CiudadelaSIM Urban Modeling Framework and Human-Centered Design (HCD) Learning based Approaches: A pedestrian mobility case study in Monterrey, Mexico

Emmanuel Lopez-Neri[1], Javier Alonso Gomez-Davila[2], Miriam Carlos-Mancilla[1]

[1]Centro de Investigación, Innovación y Desarrollo Tecnológico CIIDETEC-UVM, Universidad del Valle de Mexico, Tlaquepaque, México.
[2]Centro de Investigación, Innovación y Desarrollo Tecnológico CIIDETEC-UVM, Universidad del Valle de Mexico, Monterrey, México
{emmanuel.lopezne, javier.gomez, miriam.carlos}@uvmnet.edu

Abstract. In this document, a pedestrian mobility project case study is presented. The proposal was developed with design and architecture students from the Universidad del Valle de México, in the city of Monterrey, Mexico, under two main approaches: 1. To use HCD (Human Centered Design) as a learning methodology to solve social problems, and 2. To involve technology as a complementary strategy to strengthen the students' learning process, by using an urban modeling tool called CiudadelaSIM. Both approaches have the final goal of developing in the students, skills, and competencies such as team-work, research, or social empathy, and the use of digital tools, which are being increasingly requested to the graduates of design and architecture programs, and that are difficultly obtained in a traditional lecturer-centered learning approach. The results of the project were successful, both, because of the impact it generated in the community, and because of the learning and experiences obtained by the students, thus, proving that it is necessary to take risks and look for alternative and innovative teaching schemes for the new generations.

Keywords: Urban simulation; human-centered design pedagogies; pedestrian mobility.

1 Introduction

One of the main functions of universities and higher education institutions is to generate professionals committed to the development of their community and with the necessary skills to primarily support the increase and strengthening of the region they live in.

According to ANUIES data, there is currently an enrollment of more than 150,000 students in the area of Architecture and Design in Mexico [1], graduating annually around 87,000 of them, since the rate of completion of higher education is 57.4% [2]. Despite these numbers, the ensuring that all these graduates meet the training needs required by the companies, or the community's necessities, represents a special challenge for Mexico, as it will require efforts in the same size to achieve it.

The main consequence of not having competent graduates locally or in the region, is capital importation, with its corresponding impact on the unemployment rate of the country; this being the answer to the paradox shown in several publications that show a contradiction between the jobs increase and the high unemployment rate for this same area. In Mexico, according to the national survey of occupation and employment, 40.6% of the unemployed people have a university degree, and of those who manage to work (approximately 60% of graduates) six out of ten, do so in related activities with their studies [3], [4].

The lack of technical skills, experience and in particular specific qualifications required by the industry, are the main causes of companies' dissatisfaction with the recent graduates [5], and also, a matter of quality control and the lack of connection between the teaching strategy and the evolution of our environment and society.

Schools worldwide continue to use the traditional teacher-versus-group teaching method, despite the existence of new teaching methodologies that allow students to integrate into real applications through approaches such as Project-Based Learning [6], [7] and multiple efforts to internationalize their programs curricula [8]. It is required much more comprehensive educational proposals that promote the awareness of sociocultural and environmental issues that currently occur in our communities [9].

Specifically speaking of disciplines such as Architecture and Design [10], [11] a problem has been observed in most architecture schools, at least, during the last fifty years: that many of them (administratively and academically) are skeptical and very often, resistant to the new, the unknown, the changing, when it comes to introducing new teaching methods, new technologies and design and construction processes, provoking a controversial criticism against the new.

The above, discourages students from researching and understanding their motivations, priorities, and values; and that leads them to pose questions such as: Do architectural education institutions appropriately involve students in the notion of innovation as a condition of architecture? Are they really motivated to create innovative architecture? Are well-developed teaching methods and educational strategies applied to ensure that their graduates have the ability to think and act innovatively?

Therefore, this paper presents a non-traditional teaching/learning proposal, based on two approaches: 1. The use of a methodology for solving real problems and needs, known as (Human Centered Design), which is based on developing empathy with the people/community for which the design is being made, generating ideas, building prototypes, and finally putting them into operation and testing their real impact, and, 2. The inclusion of a digital urban modeling tool known as CiudadelaSIM [12] that allows integrating different behaviors for new urban elements, and evaluating their impact before their implementation.

Likewise, qualitative research is presented at the end of the study with the same students participating in the project, to obtain information about their experience and learning process when doing the activity, and to check if the proposed strategy was successful. This paper is divided into different sections. Section 2 presents some related works; Section 3 describes the use of CiudadelaSIM as a framework modelling tool for urban elements; Section 4 presents a case of study; Section 5 presents results analysis; in Section 6 a discussion is given and finally; Section 7 some conclusions and future work are discussed.

2 Related Works

Recent works describe that design and architecture students are starting to demand more from their education, they not only want to learn design software skills, but they also want to make positive impacts and changes in their communities through social projects and innovations.

One example of this kind of proposals is presented by Emans and Hempel [13], design professors in Zayed University, who state that the concept of Social Design, is a fundamental strategy to improve social, humanitarian, or environmental well-being, and they mention that designers play a key role in the configuration of tomorrow's society. They present a case of study, examined through the lens and methodologies of social design practice, design thinking, and Human-centered design, and they mention that students strengthened and broadened different skills such as the ability to communicate with team members from different backgrounds, humility, and respect for differing viewpoints, cultural appropriateness, and understanding of global issues, problem-solving abilities, management, leadership, and team-work. Students also expressed the urgency for social design initiatives to focus on community impact rather than awareness alone.

Moreover, Oehlberg, Leighton, Agogino, and Hartmann [14], engineering professors at University of California, Berkeley, have acknowledged that one of the many challenges of their students, is that, once they graduate, they must be able to work effectively in multidisciplinary teams. The authors present two successful case studies, in which, students mention that they have acquired a broader appreciation of others' viewpoints, new perspectives about what design was, or skills like sketching, prototyping, and brainstorming, that have allowed them to extend their expertise. The university is making some efforts to create multidisciplinary programs that integrate traditionally-distant areas such as engineering and business, with the humanities and social sciences, in order to achieve innovation education by teaching Human-centered design principles and philosophy, and the role of this approach in the development of products, buildings, software, and services.

The "*design education must respond to the needs of students gravitating to the growing field of social design with an appropriate and timely curriculum.* Even though, universities across the Western world, have recognized this situation, and have improved their curriculum and pedagogy strategies; there are other countries where that educational innovation is still in slow progress or has not started yet.

On the other hand, there are more and better tools every day. The objective of these recent tools is to strengthen the work to obtain clear and precise results meanwhile students are involved. The smart cities approach is one opportunity area in schools and industry, this topic detected the integration of external factors, physical and electrical devices, people and systems. For instance, in [15], [16], [17] mathematical models and the integration of architectures are presented, regardless the methodologies for the design and modeling of physical and cybernetic systems are developed separately.

There exist important applications that promote the evaluation of intelligent urban traffic (ITS) strategies. Such as iTetris [18] which is a modular simulation platform. The authors combine an urban traffic simulator SUMO (Simulation of Urban Mobility) and the Network Simulator version 3 (NS-3) to validate, monitoring

applications of carbon dioxide (CO_2) emissions, and traffic efficiency, using the protocol TCP/IP communication.

Another proposed tool is called Vehicular Network Simulation (VEINS) [27]. VEINS is an open source framework based on two models SUMO and OMNeT++, that allows the communication between vehicles through the TCP/IP protocol.

Therefore, the existent approaches are not enough to allow the integration of ITS strategies and generically enable the combination of one or more components in later stages. In this proposal, we integrate the social and design areas, with one of the more relevant current topics: urban traffic explained in the following section.

3 CiudadelaSIM Framework for capture of urban elements

The strategy presented in this paper proposes the integration of CiudadelaSIM as a simulation tool where students can evaluate their urban design proposals prior to the implementation phase of the methodology that will be presented later (HCD). CiudadelaSIM [12] is a development (framework) designed for microscopic simulation of urban traffic systems based on multi-agent and event-oriented approaches.

This simulator uses the urban description language called UTYiL, based on the XML (Markup Language), which has a structure that allows it to represent the topological, geographic and transmit data of a traffic system and, above all, has structures and information primitives, categorizing them into dynamic material, which changes over time, such as traffic light and traffic flow times, and static information, which is data that stays static over time as traffic stops and road signs. In addition, by the standard that follows, it is possible to add new urban elements, such as crosswalks, traffic lights, among others, to any segment. A *segment* is a block of any street that contains individual properties like density, direction, and it can possess static elements.

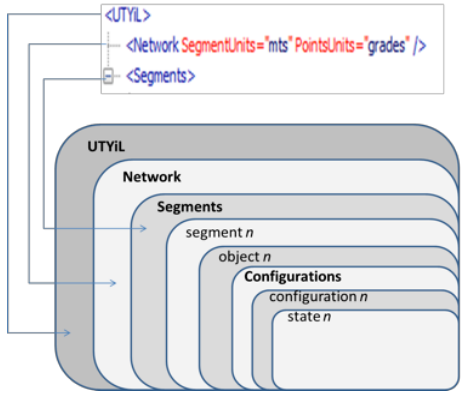


Fig. 1. General UTYiL Structure.

In Fig. 1 the general structure of the UTYiL format is shown. The format begins with the node "UTYiL", which identifies the beginning of the description of the

structure, inside is the node "*Network*" that allows specifying the units of measurement that will be used for the model, "*segmentsUnits*" for the segments and "*PointsUnits"* for coordinate points.

The segments allow describing the basic components of the road structure, which contain a set of objects (static or dynamic) and the segment length as follows:

<segment>
id=”S_i” //S_i define the segment number
type=”[*segment*|*intersection*]” //type segments and intersection
points=”LAT_1 LON_1, … …, LAT_n LON_n” //latitude, altitude
attr= “[*source* |*sink*]” //attr define directions
</segment>

The urban traffic system, in addition to objects that do not change their value over time or that do not move in the network, is composed of dynamic objects whose informational value changes over time. Examples of these are traffic lights, variable information messages (variable message sign), among others (see Fig. 2).

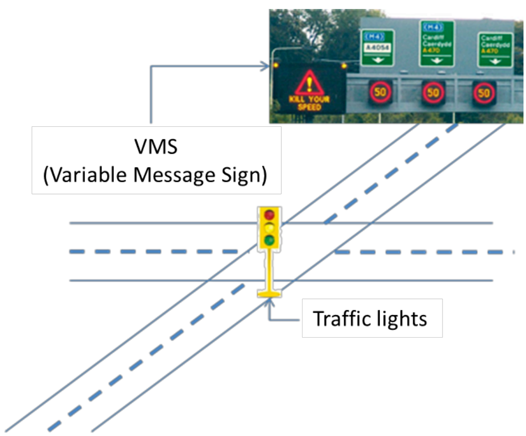


Fig. 2. Capture structure.

The users are identified by entering their username and password, the system facilitates the creation of road proposals (Fig. 3). First, the user must select the area on the map on which the control proposal will be created, this area is the quadrant inside the area where the proposal is going to be made. The system will store the coordinates of the quadrant and display a list of road objects such as traffic lights, road flows, or crosswalks, and the user can add as many *static* or *dynamic* objects and configure them as desired (see Fig. 4). Once the proposal is generated, the user can save it. When saving the road proposal, it can be accessed by other registered users.

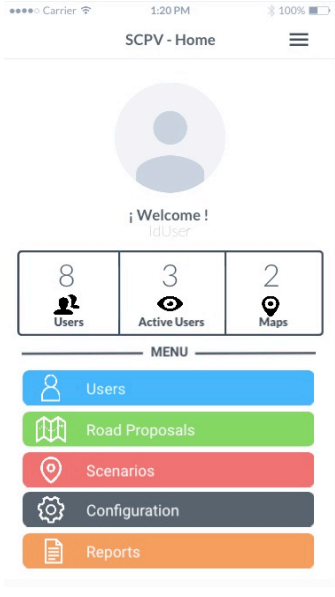


Fig. 3. User authentication.

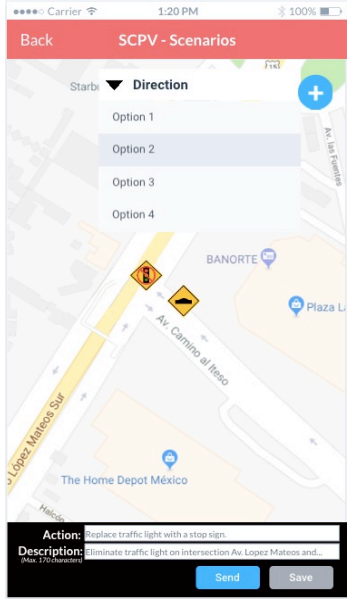


Fig.4. Road proposals.

The user is also able to see a description of every proposal created by other users and they can create copies of those proposals and make changes according to the needs they detect in the same area or zone.

4 Case study: UVM Campus Monterrey

4.1 Characterization and structure of the course

The case study presented below was carried out within the architecture program offered by the Monterrey campus of the Universidad del Valle de Mexico (UVM). The mentioned program consists of 62 subjects/courses taught in a semester scheme. One of the key courses to develop research and social awareness competencies in the students, is the course called "Architecture-applied research seminar".

The objective of the course is that the student gets to know the different existing types of scientific research, and then, develop a protocol that results in the proposal of an urban or architectural project. For the realization of this project, it was decided to work with a group of thirteen students that took the course in the 2018 August-November semester.

Traditionally, the course has a more theoretical focus due to the amount of information and concepts that the students have to manage and produce, making it sometimes monotonous and unexciting.

For that reason, and following what was mentioned previously in the related works section, about making efforts for changing educational paradigms towards

more interdisciplinary courses, and help students shift to a more social approach to make a positive impact in their community, it was decided to develop a project that helped to solve a real-life problem.

4.2 Human Centered Design learning approach and problem selection

The project was carried out under the Human Centered Design (HCD) approach [19], which is a creative method designed to solve real problems. It consists of developing empathy with a problem of the people/community for which the design is being done, generating ideas, building prototypes, and finally putting them in motion and testing their real impact, all of that, by following a three-phase process; the first one is *Inspiration* (to "immerse" in the life of the people with the problem to solve, to understand their needs from their own experience); second is *Ideation* (identify the design opportunities, and propose possible solutions, to be aware of the learned in the previous phase); and the last one is *Implementation* (to materialize the solution and put it in motion).

The social problem that the students decided to approach was related to the pedestrian infrastructure and universal accessibility in the streets and crossroads of the city of Monterrey, Nuevo León, México. The selected object of study was a very complicated road intersection between Rómulo Garza and Conductores avenues (Fig. 5). The main problem identified, is that, there is an important amount of pedestrian and cyclists traffic due to several schools located around the intersection, and that they have to cross between the vehicles and in the middle of the street because there are no adequate and dignified conditions of infrastructure and basic security for them, like, good-quality sidewalks, handicapped ramps, or well-designed pedestrian crossings.

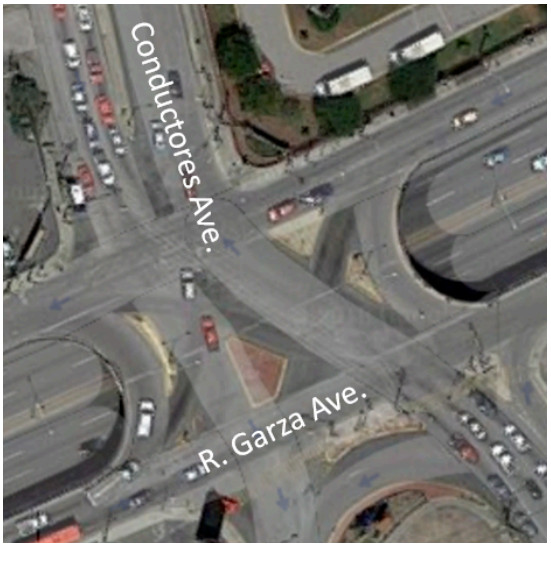


Fig. 5. Satellite view of the selected intersection

4.3 Inspiration phase

So that the students could empathize with the affected people who cross by the intersection every day, a series of walking tours and direct observations were made in the area. Also, in one of the tours, a wheelchair was borrowed to make an exercise in which the students tried to use it and cross by every corner and sidewalk of the intersection to verify how easy or difficult it was for the people in those conditions to do that (Fig. 6).

In this phase, after some sessions of brainstorming, discussions, and reflections about what they experimented and perceived, the students identified some problems like inexistent or deteriorated sidewalks and crosswalks, the dimensions of the sidewalks and accessibility ramps did not comply with what is established in the local regulations, the drivers of private cars and urban transport did not respect pedestrians at the moment they were attempting to cross, a lack of urban vegetation in sidewalks and medians, among others.

a) Direct observations b) no pedestrian paths c) non-existent wheelchair infrastructure

Fig. 6. Walking tours direct observations, and wheelchair simulation exercise a) users have to do direct observations, b) and c) shows that there is not one existing wheelchair or pedestrian infrastructure.

4.4 Ideation phase

Based on the identified problems, a series of proposals to implement were carried out by digital sketches using AutoCAD and Photoshop software, and Google Earth, like the ones shown in Fig.7. a) shows a street map, b) presents a satellite view with another possible solution, and c) shows a street-view of the proposal.
Solutions like sidewalk extensions, tree planting, crosswalk painting, and road signs, among others, were proposed and represented in the sketches.

After analyzing the different proposals made by the students, it was decided to start with a first prototype, that consisted in designing and painting five crosswalks of the intersection, not with the traditional white or yellow lines, but with colorful patterns to draw the attention of the drivers and force them to respect them, also, with the goal of making the project more visually attractive. In regard to the crosswalk designs, it was decided to invite Graphic Design students to the ideation phase, so they could help to make more creative proposals, and give advice about the geometry or the chosen color palettes.

a) Street map

b) satellite overview

c) street-view of the solution

Fig. 7. Examples of ideas and proposals, a) shows a street map, b) is a satellite view from the same site and c) is a street-view of the possible solution using the mentioned tools.

The proposals were captured in the CiudadelaSIM simulator following the process mentioned previously, so that the students could have a virtual simulation of their prototypes, in order to evaluate their impact on the behavior of the selected quadrant, and so, they could make decisions based on the obtained information. In Fig. 8 a proposal is shown, the segmentation of the streets is defined and the systems wait for the flow traffic within the scenario to perform an analysis of the behavior of the cars.

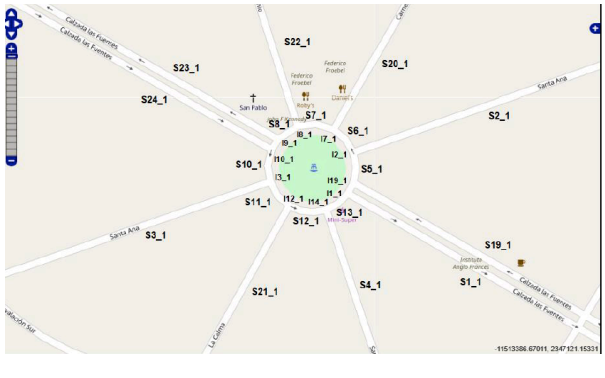
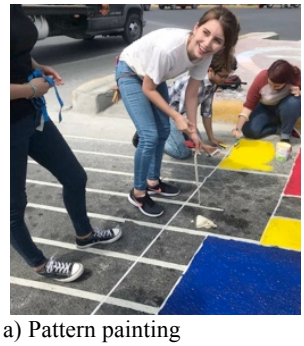


Fig. 8. Street segmentation presented in CiudadelaSIM

4.5 Implementation phase

For the Project execution, the students were divided into different teams, with a leader that helped establish responsibilities for each member, like supplies gathering, crosswalks design, as well as going to the correspondent government authorities to manage the permits and authorizations, so the activity could be performed as planned. The day of the activity, the project was executed successfully, the authorities collaborated by making the necessary traffic detours, as well as protecting the students that were painting the crosswalks in the streets; the teams worked in an integrated and efficient way, and also, volunteer students were summoned, so they could help with the painting process.

Besides the original 13 students, about 30 more volunteer students, and some government officials who came to document the activity participated in the project execution. Fig. 9 presents the different stages of the project implementation.

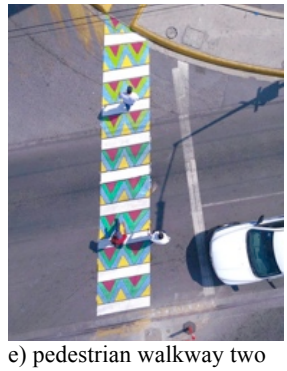


a) Pattern painting

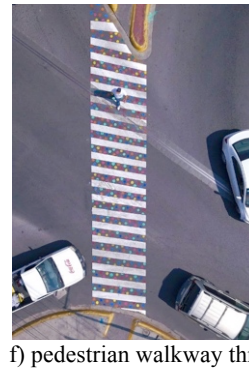
b) pedestrian crossing one

c) pedestrian crossing two

d) pedestrian crossing three



e) pedestrian walkway two



f) pedestrian walkway three

Fig. 9. Implementation phase. *a)* Pattern tracing, *b)* Work team after they finished painting the pedestrian crossing number one, *c)* students painting pedestrian crossing number two, *d)* students painting pedestrian crossing number three, *e)* pedestrian walkway two in use and *f)* pedestrian walkway three in use.

4.6 Feedback about the student's experience

As it was mentioned before, the second objective of this educational activity is to analyze with qualitative research, the student's experience at performing the project, both personally, as in the aspect of their learning and acquired skills and competencies.

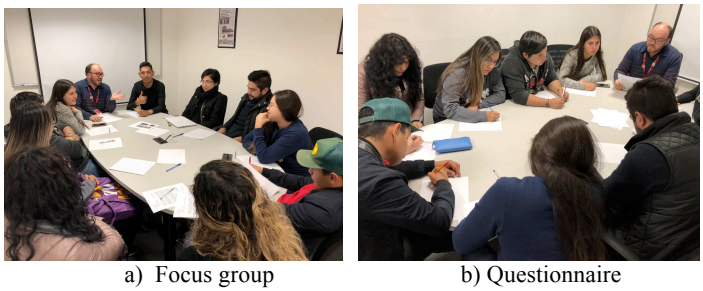
Qualitative research methods allow us to examine human behavior and its complexities, so we can understand it in a better and deeper way, and produce more valid and persuasive arguments in research. According to Hannah and Lautsch [20], qualitative strategies are important for understanding the perspectives of the research subjects, because they see things in a different way than the outsider researcher does. So, by gaining access to their perspectives, researchers can find new data and broaden their point of view regarding the research problem.

Mack, Woodsong, MacQueen, Guest and Namey [21], also explain that qualitative research is especially effective in obtaining specific information about the values, opinions, behaviors, and social contexts of particular groups of people, and that its strength is its ability to provide information about the "human" side of an issue (behaviors, beliefs, opinions, emotions, relationships, among others), because it has the advantage of using open-ended questions, so that the subjects can respond with their own words, instead of choosing from fixed responses.

Under these arguments, it was decided to analyze the student's experience with two qualitative research strategies, a focus group, and a questionnaire:

The focus group was held a few weeks after the activity was performed. To carry it out, 11 of the 13 students of the course, attended the meeting. During the session, a discussion about their experience and perception about the activity was established, talking about the challenges and obstacles they had to face throughout the three phases of the project.

Then, the questionnaire asked them questions such as: 1. If they considered that the HCD learning strategy made a difference in them as students, in comparison with other traditional lecturer-centered learning activities? 2. What were some of the competences or skills they considered were developed or reinforced in themselves after the project implementation? 3. Their opinion regarding to if they considered the project was successful or not, and why? And finally, 4. To summarize their experience participating in the project by writing only three keywords that came up to their minds when thinking about their experience (See Fig. 10).



a) Focus group b) Questionnaire

Fig. 10. Focus group activity. *a)* Students sharing feedback of the activity; *b)* students fill in a questionnaire of their experience during the project.

5 Results analysis

As for the execution of the project, it was verified that developing a project following the HCD methodology yields successful results, since from the moment that the crosswalks painting dried out, and pedestrians were allowed to use them, they started to cross showing less fear and more confidence. Different people like women with little children or elder people approached the designing teams to thank them for the initiative, stating that it was a very necessary and positive activity in the selected intersection.

Also, some social networks publications that were posted about the project, were monitored to poll the comments of the people and determine the impact in the community. Even though there were negative comments of people complaining, most of the roads detours that the drivers had to make during the project implementation, a lot of positive comments were also found, mainly of people supporting the activity, encouraging the fact that these kinds of projects should be replicated more often in other parts of the city (See Fig.11).

a) People using the walkways

b) People using the walkways

c) Results monitoring

Fig.11. a) and b) show pedestrians using the walkways, c) digital informative note about the project.

Finally, the intersection was observed at different times during the following week of the implementation day, and it was noticed that, by having the crosswalks more

visible and outlined, the vehicles started to stop before them, and reduced their speed when they noticed the people that intended to walk through them.

As for the focus group results, all of the students stated that they felt very happy with the activity and the learning process, they felt that involving them in an HCD learning activity developed different competencies and skills in them, that they wouldn't be able to obtain in a traditional lecturer-centered learning environment, and that it made a pedagogical difference in them.

The students commented that the project helped them to be more aware of their environment, their community and its problems, but also mentioned that it would have been better if they could have had more time to develop a strategy that involved the neighbors and members of the community, not only students, in order to have a stronger impact.

In Table 1, there is a synthesis of the subjects mentioned in the discussion and the questionnaire, by each student that participated.

Table 1. Focus group summary.

	Student	Learning difference/impact	Positive/negative results	Skills/ competences	Key words
1	Student 1	yes	The students participation, the drivers respect for the crosswalks	Team-working, research, organization	Happiness, pride, motivation
2	Student 2	yes	There's still a lot of work to do regarding to education and culture of every person involved in urban mobility	Team-working, sense of community, empathy	Learning, satisfaction, culture
3	Student 3	yes	The students participation, the drivers respect for the crosswalks	Team-working, research, organization	Happiness, satisfaction, creativity
4	Student 4	yes	There's still a lot of work to do regarding to education and culture of every person involved in urban mobility	Team-working, environment awareness, empathy	Satisfaction, motivation, happiness
5	Student 5	yes	More projects like thise are needed and urgent in the city	Team-working, organization, oral expression	Tired, learning, creative
6	Student 6	yes	It would have been better if more students had been involved in the project	Research, oral expression, organization	Satisfaction, well done, positive impact
7	Student 7	yes	More information about the project would have been useful, like signs and posters for the people that didn't know what we were doing	Team-working, creativity, patience	common-wellness, practice, creativity
8	Student 8	yes	The inspiration and ideation phases were the key to the success of the project	Creativity, organization, empathy	Humility, participation, common-wellness
9	Student 9	yes	The drivers respecting the crossroads, and the people walking through the crossroads showed happiness in their faces	Team-working, oral expression, inclusion	Satisfaction, tired, interesting
10	Student 10	yes	More information about the project would have been useful, like signs and posters for the people that didn't know what we were doing	Organization, team-working, patience	Effort, happiness, humility
11	Student 11	yes	It would have been better if the neighbors and members of the community had been involved in the project, too	Organization, oral expression, team-working	Effort, dedication, work

After applying the questionnaire, it was decided to analyse the frequency of the obtained data, the skills developed, and the keywords that synthesized the student's experience, in order to complement the findings with tangible evidence.

Hannah and Lautsch [20], mention that several experts have written about the benefits of counting data in qualitative research, and how it helps researchers to produce more valid and persuasive arguments. Also, the presentation of data counting provides transparency about the research and can also provide some insights into the amount of work that was done in the research. They suggest there are four types of

counting, each of which serves a specific purpose: *autonomous*, *supplementary*, *corroborative*, and *credentialing*.

The counting of the words obtained in the questionnaire can fit in the credentialing category because the purpose of this type is not to produce big findings, but instead, it focuses on either documenting counts of data sources or generating evidence of the analytical honesty of qualitative researchers.

Ramlo [22] states that visual representations of data may improve communication and help to organize and summarize important research data in a creative way, enhancing the clarity of the findings.

So, after counting the data, it was organized into the following bar charts that help us observe the information, both in a quantitative and in a visually appealing layout:

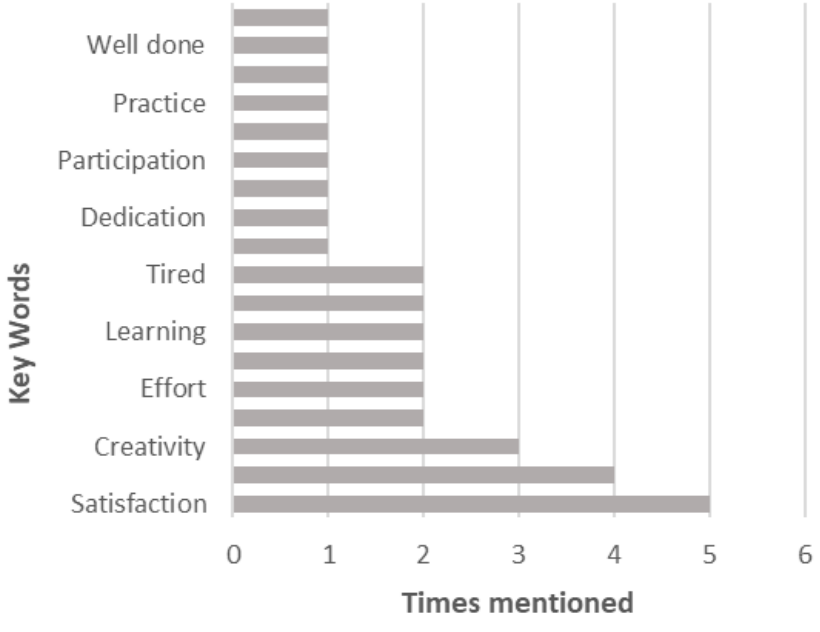
In chart 1, it is possible to observe the developed/strengthened skills and competences named by the students and the number of times they were mentioned. The three most repeated competences mentioned by the students were *Team-working, organization,* and *oral expression*.

Chart 1. Skills/competences developed.

Finally, in chart 2, the keywords used by the students to summarize their experience in the project, are shown, also counting the times they were mentioned. In table 3, we can find that the three most repeated keywords by the students were: *Satisfaction, happiness, and creativity*.

These words (and the rest of them) show that the HCD learning activity had a profound positive impact in them, leaving them with a feeling of satisfaction and happiness to see their ideas put into action, solving a community problem in a creative way:

Chart 2. Keywords description for the evaluation of the project.



6 Discussion

Definitively, teachers and instructors, not only from design and social sciences but from any discipline, should try to implement non-traditional teaching strategies like the ones presented in this proposal. They should be proactive and not wait until their universities change their curriculum, or decide to make some innovation in their pedagogy strategies, because that could, sometimes, take several years to happen.

As it was mentioned before, even though strategies of learning and problem-solving in real contexts, are not as new in most of the Western World universities, there are still a lot of countries and institutions that remain educating under a more traditional lecturer-centered learning approach, including Mexico. Because of that, it is important to evidence these efforts to the academic authorities, students and teachers; efforts that may seem like baby steps, but are very important and have a real impact in the students, preparing them better, and giving them useful skills and competencies for the real-life context they will face when they graduate.

That is why we encourage teachers and instructors to establish connections and networks with teachers from other disciplines. They may experiment with interdisciplinary courses or activities that stimulate and challenge their students to develop flexible methods to solve real design challenges. It is not necessary to design an entire course or program, a group-learning activity could be a good start, or other small activities like student-led discussions, or co-design projects. The lessons learned with this exercise taught us that with a good organization, communication, and

teamwork, a project with these dimensions can be planned and executed in the best way.

Finally, a fundamental recommendation is that, whatever activity is made in the classroom, it should be documented and measured, in order to be able to analyze the impact of the projects and to generate information that helps strengthen design thinking, and Human-centered design principles and strategies, and to improve design teaching. Many tools are available nowadays, it is important to know which one has to be used according to the project, and to motivate the students to create new strategies that help to improve their community.

7 Conclusions and future challenges

According to the National Graduates Survey from Laureate México's Center of Public Opinion, the recent graduates of this country face difficulties to find a good quality and well paid jobs, as well as gender inequalities, a situation of unemployment, either due to the saturation of the labor market or because of the lack of necessary skills that employers are demanding from them [23].

Therefore, it is undeniable that higher education institutions and universities throughout the world, have the responsibility of knowing which are the current work circumstances their graduates are going to face, because their main challenge is to avoid them falling into situations of unemployment, for which, training them with the necessary skills and competencies that facilitate their competitive insertion in a job, is a priority.

The results of this project definitively prove that involving technology-using strategies, as well as non-traditional learning approaches like HCD into school curricula, really contribute to solving problems mentioned before by leaving a positive impact in students, not only in their learning and competences development process but also, in the empathy aspect.

Using empathy as a learning methodology is a crucial motivational concept to be taken into consideration in student-centered educational systems, because an empathetic environment sets specific attitudinal qualities and behaviors that facilitate learning, according to Bozkurt and Ozden [24]. They also state problem-solving activities and related initiatives are excellent strategies to develop empathetic classroom climates.

Also, some other authors and studies demonstrate that empathy makes a positive contribution in skills and competencies, for instance, interpersonal relationships or social cohesion, which are fundamental for socialization and learning process of students [25], [26].

In that aspect, the students manifested to have experienced some of the mentioned qualities such as social awareness, happiness, and personal satisfaction feelings after the social activity execution, because implementing a real project allowed them to measure and to observe for themselves, the benefits and impact the project had in the community.

One of the highlights to take into account for future projects, is that the students felt that more time should be designated to inform the neighbors and other members of the community about the project, in order to include them since the first phase of

inspiration, so that the other two phases (ideation and implementation), can be enriched with the ideas and experience of all of the involved/affected people.

Educating future architects to go to work in an unstable, changing, adaptable, fluid, hybrid, and more or less unpredictable world, as well as with economic challenges and saturation of the labor market, should encourage schools of architecture and design to redefine their educational strategies, to reformulate their curricula continuously, and to re-establish their principles and values related to their role and social mission.

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