational activities in each SDC	YES	YES	YES

V. Conclusions

We are proposing a model solution for needed training based on a Distance Education approach. Our proposal must fulfill all training needs that are required. The characteristics of our proposal must also match requirements listed in the assignment paper. We are considering that our proposal has some advantages as well as some disadvantages and we have decided to list the most important of them in order to balance our proposal. We hope this explains how a training project could be implement and how this could improve the present proposal.

Advantages of the project

Since this topic is a nationwide public safety concern and therefore a national security concern, we are assuming that trainees will be highly motivated about this program. The non-linear design in the set of courses and the chain reaction strategy for replicating the training process are the core of this project. With the availability of the new Internet, and state of the art technology, such as Centra Software, we can make this project a reliable and effective solution for massive training. Another advantage is most participants will be people who have an above average educational level. This characteristic could facilitate the training process because participants are already dealing with life long training processes, due to the nature of their jobs, which requires them to keep their skills current.

Disadvantages of the project

There are some concerns for the delivery and implementation of this project. The following are the most important detected disadvantages. (1) The size and (2) diversity of the target participant population to be trained are our biggest concerns in terms of training effectiveness (3) The possible lack of participant's experience with DE technologies (4) differences related to work skills and position and finally (5) the lack of project assessment tools could be a constraint.

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Author's description
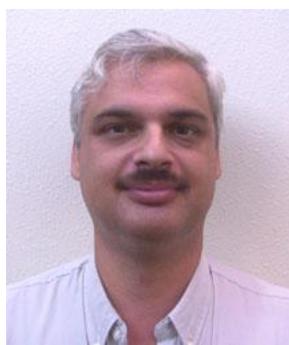
Jalil Fallad, holds a Bachelor degree on Biology by University of Guadalajara, Mexico. He also holds a Master in Science in Instructional Technology by University of Houston-Clear Lake. And he holds an Organizational Learning and Instructional Technology Ph. D., by The University of New Mexico. He has 21 years of teaching experience in higher education. Finally, he has a number of domestic and international publications including a book and two book chapters. Also he has presentations on international academic meetings. Currently, he is Senior Professor at the University of Guadalajara, campus Costa Sur.

Eva Judith Hueso holds a Bachelor degree on Biology by University of Guadalajara, Mexico. A Master in Science in Animal Sciences by University of Colima-Colima. She holds a Ph. D. on Biotechnology Sciences-Biological Control by University of Colima; campus Tecoman. She has 21 years of teaching experience in higher education. She has a number of domestic and international publications including a book and two book chapters and also. Also he has presentations on international academic meetings. Currently, she is Senior Professor at the University of Guadalajara, campus Costa Sur.

Rafaela Blanca Silva is **a** Professor with 22 years of experience in teaching. She holds a degree in Electronic Engineering and a Masters in Science on Computer field, both in the Metropolitan Autonomous University. She is currently a doctoral candidate in the UDG Learning Environment Systems doctoral program.

She has won the Award for Teaching in 1998 and 2010 issued by the Metropolitan Autonomous University-Azcapotzalco.

Her professional experience includes research, teaching and management as Head of Systems Department Division for Basic Sciences and Engineering at Metropolitan Autonomous University-Azcapotzalco October.

Among his most recent research published 15 articles in national and international congresses, as well as 8 publications in indexed journals related to education issues is included.