BUILDING ENTREPRENEURSHIP COMPETENCIES THROUGH THE DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEMS APPS

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Abstract

Experiential Learning may be defined as an approximation to education where knowledge is acquired through the interaction of the individual with his/her environment. A group of professors from Tecnológico de Monterrey (México) designed and implemented an entrepreneurship course based on experiential learning. They enriched the traditional curricula of the course with a MOOC on development of Geographic Information Systems Apps. During the course, students are requested to generate business ideas on GeoApps, develop a prototype app for Android, define a business model for their software, and validate the model with a target market. An inventory on Entrepreneurship competencies is presented, as well as conclusions on the lessons learned from this project.

Keywords: Experiential Learning, Entrepreneurship, Apps Development, GIS.

1 INTRODUCTION

Experiential learning aims to create knowledge and understanding through interaction with the environment [1]. It can be defined as an educational approach where knowledge is acquired -either tacitly or explicitly- through the understanding obtained during the contact and communication between the individual and his/her setting [2]. Its implementation in many areas is recommended because it has been demonstrated that involving students actively in the learning process increases their participation and commitment [3].

Currently, entrepreneurial education can be divided in three groups according to its main objective: educate about entrepreneurship, educate to become an entrepreneur, and educate through entrepreneurship [4]. Independently from its objective, experiential learning in entrepreneurship has been defended by various experts in the topic [5] [6] [7] [8].

A group of professors from Tecnológico de Monterrey, designed and implemented a pilot entrepreneurship course based on the concept of experiential learning where students were requested to create original GeoApps business ideas, to build prototypes for market exploration, and to design business models for their implementation. This document describes the course design, and discusses the experience and lessons learned from the course implementation.

2 METHODOLOGY

The course EM3004 Leadership for Entrepreneurial Development is a senior core course offered to all business and engineering majors. The course objective states that “students will be able to enhance their entrepreneurial potential by developing their skills to identify, create and evaluate new feasible business opportunities and business models based on technology and/or innovation, generating the most possible value while being socially responsible” [9]. The authors of this document decided to offer a pilot experiential learning course in Querétaro, México, during the Spring 2017 term. The classes took place once a week, every Monday from 7 to 10 p.m. and 36 students were enrolled.

Participants attended sixteen sessions. In the second session, they brainstormed ideas to novice GeoApps, after being introduced some basic concepts of geographic information systems (GIS). During the third session, they created multi-disciplinary teams between four to six classmates and developed the concept of their app, such concept was reinforced and analyzed from a value-oriented perspective during weeks fourth to seventh. A first prototype was built in the eighth week. Then, students designed the business model and did experiments to validate the most important assumptions from week nine to twelve. During the last four weeks of the course, students were introduced to techniques such as Lean Start Up to evaluate and validate their product launch to the
market. A final presentation of their business models and prototypes was conducted during the last week of the semester.

In order to be able to build the prototypes, students were asked to enroll to the MOOC “Do-It-Yourself Geo Apps” [10]. They were asked to be enrolled in the MOOC by the third week, submit evidence of 50% completion of the MOOC by the sixth week, and submit the Certificate of Completion before the session of the ninth week. The general idea of these deadlines was to align the MOOC with the process of developing the GeoApp prototype.

Additionally, an experienced app developer was assigned to assist students in the process of developing their applications. The intention of this support was to either provide technical assistant in the case the teams required minor support, or an estimate of the development cost, in the case that they required something more elaborate.

3 RESULTS

At the beginning of the course, students were vastly motivated by the perspective of having the challenge of creating their own apps. This was reinforced at the brainstorming stage, where the ideas developed were original and featured substantial potential. During the MOOC, they realized that not all the majors have the required technical knowledge to successfully complete the most advanced exercises. After our expert evaluated the prototypes, only three out of nine teams had the potential to pursue a professional prototype development. The other six teams received an estimate of the programmer hours they would require in case they wanted to pursue a professional prototype.

Table 1 shows a list of competences required to develop successfully a GeoApp and launch it in the market. As it can be observed, the course provided the entrepreneurial-based competences. However, some key competences were not covered neither in the course nor in the MOOC.

Table 1. Competences required for developing GeoApp-based businesses.

<table>
<thead>
<tr>
<th>Competence</th>
<th>Course</th>
<th>MOOC</th>
<th>Not considered</th>
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<tbody>
<tr>
<td>Identify business opportunities</td>
<td>√</td>
<td></td>
<td></td>
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<tr>
<td>Elaborate value propositions</td>
<td>√</td>
<td></td>
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<tr>
<td>Design business models</td>
<td>√</td>
<td></td>
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<tr>
<td>Build product prototypes</td>
<td>√</td>
<td>√</td>
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<tr>
<td>Validate business models</td>
<td>√</td>
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<tr>
<td>Understand fundamentals of GIS</td>
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<td>√</td>
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<tr>
<td>Build simple GeoApps</td>
<td>√</td>
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<tr>
<td>Design and manage web-based databases</td>
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<tr>
<td>Programming for Android devices</td>
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<tr>
<td>Development of user-friendly interfaces</td>
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<td></td>
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<tr>
<td>Internet security and encryption</td>
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<tr>
<td>Build advances GeoApps</td>
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</table>

As stated before, the main goal of the entrepreneurship course is to develop entrepreneurial skills. The concept of designing and developing and Android app was an excuse to create a learning environment where experiential learning may take place. At the end of the course, students applied experiential learning to developed entrepreneurial competences. These competences were documented in their business models, business validations, and final project presentations.

Another element to be considered in the evaluation of this pilot course is the evaluation that the students made of the professor, such as intellectual challenge, mentorship, and recommendation. The same professor taught the course the prior semester without the experiential component. In the previous semester, the average evaluation of the course was 9.35 of 10.00 possible points, this time the evaluation was 9.51. The main increases were observed in statements like “the method and learning activities were clear and innovative” (from 9.29 to 9.40), “understanding of how the theory is
applied in real life” (from 9.20 to 9.49) and specially “interaction with the professor and mentorship received” (from 9.41 to 9.70). The other statements concerning evaluation, challenge and recommendation remained basically in the same levels.

4 CONCLUSIONS

There are many obstacles that can impede entrepreneurial education [11], such as classes that are too theoretical (entrepreneurship cannot be developed only inside of a building), difficulty to assess the outcomes of the educational program, and the lack of communication between technical programs and entrepreneurship programs. For a more successful implementation of a course like this in the future, we would suggest the following actions:

• Design a less academic environment, featuring a course more oriented on appointments and guest lectures than to a weekly class setting.
• Enrol in the course at least 15% of computer science majors, to have enough technical knowledge for the app development.
• Introduce the app developer expert since the idea selection stage, and not until the prototype development stage.
• Generate a set of ideas during the brainstorming stage of the course, requesting students to eliminate ideas during the course by a comprehensive evaluation (including the complexity dimension) as they advance in their technological skills.
• Involve the technical expert in the evaluation and cost estimation of developing ideas in earlier stages of the course.

It is hard to evaluate the success of a pilot course like this. The evaluation of the professor is an alternative, but it is not evidence of students’ learning (although students’ satisfaction is not a bad outcome at all). Additionally, there are other entrepreneurial programs available in our institution like a full-semester entrepreneurship program and an incubation program. We can see if some of the participating students pursue those opportunities to concentrate more in the development of their business model and the commercial launch of their app.

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REFERENCES


