

**PROPOSAL OF A CONCISE METHODOLOGY FOR TEACHING
ENTREPRENEURSHIP TO ENGINEERING UNDERGRADUATES**

Marcus Lloyd George
Ultimate Virtual Market Limited, San Fernando, Trinidad and Tobago
marcus.george99@yahoo.com

ABSTRACT

Entrepreneurship education in the Caribbean is crucial to sustainable development of the region. This paper proposes a concise and effective methodology for teaching Entrepreneurship to engineering undergraduates based on application. This paper will present a methodology which will introduce students to the principles and practices involved in building their own business from start to success. Unlike many taught business programmes which conclude with students having vast knowledge on fundamentals of business, this programme however will give them direct hands on experience in actually building the business, which concludes with the students actually having a registered, planned business with relevant strategic promotional platforms to begin attracting clientele. Aspects such as business conceptualization and planning, business registration, business economics, business marketing and promotions, and business expansion strategies are included.

KEYWORDS:

Entrepreneurial Studies, Teaching Entrepreneurship, Business Development Studies, Entrepreneurial Education, Group-Learning.

INTRODUCTION

Engineering undergraduates at the University of the West Indies (UWI), St. Augustine campus are not formerly taught entrepreneurship in their respective programmes. In recent times there has been discussion on introducing an optional theoretical entrepreneurship course for level 3 students. However, to effectively teach entrepreneurship, a practical approach is required.

[1] presented an approach for teaching entrepreneurship to engineers of School of Engineering at the University of New Mexico. In this approach that students work together in small groups and each group will develop a business plan for a start-up business proposed by the group. [1] also identifies all reasons for facilitating a course like that and also the methodology for conducting such a course. The course presented material on economics, management, etc, as they relate to entrepreneurship. [1] indicated that the entrepreneurship courses present appeared to have fulfilled all objectives for students. [1] also indicated that the course has the capability of awakening tertiary level students' and professionals' ability to create successful business.

[2] indicated that the booming entrepreneurship practices requires an improvement in the teaching of the topic of entrepreneurship. As such [2] presented an argument of whether or not the topic of entrepreneurship can actually be taught and if it can, what approach can be utilized in teaching it to university students. [2] contrasted two approaches of teaching entrepreneurship – business school approach and entrepreneur real world approach. At the end of the study [2] concluded that in order for entrepreneurial programs to be effective the learning of entrepreneurial techniques should be based on real world situations and as such the entrepreneur real world approach is the most appropriate.

[4] presented a sandbox model for the teaching of entrepreneurship to software engineering students. In this approach the student activities were coordinated and monitored by the course lecturer. Entrepreneurship thinking is integrated into the approach and students are allowed to fail objectives but resume progress from the subsequent milestone of the project [4]. [4] indicated that the merits of the sandbox model are debatable as some faculty members argue that this methodology limits students' creativity while others question the effectiveness of the approach in teaching entrepreneurship.

[5] indicated that the growth of the economy of India lies on entrepreneurship and there is a need for the development of entrepreneurship among engineering students from the beginning of their technical education. In India entrepreneurship courses are offered in more than 100 university departments. Most of these courses cover

the legal and managerial aspects of entrepreneurship and serves to equip students with knowledge, skills and the mindset for the running of their businesses [5]. Institutions such as the Indian Institute of Technology have started incubators for business which are used to begin entrepreneurship courses. [5] indicates that using this procedure and also exposing young engineers to these entrepreneurship programs will likely improve the Indian economy and elevate it globally.

[6] presented a PIPE (Problem-Idea-Product-Enterprise) model for the teaching of creativity, innovation and entrepreneurship to at the Hong Kong City University. The approach is very operational and structural and motivates students in actively learning the entrepreneurial process from problem discovery [6]. [6] indicates that students at Hong Kong City University with little technical knowledge find the PIPE model very useful in solving problems in daily life along with problems in the industry.

[7] reported on the teaching of entrepreneurship to 243 students using serious games and Web 2.0. In this strategy a series of mini-games are developed, a Web 2.0 platform is set up and finally a collaborative competition involving students of ages 14-18 was established [7]. Students participated in a series of tasks ranging from generation of business ideas to the creation of products. Questionnaires were completed before and after the competitions to gather information on the student experience with the methodology [7]. Based on the feedback from questionnaires of [7] students stated that the use of such a learning technique was very useful in them learning about entrepreneurship.

[8] indicates that entrepreneurship is generally a key economic driver of a country. With the uncertainty associated with entrepreneurship parents resort to motivating their children to acquire permanent jobs, hence having them grow with that aspiration [8]. Massive Open Online Courses (MOOCs) removes the needs for universities to have infrastructure and other required resources needed for promoting entrepreneurial learning. MOOCs can be used by corporate entities in promoting the entrepreneurial skills of their employees. [8] demonstrated the use of MOOCs in uplifting the entrepreneurial education of citizens of a nation. [8] claims that the operational flexibility, cost advantage, easy scalability, etc. of MOOCs will enhance the entrepreneurial skills of users.

[9] presents the use of project management courses for teaching entrepreneurship communication and also describes the experience of using entrepreneur clients for the teaching of project management courses. The courses presented focused on several aspects including project management roles, project management processes, project conception and planning rhetoric, etc [9]. [9] indicates that students however used skills acquired in the project management course to construct companies after they are graduated and have claimed that the experience of this course supports the teaching of entrepreneurial communication. [9] further claims that the project management course encourages Alumni to consider a career of entrepreneurship.

[10] presented a semester-long course presented at George Mason University which is aimed at the provision of sufficient resources to engage its students in the process of idea generation and design cycle development enroute to the development of a business plan corresponding to the ideas generated. Students with product ideas are recruited, organized into groups, and then taken through a seminar-type course through a 15-week semester. Students are then taken through a 1-week boot camp to present their business plan. In this course students are provided with micro-grants to support the realization of their ideas. [10] claimed that the course was a success and that out of the five teams who participated, three teams completed their products while the remaining continued beyond the timelines for the course.

[12] presented a comparative study on innovation and entrepreneurship education in China. [12] analyzes five aspects of entrepreneurship education – concept and positioning, faculty construction, organization setting, external support and teaching content and subject support. Existing problems along with reform of China's innovation and entrepreneurship education.

[13] explores entrepreneurship and examples of entrepreneurship programs in various computer science departments with special emphasis on their aims and learning outcomes. A two-part entrepreneurship courses is then developed and presented. One part focuses on discovery stage of entrepreneurship while the other deals with the delivery stage. The learning outcomes and flow of the course are developed and examined. Common challenges faced in these entrepreneurship programmes along with solutions are also presented. To determine the effectiveness of the program, students were questioned on their experiences while undergoing this course. [13] did not comment on how students responded to the questionnaire.

SUMMARY OF PROPOSED METHODOLOGY FOR TEACHING ENTREPRENEURSHIP AT THE UWI

The proposed teaching methodology project-based and not only provides students with a theoretical foundation in entrepreneurship but also a solid practical approach to building a company from start to success. The corporate offering is broken up into six modules:

- Introduction to Entrepreneurship, a Way of Life
- Business Conceptualization and Planning
- Business Registration
- Business Economics
- Business Marketing and Promotions
- Business Expansion Strategies

Students are first organized in groups of 4. They are then asked to propose a business idea which they will use as the focus of the course. Students are then introduced to each topic from both a theoretical and practical point of view. Since each topic presented represents one phase of the company start-up cycle, students are assigned a group sub-project for each topic which they must undertake based on the business idea selected. This teaching methodology basically allows students to emulate sub-processes involved in bringing an idea to a successful business. On successful completion of this course, students would be able to achieve the learning outcomes of Table I below.

TABLE I: SUMMARY OF THE LEARNING OUTCOMES OF THE LABORATORY AND DESIGN COURSE

#	Learning Outcome	Cognitive Level
1	Recognize the roll of entrepreneurship in a nation's financial structure.	Knowledge
2	Demonstrate competence in conceptualizing and planning all aspects of a business including strategic planning, business controls, operations, human resource management, etc.	Application
3	Demonstrate competence all aspects of the business registration process, including preparation and filing of documents required in registering a business.	Application
4	Demonstrate competence business economics including, financial forecast, investments, setting up of business accounts, etc.	Application
5	Demonstrate competence strategic marketing and promotions for business including the use of social media.	Application
6	Identify the fundamentals of expansion strategies for their business ideas, new ventures and the topic of acquisitions.	Comprehension

MODULE 1: INTRODUCTION TO ENTREPRENEURSHIP

In this module students are inspired about the importance of entrepreneurship and its implication sin the world today. They are also introduced to factors influencing success in business and why reasons why business may fail. They are also presented on the importance of entrepreneurship in job creation in the region. This was an introductory module and as such no group project was associated.

MODULE 2: BUSINESS CONCEPTUALIZATION AND PLANNING

In this module students are inspired on how to discover and conceptualize business ideas. Students are encouraged to seek business ideas from observing issues persons face and finding ways to monetize them. Students are also though about business controls and investment options for supporting business. The group

project for this module was for students to go out into the public domains and identify two (2) issues faced by members of the public. For each issue faced they were required to list one product or service that can be provided to the public to solve the issues faced. This enabled students to identify business ideas. Groups were then required to choose one of these ideas to move forward with. For the selected idea groups were asked to prepare one paragraph to describe the how this idea would benefit potential clients, the target market and how the idea will be funded.

MODULE 3: BUSINESS REGISTRATION

In this module students are taught about the different types of business registrations such as sole trader, firm limited liability company and unlimited liability company. Students were also taught about the importance of registration and under what circumstances they selected each registration type. The most important part of this module was that students were actually taught how to register a business, all relevant paperwork required and the costs associated with filing this paperwork. The group project for this module was for groups to actually register a firm for the business idea the selected in Module 2.

MODULE 4: BUSINESS ECONOMICS

In this module students are introduced to aspects of business economics such as financial forecast, and how to set up business accounts. Requirements for setting up business accounts are discussed along with the importance of acquiring cheque books. Other crucial aspects such as business taxation, minimization of taxation and even tax breaks are discussed. The group project for this module involves groups preparing a financial forecast for their business. Setting up of a business accounts by groups was optional as it came with some legal implications and it was not the intention of the instructor of the course to burden groups with banking fees for maintaining the business accounts while learning entrepreneurship. Nevertheless, students were taught in detail how to create a business account for banking purposes.

MODULE 5: BUSINESS MARKETING AND PROMOTIONS

In this module students are taught business marketing and promotional strategies required to successfully attract their target market. Students are made aware of the importance of marketing and promotion in a business's success. In this module students are shown how to use social media in promoting their businesses along with the strategic use of viral promotional strategies. The group project for this module involves groups preparing a marketing and promotional strategy for their business. Groups are also required to execute that strategy and demonstrate to the instructor the success of such strategies on uplifting the business' popularity in the public domain. At the end of this module group's business should be attracting clientele.

MODULE 6: BUSINESS EXPANSION STRATEGIES

In this module students are taught about expansion strategies for their business ideas, new ventures and the topic of acquisitions and in what scenarios an acquisition is advantageous. The group project for this module involves groups listing three (3) possible expansion opportunities for the business and how these may affect the company's financial status.

CONCLUSION

This paper presented a methodology which will introduce students to the principles and practices involved in building their own business from start to success. Unlike many taught business programmes, this programme however gives students hands on experience in actually building the business, which concludes with the students actually having a registered, planned business with relevant strategic promotional platforms to begin attracting clientele. In this methodology students are introduced to aspects such as business conceptualization and planning, business registration, business economics, business marketing and promotions and strategic business leadership and management. The effectiveness of this methodology can be easily validated via the success of students in their respective business over a period of time as long as they remain consistent with the application of what was learnt in the course. An important ingredient for success however will be the provision of support to these students.

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REFERENCES

- [1] Gross, William A. 2000. "An Approach To Teaching Entrepreneurship To Engineers". *Proceedings of the 2000 IEEE Engineering Management Society. EMS - 2000 (Cat. No.00CH37139)*, 15-15 August, 2000, 648-652. New York: IEEE.
- [2] Zheng, Xin, Erli Liu, and Yi Cui. 2009. "Can Entrepreneurship Be Taught? The Approach To Teaching Entrepreneurship". *2009 International Workshop on Intelligent Systems and Applications*, 23-24 May, 2009, 1-2. New York: IEEE.
- [3] Gold, Steven K., and Franklin W. Olin. 2010. "Workshop - Teaching Entrepreneurial Behavior". *40th ASEE/IEEE Frontiers in Education Conference*, 27 – 30 October, 2010, 1-2. New York: IEEE.
- [4] Fu, Xiang, Simona Doboli, and John Impagliazzo. 2010. "Work in Progress - A Sandbox Model for Teaching Entrepreneurship". *40th ASEE/IEEE Frontiers in Education Conference*, 27 – 30 October, 2010, 1-2. New York: IEEE.
- [5] Subramanian, T.S.S., Pallavi Dubey, and Anupam Singh. 2012. "Need of Promoting Entrepreneurship at Institution Level for Engineering Students in India". *2012 IEEE International Conference on Engineering Education: Innovative Practices and Future Trends (AICERA)*, 19-21 July, 2012, 1-3. New York: IEEE.
- [6] Sun, Hongyi. 2012. "The PIPE Model for Teaching Creativity, Innovation and Entrepreneurship". *2012 Hong Kong IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALe)*, 20–23 August, 2012, 6-9. New York: IEEE.
- [7] Protopsaltis, Aristidis, Sonia Hetzner, Spiros Borotis, Thomas Connolly, and Thomas Hainey. 2014. "How to Teach Entrepreneurship Using Serious Games and Web 2.0". *2014 IEEE 14th International Conference on Advanced Learning Technologies*, 7-10 July, 2014, 227. New York: IEEE.
- [8] Mondal, Manoj Kumar, Aashish Kumar, and Bishnu Pada Bose. 2015. "Entrepreneurship Education through MOOCs for Accelerated Economic Growth". *2015 IEEE 3rd International Conference on MOOCs, Innovation and Technology in Education (MITE)*, 1-2 October, 2015, 407-411. New York: IEEE.
- [9] Kampf, Constance, and Line Berggreen. 2016. "Using the Project Management Course as a Basis for Teaching Entrepreneurship Communication". *2016 IEEE International Professional Communication Conference (IPCC)*, 2-5 October, 2016, 1-7. New York: IEEE.
- [10] Reagle, Colin, Viviana Maggioni, Mihai Boicu, Massimiliano Albanese, Mahesh Joshi, Dann Sklarew, and Nathalia Peixoto. 2017. "From Idea to Prototype: Introducing Students to Entrepreneurship". *2017 IEEE Integrated STEM Conference (ISEC)*, 11-11 March, 2017, 71-75. New York: IEEE.
- [11] Haigen, Yang, and Fu Xiao. 2017. "Research on Innovation and Entrepreneurship Education for College Students of Electronic & Information Majors". *2017 IEEE Integrated STEM Education Conference (ISEC)*, 11-11 March, 2017, 701. New York: IEEE.
- [12] Lu, Chengjiang, and Hongming Zhu. 2017. "Comparative Study of Innovation and Entrepreneurship Education". *The 12th International Conference on Computer Science & Education (ICCSE 2017)*, 22-25 August, 2017, 629-633. New York: IEEE.
- [13] R. Pito Salas. 2017. "Teaching Entrepreneurship in Computer Science: Lessons Learned". *2017 IEEE Frontiers in Education Conference (FIE)*, 18-21 October, 2017, 1-7. New York: IEEE.
- [14] Mani, Mukta. 2017. "Aspects of Entrepreneurship Education in Higher Education Institutes". *Proceedings of 2017 Tenth International Conference on Contemporary Computing (IC3)*, 10-12 August, 2017, 1-3. New York: IEEE.