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EDUCATIONAL CHANGE IN THE 21ST CENTURY: SMALL BUSINESS TO TACKLE TEMPERATURE, WATER, SOIL

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ABSTRACT. This is a case study, of the development of UNAN-Managua as an innovative Nicaraguan University. The history 2004-2017 is of the developmental path of this leading educational institution. It focuses on the importance of interdisciplinary development of pedagogy across the universities' multiple campuses, farms, facilities and institutes. It starts simple and ends with a major program to change the university using Innovation and Design Thinking. The nexus of knowledge and innovative processes are opening this university to compete in the world marketplace. Students have the chance to learn from faculty who have experienced innovative thinking and innovative pedagogy. Starting was not easy, as those coming from the United States were educated in that very individualistic culture. It took time to understand, empathize, and design programs that work within the collectivistic culture, and within the social and economic structures of the country. Remembering that Nicaragua is the second poorest country in the Western Hemisphere, it has taken effort to bring a university of 40,000-plus students into the thinking methods of the 21st century. Much is built around the models of Design Thinking and the Business Model Canvass, as these are easily accessible in multiple languages. UNAN Managua is the largest University in Nicaragua with a campus in the capital city, four regional autonomous campuses, an extensive program in the rural farming areas (UNICAM), many institutes and areas of investigation. Faculty come from all campuses, all disciplines, ages, and ranks to engage in learning the innovative approaches to problem solving. Working across the disciplines, they meet each other, learn from each other, help each other, and think about how to change the classes that they teach. Working across the campuses brings a new strength and vibrancy to the university. Today, students from farms in the most rural areas of this

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poor country sit with freshly degreed faculty members learning one from the other. Today, faculty departments work together to bring innovative thinking into a variety of subject matters. They join to create events to encourage their students to be innovative. Today, the Rectora envisions the innovative UNAN or UNAN INOVA, only a dream a few years ago. This is the history of how innovative thinking, application and the challenge of business professionals can help a faculty to create a university for the 21st century. This is the thinking behind a transformation from once-guarded Sandinista institutions to becoming an innovation leader on the National Stage of Nicaragua and the world stage as a player in international competitions. Under the Rectora, the university has done all this without losing sight of including everyone in the educational revolution. Most recently, they placed second in the Wege International competition with Kendall College. This is a case of being entrepreneurial in the Drucker sense of being a change agent. The leadership defined the problem, sought the knowledge for change for its faculty, and is now in the process of making a difference in Nicaragua. This is a story from which other universities can learn.

Keywords: design thinking, entrepreneurial, innovation, interdisciplinary, knowledge

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Introduction

UNAN-Managua was half of the former National Autonomous University of Nicaragua, which was split in half to be UNAN Managua and UNAN-Leon by law, (law number 89 focused on the superior education in 1990). Just 14 years later, on a rainy afternoon in May 2004, with a delegation from the United States, the author met the then-Dean of what was autonomous regional faculty in Estelí, Nicaragua. At that meeting, they started the process of what has evolved into bringing innovation to UNAN-Managua, now, the country's largest and leading university.

In May 2004, the then-Dean of the regional autonomous faculty in Estelí spoke eloquently of the need for help in entrepreneurship and innovation in her community, the region, and the nation. She explained that even when a student completed education, there were no jobs. Nicaragua was facing two major problems in lack of employment and in underemployment: There was not enough work to do. The Dean's dream was to take education into the realm of creating businesses and creating employment. Two of the delegation from the United States, one from Engineering and one from Entrepreneurship took this as a personal challenge and came back to try to develop something.

Initially, the workshops consisted of creativity activities with a single class of students, using local materials such as the bountiful fruits. The two professors quickly realized it was not working; Hair gel, soaps and wine made of seasonal fruits would not solve the problems of underemployment in Estelí or Nicaragua. The project quickly began to involve US students, community members, faculty, and administrators as well as, a local Nicaraguan coordinating group from FAREM, Estelí.

For four years, the program took place on the FAREM Estelí campus, initially in a classroom in the library building and then in a new auditorium facility. Initially, the US faculty explored both December and May as times for the program, finally deciding on May as the better choice. Each year, the leaders tried to improve the program based on what they were learning of UNAN-Managua and the culture of Nicaragua. There were many challenges that affected the methodology:

- language barriers between Spanish speakers and English speakers.
- collectivism (ex. you do not want to stand out as different; we should all share together).
- learning styles.
- psychology of poverty (ex. without money, nothing can be done; there is no way to start in terms of logistics; this is the job of the government).
- social issues (ex. machismo society, dominated by male individuals; hierarchical structure – those with higher studies are always right).
- student and faculty resources.

Individualism vs. Collectivism

One of the greatest challenges beyond the obvious linguistic differences arising from the use of Spanish and English was the problem of cultural differences. Participants from the United States came from a very individualistic culture while Nicaraguans were more collectivistic. Hofstede's work on cultural dimensions does not include Nicaragua but does include Honduras and El Salvador to the North and Costa Rica to the South. These countries have very low individualism scores.

Nicaragua has an important additional piece of history that further discouraged individualism, which was the eleven years of socialism from 1979 to 1990. Many of those who are faculty grew up or matured in this period when education often occurred in the then-Soviet Union or Cuba. In these countries and in Nicaragua individuals standing out was discouraged.

The team from the United States comes from a different culture, where individualism is celebrated and encouraged. It is the core of a major Protestant denomination advocating individual responsibility. It is also a center for individually-driven entrepreneurship and there are many men and women who have led their companies to greatness starting with little or nothing. It is an area where university students take control of things and develop their own organizations. This team is trying to help Nicaraguan students and faculty think about innovation and entrepreneurship in a culture where you do not think as much about yourself as you do for the collective good, of the group, the class, or the community.

This collectivism made it hard to encourage the start of small businesses. The team from the United States would leave and assume that the Nicaraguan teams with good ideas would continue them and see them into the market. There were several things wrong with that assumption. First, unless everyone on the team wanted to work together, the idea would be dropped, as one cannot move forward with a group's ideas in a collectivistic society without group consensus. Second, most, but not all, students have no idea of where to go and what to do. If you have read Kiyosaki, R. T, and S. L. Lechter's, 1997, Rich Dad Poor Dad and thought about it as if it was Rich Country Poor County, it would give you an idea of what the team from the United States was facing. There was no background knowledge of what is today called entrepreneurship. Third,

there was very limited manufacturing of any kind, perhaps because of the need for collective ownership. While there were little shops (pulperias) with a few things sold out of the front room, ice at one house, food stuffs, at another, school supplies, etc., even the retail segment did not show a strong entrepreneurial bent.

Altogether, there were small businesses but few large businesses. Few individuals seem prepared to take the risk necessary to create the change. Everything seemed to be decided in a collective fashion. The lack of individual focus while creating a warm and wonderful culture was not helping to create businesses that would change the economy, support grow and employ others. One of the challenges of every program was to show participants how to think differently and how to begin to think like a business.

Learning Style

Another difference was in learning style. Coming from a guide on the side, or flipped classroom perspective, the author from the United States was amazed to learn that students did not have books, and until gifts arrived from Spain, labs had nothing to work with. If the professor had a book, then they could use that book to develop a lecture and even read from the book during class. The students got everything verbally or on the chalkboard and then made notes from which to study. Rote memory was the task for students.

When gifts from Spain and other members of the European Union did arrive to help universities' labs in sciences and in health, it was often a challenge. If you were a professor in Nicaragua who had learned science from a book and never had the opportunity to do something in a lab, then you did not know what to do with a lab kit. Fortunately, until the economic collapse of 2008, there was an attempt to develop some educational programs showing how to use some of these materials in the classroom.

The people of Nicaragua are smart, but history has dealt to them very difficult times in the latter part of the 20th century and now in the 21st century. This has sapped the educational resources and led to the learning style that was so prevalent in the first part of the 21st century, which was all based on memory and copying and not on doing. It is the

application in the classroom that seems to empower students to realize that they can do things on their own. It is in faculty development, such as the May workshop of today, that faculty learn to look at the student who thinks differently not as a problem, but as a potential leader of the future.

Opening one's mind was not easy. Participants from the United States asked students to think on their own, and, to say what they thought, which was new to them. When asked to quickly sketch things, the Nicaraguans would carefully copy whatever the moderator had done. It took a considerable time to understand how to help them feel free to think independently even in the workshop space. Students would not contradict faculty. If you had both faculty and students on a team, the team did whatever the faculty member wanted. Today, using multiple examples, videos, and contests for numbers of ideas, etc., participants seem to be much freer in creating ideas, sketches, and models than in the past.

From a Class to a Workshop

It became clear after a couple of attempts that trying to use the process in a class was not going to work. It was clear that classmates did not necessarily have the complementary skills to launch a business. They all heard the same things and repeated them back as opposed to responding with individual answers. It was decided to try a not-for-credit workshop format and the teams would come from two different universities, FAREM Estelí (UNAN-Managua) and UPONIC (Popular University of Nicaragua), a national, private university. The hope was that we could now have a diverse set of skills on each team. The leadership of both institutions by women may have been what made this work. When we reached an impasse, these women would figure out how to make it work for their Nicaraguan students. They both cared more for the learning experience of their students than for the competition between their universities for students.

The workshop format had a greater success, especially when some energized helpers came from the United States to help make things happen. The University also had a new large building known as the auditorium, and this open space was great for many of the workshop

events. In the workshop, we began to separate faculty and students and seated the students in teams together for the whole time. Interestingly, this created a new set of problems.

Despite the collectivistic culture, students from two universities did not necessarily want to share. It took lots of work to get the business students and the engineers to see how they had something to offer to each other. The goal of seeing ideas getting into the market was still illusive. UPONIC even tried creating an innovation lab to provide spaces to attempt to build prototypes. They had an ideal spot to play with retail in an old market in Estelí. The results were not overwhelming. One persistent bicycle seat company got things into the market and that was the extent of the programs market entry success at this phase.

In May 2009, when the United States participants arrived to start at what was then-called the May Innovation Workshop, the gates to FAREM Estelí, were locked and the Nicaraguan students had taken over the campus. They were upset about their share of a vote for administrators. The Dean piled all the participants from the United States into a huge truck and went to Casa Estelí. Surprisingly, the Nicaraguan participants quickly followed.

The workshop went on as scheduled, introducing students who were volunteering their time with no credit to learn about innovation and entrepreneurship. The team from the United States was impressed that even with the University closed; we still had everyone expected at the workshop. Furthermore, it showed what a good job the Nicaraguan universities were doing in explaining this workshop as an opportunity to their students.

From Regional to National

In 2010, as we began to make the detailed plans, the new Vice Rector, former Dean at Estelí, made it clear she wanted to include more of UNAN-Managua faculty as shown in figure 1. You can quickly see that the workshops and learning experiences had been focused on only one campus, labelled "Facultidad Autonomous Regional Multidisciplinaria Estelí." A new vision was formed to include all UNAN Managua in the workshops. This changed the scope of the project from Regional to National.

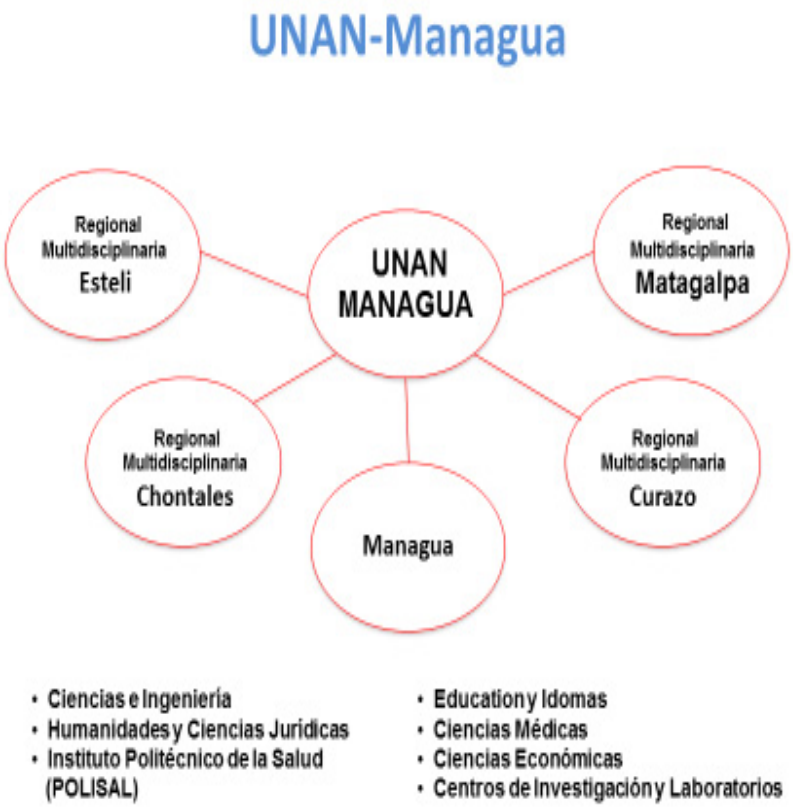

Figure 1. Source: the author with Waltraud Beckman created this graphic of UNAN-Managua

2011

Faced with a much larger pool of students and additional faculty, there was an attempt to increase involvement of United States-based industry personnel and a College of Design faculty and students. The workshop evolved once again as program planning changed by the addition of more industry processes, methodologies, and Design Thinking.

With the Design College faculty member, a prototyping accelerator was launched. A limited number of teams, usually four or five, were selected for a long weekend in August, to design and create a prototype

with engineers, designers, and entrepreneurs from the United States. This was all hosted at the Spanish School CENAC in Estelí. Here, the teams from Nicaragua and the United States could work intensively to design and create prototypes.

From Student-Focused to Faculty-Focused

In July 2014, when the Rector Magnifico Elmer Cisneros Moreira took power for the second time, he spoke much about innovation and creating UNAN as the innovative university. He referred often to the program of Applied Global Innovation Initiative. Only a month later at dinner, there was a discussion about how he envisioned this. Until that time, the focus had been on students and some faculty. The goal had been to introduce them to innovation.

The Rector Cisnero had another vision. He wanted to change the focus of the May workshops to the faculty. There were several reasons for this:

- faculty can impact generations of students
- faculty staying at the university create synergy with others, who have innovative ideas
- faculty learning together will increase interdisciplinary activity
- the impact of this can reach across the university's multiple campuses
- it will be less expensive to do faculty development than scale up the student workshops
- faculty thinking about business may help students to think about business

Rector Magnifico Cisnero died at the end of February 2015. The new Rectora, former Vice Rectora General and former Dean at Estelí, called a meeting to discuss the implementation of Cisnero's vison in March of 2015 and several points were agreed, too:

- an objective to be accomplished by the end of the term of the Rectora in June 2018

- 25% of the total faculty should be exposed to innovation and Design Thinking
  - understanding the process from ideation to market solution
  - application of discipline knowledge to human problems
- Faculty should include:
  - tenured teaching faculty
  - part-time teaching faculty
  - research institutes
  - administration – most are from the teaching faculty and continue to teach a course
- university-wide program
- the program should become bilingual in as many ways as possible
  - the Rectora wanted the faculty to learn English which would resulted in Nicaraguans presenting idea pitches in English
  - she would like the United States participants to learn Spanish which would lead to more extensive prep time for the United States participants
- increasing use of Mentors from the University
- the University would look at ways to encourage new ideas and business development.

Shortly after, a university innovation commission was formed to work with the division within the Vice Rectoria of Investigation that was hosting innovation. The program was underway with a new direction and emphasis. For the first time, there was a dedicated team that would work on spreading innovation at the university. Suddenly, the workshop led by Applied Global Innovation Initiative was one in a series of activities that this team would plan and conduct each year. Examples of some of the programs have included:

- workshops in innovation related to medicine
- development of classes that focus on innovative thinking
- agricultural innovation
- programs in Innovation for the University of the field
- creating a program of innovation and entrepreneurship in the Anthropology Department
- congresses on Innovation
- funding prototypes in innovation./

From New Product Theory to Design Thinking and the Business Canvas

In 2014, the workshop began to change as the team from Applied Global Innovation Initiative (AGII) began to realize that faculty might have different needs. First, the focus on producing something that would make a company in Nicaragua was reduced. Faculty are usually not risk takers, and already have full-time jobs. They need to learn more about how to work with ideas and bring new ways of thinking into the classroom. Part of that thinking is to show students how they can think more broadly in a discipline; specifically, how their discipline help resolve human problems can. From that comes thinking about how can you make a business or a job out of your discipline knowledge. A great example of this is inside the Humanities; in Anthropology, there is a program in entrepreneurship helping to start businesses.

Secondly, faculty are experts in their disciplines and AGII needed to be careful in its organization that it was not telling them what to do with their discipline but providing a buffet of tools and exercises that they might use as they deemed appropriate in their individual disciplines. With each workshop, the Applied Global Innovation Initiative team has sought to bring more and different tools to the faculty. In that way, each workshop is new and different even for the mentors and returnees. These tools are often focused on better planning for business.

Thirdly, it was essential to create the environment that the Rectoria and the Innovation commission sought that it was very interdisciplinary with teams that also spanned the campuses. This meant that the assignment of teams was a very important, but politically-risky task in a university where every vote counts. Interdisciplinarity is challenging at UNAN-Managua. In Managua, people work in their major areas: Sciences, Humanities, Allied Health, Medicine, Education, Economics and Research, etc. In the regional autonomous FAREM's (Carazo, Chontales, Estelí and Matagalpa), it is very interdisciplinary. The problem is that the disciplines are not mixed across the disciplines in the university as a whole (in all of its campuses and extensions) or across the disciplines in the Managua campus. Part of helping students learn is helping them to learn about the power of networking. Hopefully, the faculty are learning something about that to share with their students.

Fourthly, it was important to use a recognizable theory base to present the work to the faculty. Two basic models were selected. Design Thinking (Figure 2), as promulgated by the Hasso Plattner Institutes at Stamford, Potsdam and Cape Town, and the Business Canvass. In 2017, one of the team from the United States was well-connected with the Stamford program and it offered a special opportunity for Nicaraguan faculty to understand where they were in the model each day.

Figure 2. Source: R. Dam and T' Siang (2017)

The model, starting with Empathy, led the Innovation Staff of the Vice Rectoria of Investigation and the AGII team to try to define the problems in more detail than ever before. In 2016, the idea of using faculty to introduce each problem that the Innovation staff had selected was used. In 2017, this continued but was enriched greatly by student-made films showing the problems as seen on a farm, in a barrio (neighbourhood), or in someone's home.

For the 2017 workshop, we tried hard to get a presentation on the basics of registration and other things necessary to start a business in Nicaragua. Ultimately, this becomes important for faculty to understand so they could share with teams of students who have exciting ideas.

Problems in Need of Interdisciplinary Solutions: Temperature, Water and Soil

In 2016, the Innovation staff of the Vice Rectoria of Investigation selected three topics for the May 2017 faculty workshop. The goal is solving human problems and these are directly related to life in Nicaragua today as the participants from the United States were shown.

1. increasing temperature
2. water collection and conservation
3. soil use and conservation

Choosing the topics required some thought. In May 2016, the problem of diet had been considered in a country with increasing diabetes, obesity, and blood pressure problems apparently related to the high fat and salt content of the diet, along with the quantities of rice. It was quickly observed that while faculty claimed to want to talk about this, they were not interested in being leaders in this area themselves. They, in fact, crave salt, fat, and lots of starch and are not in favour of introducing vegetables or fruits on to their plates.

In early 2017, a faculty member was selected to present on each topic. The presenters were from three different campuses of the university allowing the presentations to show off the wide diversity of ability in the university. In March, two months ahead of schedule, AGII representatives tried to meet with these presenters to learn more about what they would be sharing.

Several things were done to make the program more focused:

1. the facilitators were shown real examples
2. the professional professor presentations were reviewed
3. the student videos were reviewed

In summary, there was a lot of work put into the empathy part of the Design Thinking process and the problem definition. For those, who work in Innovation and New Product, a real key is getting the problem defined enough that it is possible to come up with realistic solutions.

Temperature

For example, on one hot afternoon, the facilitators were taken out to experience the heat at a new house of a nurse and her family. The cute bungalow house was unbelievably hot, and she explained some of the medical issues this could cause:

1. high blood pressure
2. heat stroke
3. pulmonary issues
4. skin problems

5. challenges for the chronically ill like
    a. diabetes
    b. blood Pressure problems
    c. cancer.

The new house was not designed well for ventilation or for air conditioning. Simply put, there were few windows, and, except for the front, they looked out on to walls so there was no space for air movement. The house leaked air through visible openings. It was hot. This is a new house constructed on a tiny lot; it was not an old house where you might expect these problems.

A second home we visited was so hot the elderly couple had moved out of the main part of the house on to the porch-like enclosure in front. They had even moved the stove out of the kitchen to a part of a covered patio. It was incredibly hot. This was all-important so the facilitators from the United States might really understand in some small way the scope, depth and possibly scale of the problem. It also helped in reviewing the presentations and videos.

There are obvious opportunities as the temperature rises to figure out cost-effective measures to deal with the heat. This is essential for the health and safety of the population. The experience was an excellent form of empathy as it made very real the opportunity. It would be hard to replace reading about it in an air-conditioned office or library.

Water

In the same manner as temperature, water was looked at carefully. Nicaragua receives a large quantity of rain by any measure, but has not developed provisions for collecting, preserving or conserving it. First, almost all homes dump their rainwater in the street. The streets dump the water into streams, rivers, or canals and those cement canals, which have been made deeper and deeper, rush filled with water to Lake Managua, the ocean or whatever river or body of water is nearby. In the case of Managua, the canals that approach the lake are deep and broad, with evidence of adding to the height as more and more roofs are built, and parking areas paved. All this fresh rainwater is going into the polluted lake and cannot be used. Further, for those living near streams, when the rains are heavy, it can be devastating as the land beneath their homes are washed away.

If water is not allowed to slowly settle back into the soil and thus recharge aquifers how will the country maintain its water supply? How will it have water for the rest of the year or the rest of the decade? The video done by students made this problem quite clear. The video was made in the mountain city of Matagalpa. It starts with a little brook gently flowing around rocks and in seconds (in the video) becomes a raging river endangering all in its path. It made several points:

1. run off can be forceful
2. water is not being retained for future use
3. there is little water preserved.

The last point was made with footage of people standing in line the same city, and the same neighbourhood with their water jugs next to a public well. The insights of the facts of the professor presenting on water combined with the power of the videos really helped define the problem. The videos might have seemed dramatic, but they are typical scenes of Nicaragua, a country that is not managing its water resources.

This is true on the farm, in the urban dwelling, as communities, as municipalities, and as a nation. There is room for effective economic ideas for managing aquifer recharge throughout Nicaragua.

Soil

In the case of soil, the presenter explained a lot about the negative impact of compaction of soil. Compaction occurs when the forest is cleared for grasslands by cutting or burning, and then cattle can wonder the area. One may not think of soil as something fragile and tender, however, when trod upon by heavy animals, the soil loses a great deal of its ability to retain water and thus to be useful to the farmer.

The videos done by the students were excellent. They really demonstrated the point of the expert-professor presenters. They showed the process of compaction on the land. Again, a case for agricultural businesses that make better use of the land and the rain as a resource.

Workshop Process

On the first day of the workshop, we had three cycles of presentations of the three challenges or problems: temperature, water, and soil. Starting with the large problem and the national and international research presented by

a professor. The next step was empathy in which each of these faculty speakers was followed by Rural and Urban Videos made by students. The material fit together well. Students on different campuses produced these empathy videos. Some of the videos had to be redone as either they did not seem to be a visualization of the issues, or they tried to offer solutions. At this point, the goal is only to offer the problems. However, the edited videos were excellent examples of what students can do. The videos conveyed an understanding of the problem that really helped to focus on the problem definition and then ideation.

Define and Ideate

Each of the three temperature, water and soil participants were asked to first define a subset of the problem that interest the team before moving forward with an ideation. In this part, a team might have chosen to look at methods of collecting water from roof run off, from a creek, or ways of retaining water once collected, or ways of maintaining it in the hot climate. Teams got to define the problem in a way that they thought would interest them the most.

For each problem, an ideation was performed using different methods of ideation. Remember that this workshop is for professors so the goal is to give them as many tools as possible. Thus, ideation is taught with words in many forms, with sketches and with the help of three-dimensional construction. There are techniques available to get huge quantities of ideas rapidly.

Selection

After all the ideations were finished, including one on each of the themes, (temperature, water, and soil), the group moved on to selection. Each team of five people selected ten of the more than 80 ideas that were on the wall (20 from Temperature, 20 from water, 20 from soil, and 20 from participants' lives). Professors and students alike are often amazed at how many ideas can be generated.

Testing

The first test of the ideas was to go out into the communities (either rural or urban) and ask people what they thought of the teams'

ten ideas in hierarchical order. An administrative team, (composed of one young professor, one young technical person, and the lead researcher), had figured out how to do all the data collection using the smart phones. It was an incredible process to see professors visiting rural communities and those in city parks all coming online with their information. This was very exciting when you consider where we were in Nicaragua. It was also exciting for the faculty to see and to think about what they might realize for a class in the 21st century!

Perhaps as important was the fact that as they discussed issues with homeowners and small farmers, they were shown what the local was experiencing. Comments such as, "here is the water gully behind my house," "here is how high the river was when it flooded; "here is an attempt to keep my roof cooler with vines growing on it," and so forth. Most of them with phones took picture of the challenges, which is good empathy work. Unfortunately, there was not a wall to display pictures of problems and that might be an idea for the final year when AGII will host this workshop for UNAN-Managua. It is a budgetary item and it is incumbent on the designers of the program to think about cost to the program and to the classrooms of these professors. There is little budget for classroom expenditures at any age in Nicaragua. However, we did introduce that concept to the faculty as the prices and availability of things keeps changing.

Prototyping and Testing

The teams went through from two to many rounds of first sketching and then making prototypes to solve the problem that they had selected. In round one, example sketching was used and soon they were back out in the field in the communities, asking people which sketch came closer to meeting their needs. Respondents often take select elements from more than one sketch and that is an important lesson for faculty to learn to keep the minds open and listen in each round.

At the very end of the week, the participants were all very busy making prototypes of a whole variety of materials. Once you unleash the creative juices, and people begin to create, it is amazing to see what they produce. For faculty participating in the process will hopefully lead them to work with students and others in a more open and sometimes hands on approach. When they had models either the models or pictures of the models went to the community for further comments by the potential clients, or users.

The Design Thinking Model as put forth by the Institute for Design at Stanford is not a straight-line model in practice. It is expected that teams will advance from defining to ideation and then back to greater definition, more ideation, and then on to sketching as a form of prototyping more testing and then possibly back to ideation, and then to more prototyping and testing with a goal of getting closer and closer to an idea that has real value in solving the problem.

This is important process to be able to communicate, as having an idea with value is the first step to creating a business. You can copy others, but it is far better if you can help people in some way to live better because you have created new value.

Conclusion. Ready for the Final Year

It is with great enthusiasm that we look forward to a banner year for the workshop in 2018. It is hoped we can find even better problem statements. One possibility is to look at the United Nations Sustainability Goals. It may also be decided to focus on some specific problems of Nicaragua as it approaches 40 years since the revolution was completed.

Along with the better problems comes the goal of defining them clearly. There is a trick to bringing a problem down to level at which you can resolve it. Industry has much to teach, and in the business of innovation, one of the things is the idea to solve one problem for one person and build from there. To do this means to be able to define the problem in a specific way. For example, with temperature, without mechanical aids such as air conditioning, how do you maintain the heat at a tolerable level into the future at your house, on your farm, etc.? Ultimately, it should be one example. Doing this kind of defining is not easy for faculty, as everyone always wants to be all-inclusive.

In 2017, the testing and investigation, changed greatly thanks to a new director of research provided by UNAN and two young people who had a vision of how to use the cell phones. The first major improvement was to go to many types of communities – as in get out of the city. The second is that all data could be entered on cell phones live, as the participants were face-to-face with the respondents. These were great improvements. In 2018, the dream is to develop even better information from the respondents and the best locations possible for the themes.

One thing that is still problematic is getting people to let go of an idea and switch to something else. The idea of iterating or circling back in the process is built into the theory and practice but it is still hard for individuals to implement. People naturally do not want to let go of their ideas. This will be an area of focus in 2018.

For years, the final presentations have made a slow progression from five big sheets of paper to PowerPoint presentations, and occasionally a PREZI. These are still dependent on the presenters and their style in the front of the room. What would it be like if all the presentations were standalone videos? The idea that all is organized and contained in a video that is transportable and usable multiple times has appeal. Professors could use their video to be an example for their students.

The final part of the changes for the 2018 program is to once again ramp up the level of technology for all engaged. If Nicaraguan faculty can help their students to see how to use the technology of the 21st century, this can have an amazing impact on the future of education in this country and beyond.

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