

## **Entrepreneurship Program in Science and Technology**

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### **Abstract**

This paper presents the principles, premises and basic structure proposed for the implementation of a new undergraduate entrepreneurship program in science and technology.

The reform in the education law in Brazil, established by the new “LDB – Law for Basis and Principles for Education in Brazil” (Law no. 9394 of 1996) creates the possibility of what is called “Sequential Programs by field of Education”, open to candidates with the minimum of high school degree, where the selection requirements is determined by each college or university criteria. The programs must be organized in high-level education system and programmed for at least two years degree, with the minimum of 1,600 class hours. These programs differ from regular undergraduate bachelor’s degree programs because they are organized in a specific field of education. This field of education can be organized in a specific area or discipline determined for example by agreements between industry and university.

The Universidade do Vale do Paraiba, associated to other organizations such as City Hall of Sao Jose dos Campos, some technology based companies, and professional industry associations, decided to implement the “The Sequential Entrepreneurship Program in Science and Technology”. This program is proposed for the students with interest in subjects related to innovation, technology based start-ups, technology management, technology development initiatives, and entrepreneurship in the science and technology industry. The Vale do Paraiba, in the State of Sao Paulo, Brazil, is well known as a science and technology based developed region. The aerospace, telecommunications, pharmaceutical, automobile industries and centers for research and innovation are located in the area. The program proposed intends to organize activities related to technology based project development, theory related to feasibility and risk analysis for technology based start-ups, team work, return on investment, benefits analysis, investment and return cash-flows, environmental issues, technology and society, etc. The program is design for a two-year degree and should be implemented in the middle of 2002.

## Introduction

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The instructors should be very special people with experience in developing projects in the industry and/or research and development agencies, preferable in the field of science and technology. The program also expects that part of the instructors had some previous involvement and experience in innovation and technology management as well.

The program activities should drive the students to understand and evaluate in advance the risks related to technology-based projects, where some of these projects are more related to anticipate some kind of technology.

The overall curriculum will follow the subjects:

- Theory and Decision Making Analysis
- Management Information Systems
- Sustainable Development and Organizations
- Technology and Society
- Mathematics and Finance

- Project Management involving: objectives, tech analysis, goals, lifecycle, timeline, cost analysis, ROI – Return on Investment, etc.

The program expects that the students learn theory, but the working time should be much more related to project development during the semesters and the conclusion of a Final Project at the end of the program. The idea is that during the program the students learn different subjects and be trained on how to collect all the information they need to develop the projects. The team of instructors will be responsible to delivery the “know-how” for the students to arrange and collect the right information they need.

<b>Entrepreneurship Project</b>			
<b>1st. Semester</b>	<b>2nd Semester</b>	<b>3rd Semester</b>	<b>4th Semester</b>
<b>Basic Courses</b>	<b>Basic + General Courses</b>	<b>General + Specific Courses</b>	<b>Specific Courses</b>

For example, if the project is to “Design and Built a Technology and Science Park”, the student team request from the instructors team all kind of knowledge they probably will need to develop the project. The knowledge can be related to economy, engineering, architecture, finance, social sciences, reports writing, languages (Portuguese, English, etc.) and so on.

The same we can say about how to develop a technology based start-up company. The students learn in class the theory, some specific technology and management tools and apply the knowledge in the development of a project or start-up company. The information and subjects are connected. The main purpose of the program is to prepare the students to learn how to develop and make the projects feasible, and at the same time in a good source of revenues.

### **Entrepreneurship Education in the Program**

Besides the many different ways we can educate students for the entrepreneurship, this program is much more related to: I. Intrapreneurs and II. Entrepreneurs. The program expects from the students a high level of entrepreneurship behavior. In this way the concepts we adopt are:

I. Intrapreneurs – The companies and corporations need innovation all the time. They need to attract more clients and achieve new markets. The “intrapreneurs” are employees that can make changes and promote innovations inside the corporations.

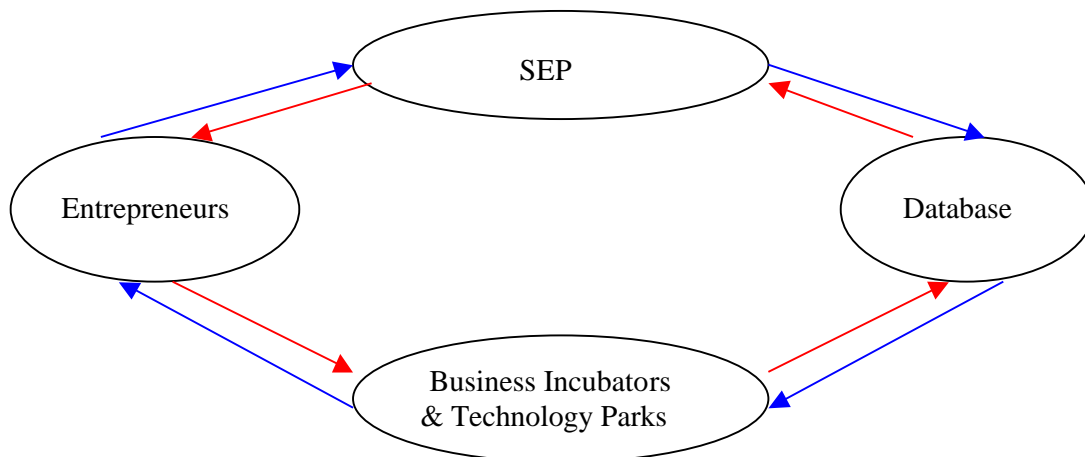
Intrapreneurs fell freedom to develop ideas, and are able to attract financial support to create new products, services, new systems, and to change the management culture of the company.

II. Entrepreneurs – New opportunities are open for professionals involved in the spirit of work in their own business and develop their own projects. The entrepreneurs have more freedom than employees of corporations and other professionals. Entrepreneurs accept the risk as something usual in the daily work. They don't have the guarantee of they salaries. They are more flexible and need to understand at least a small part of almost everything. The entrepreneurs are people who are able to organize and manage any enterprise or business, usually with considerable initiative and risk.

### Strategic Objectives of the Program

The main objectives of the proposed program are based on the fact that there are a huge amount of opportunities related to the development and implementation of new business based on science and technology in the region. These objectives are:

1. Establish the SEP – Sequential Entrepreneurship Program with emphasis on Science and Technology, a program that can support, contribute, develop and identify leadership in the region.
2. Share different experiences between entrepreneurs, students and instructors, creating an environment where people can talk about success, failures and opportunities.
3. Stimulate the integration between the University and the technology based Industry.
4. Create a database that group information about science, technology and entrepreneurship.
5. Establish the connections between the students involved in the program with Business Incubators, Science and Technology Parks, and Industry.
6. Stimulate leadership and innovation.



## **Mission for the Program**

The SEP – Sequential Entrepreneurship Program at Universidade do Vale do Paraiba is one of the tools that the university system will use to discuss about economy, education changes, sustainable organizations, society, environmental issues, social, political and cultural issues.

The SEP will try to emphasize the importance of Research and Development programs maintained by public and private agencies, research and development funding, venture investment, and the partnering between the university and industry.

Another premise adopted by the program is the relationship between business and the social aspects of life. The program will stimulate projects that could be based on the principle that business ethics and honest is in average more profitable.

## **Policies for the Program**

a) Policies for the courses, activities and subjects:

1. To create conditions to attract students with different backgrounds with interest in entrepreneurship related to science and technology.

2. To hire instructors with experiences in innovation and people able to drive the students in a risk taken behavior.

3. Select disciplines that can contribute to the entrepreneurship education process.

4. Develop theory and practice related to the business planning proposals.

5. The **Final Project** is the most important activity of the program. All students involved in the program must develop a final project using the theory and practice acquire during the program.

6. All the students involved in the program should develop the skills necessary for working in groups and for the group. Working with different people and **teamwork** is a requirement of the program.

7. The Final Project is a teamwork activity. The end product of the final project must be the result of different people working together following the same objectives.

8. Simulation will be used in the program. These simulations will involve technology, management, finance, etc.

9. A committee composed by instructors and professionals in the field will evaluate the final project.

b) Students:

1. All the students must have at least a high school degree in order to be accepted by the program.

2. Grants for tuition will be provided for some students. The Universidade do Vale do Paraiba, the City Hall of Sao Jose dos Campos, corporations, and professional associations are planning to provide these grants.

3. For selected projects, students will receive institutional support and finance from R&D agencies and venture incentives.

4. A database including information from students and their projects will be developed.

c) Equipments and laboratories:

1. Modern equipment and laboratories will be provided for the program. Students and instructors will use computers and equipments including different applications.

2. Internet high-speed connection for the students involved in the program.

3. Multimedia infrastructure including multimedia projectors, digital cameras, video conferencing systems, satellite conferencing system, and all sort of infrastructure in the university campus.

4. Library with emphasis in technology, engineering, management and law, including books, manuals, technical reports, papers, video-tapes, guides, etc.

### **The Entrepreneurship Education Program at UNIVAP**

The SEP – Sequential Entrepreneurship Program at Universidade do Vale do Paraiba intends that the students graduated from the program must have the abilities to propose and manage a technology based business plan. Some of the characteristics of the curriculum are:

- Vision of the future, by the courses including Strategic Planning, Government Public Policies, and Sustainable Organizations.

- Independence to act and to manage projects, by courses including disciplines such as Project Management, Business Law, Intellectual Property, and the Final Project.

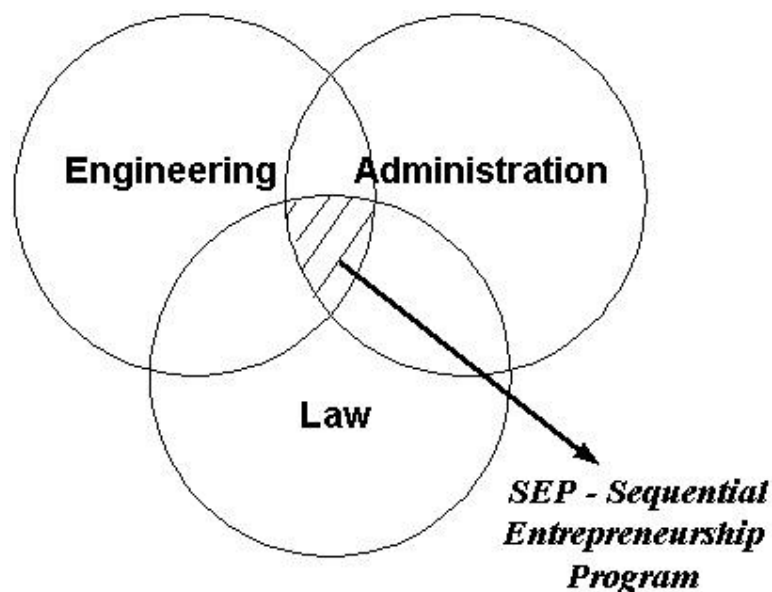
- Capacity of Analysis, by courses including Mathematics, Quantitative Methods such as Statistics and Finance.
- Capacity of Synthesis, by courses including subjects such as Planning, Business Administration and Administration of Organizations.
- Capacity of Evaluation, by courses including disciplines such as Risk Management, Risk Evaluation, Venture Investment, Finance and Accounting.
- Capacity of Teamwork, by the Final Project.

The program expects from the students behavior that follow innovation. One way to have innovation is to work in teams.

Progress toward a sustainable future is the most important premise for the conception of the program. The program aims to foster a wide-ranging and intellectually substantial exploration of sustainability as it relates to the science and technology environment. Sustainability implies a concern for social justice, and for the value of environment. Some topics related to sustainability in the program: What is meant by Sustainability? Economics of sustainability in the science and technology sector. Social justice and it correlations with science and technology. Methods and tools for economic and environmental analysis for science and technology systems.

### **The Infrastructure for the Program**

The Sequential Entrepreneurship Program at Universidade do Vale do Paraiba is planned to be a joint venture between the College of Engineering, the College of Business Administration and the School of Law.



Computer labs, engineering labs, conference rooms, training rooms and the libraries are resources included for the program.

### **Program Schedule**

The amount of class planned for the program is the minimum of 1,600 class hours, distributed in four semesters. The program is scheduled for a two-year degree and the expectation is that it can be implemented in the middle of 2002. The first class is planned to graduate in the middle of 2004.

Teams of students will develop the Final Project supported by an advisor. The advisor can be an instructor of the program or a professional connected to the program. The final project must be presented and evaluated by a committee composed by instructors and specialized people in the field. The final presentation scheduled for the last semester of the program includes oral and written presentations. The final project can be a business plan developed by the student team.

### **Faculty for the Program**

The faculty proposed for the program includes professors from Universidade do Vale do Paraiba, people with the minimum degree of specialization, people with masters and doctorate degrees and other professional with experience in the field. The professional experience in projects related to science and technology is a major requirement for the instructor in order to be accepted by the program.

At this time we have about 9 people involved with the program including: 4 PhDs, 3 Engineers with Master's degree and 2 Bachelor's Degree with specialization in management and technology. Some of this people are employees from the local technology based Industries.

### **Curriculum proposed for the Program**

Below is presented the curriculum proposed for the program. The curriculum proposed below in being continuously improved.



**SEP Curriculum**  
**1st. Semester**

1720 h

<b>Courses</b>	<b>Class hours</b>	
Corporate Projects and Organizations: Manufactures, Commerce and Services	60	380
Government and Public Policies	40	
Law and Commercial Regulations for Corporations and Business	40	
Mathematics applied to Projects and Corporations	60	
Management Information Systems	40	
Sustainable Development	40	
Technology Innovation Process	60	
Topics in Entrepreneurship I (Field Trips, Guest Speakers & Conferences)	40	

**2nd Semester**

<b>Courses</b>	<b>Class hours</b>	
Corporate Finance	60	380
Applied Statistics	40	
Marketing and Corporate Management	40	
Cost Accounting	40	
Quality Management	60	
Project Management	60	
Logistics and Product Distribution	40	
Topics in Entrepreneurship II (Field Trips, Guest Speakers & Conferences)	40	

**3rd Semester**

<b>Courses</b>	<b>Class hours</b>	
Strategic Management and Partnering	40	480
Sales Management and Technical Support	40	
Risk Investments and Stock Market	40	
Industrial Engineering and Manufacturing	40	
Intellectual Property and Patents	40	
Business Planning, Venture Capital and R&D Agencies	40	
Final Project (Part 1)	240	

**4th Semester**

<b>Courses</b>	<b>Class hours</b>	
Risk Management and Project Simulation	40	480
Knowledge Management	40	
Human Resources Management and Corporate Communication	40	
Project Finance and Incentives for Export	40	
Final Project (Part 2)	320	

## Conclusions

The region of Vale do Paraiba, in the State of Sao Paulo, Brazil, presents a huge potential for new projects and start-ups related to science and technology. The Univap - Universidade do Vale do Paraiba, has strategic interest in be involved and provide contributions for this process. One of the actions proposed by the university is to prepare and train people to work in the field. This is the reason of the SEP – Sequential Entrepreneurship Program in Science and Technology. Other three initiatives promoted by the university are already running. They are: the Univap's R&D Institute, the two Business Incubators maintained by Univap, and the Univap's Technology and Science Park, this last one starting the first stage of construction on February of 2002.

Talking about entrepreneurship education we understand that three aspects are the most important: the capacity of people in access, implement and make new technology feasible; be prepared to manage and lead people; and the capacity of the entrepreneur in manage and transform ideas into products and business.

## Bibliographic References

1. Bygrave, William D.. (1997) The portable MBA in entrepreneurship, 2<sup>nd</sup>. Edition, John Wiley & Sons Inc., New York.
2. Dolabela Chagas, Fernando C.. In portuguese: O Ensino de Empreendedorismo no Brasil; uma metodologia revolucionária, article published at Sebrae's homepage, <http://intranet/Intramine/Empreendedorismo/Ensino.htm>.
3. Dornelas, José C. A.. (2001) In portuguese: Empreendedorismo: transformando idéias em negócios, Editora Campus, Rio de Janeiro - RJ, Brazil.
4. Osborn, Charles S.. (1998) Systems for Sustainable Organizations: emergent strategies, interactive controls and semi-formal information, Journal of Management Studies, Blackwell Publishers Ltd., 35 :4, July 1998, 481-507.
5. Porter, Michael. (1985) Competitive Advantage, Free Press, New York.
6. Homepage: <http://www.sbaonline.sba.gov>

## **Biographical Information**

LUIZ ANTONIO GARGIONE is an Adjunct Professor at UNIVAP - Universidade do Vale do Paraiba, Sao Paulo, Brazil, since 1991. Before becoming a faculty member at UNIVAP he worked as a technician - engineer in the manufacturing industry for about 10 years. Luiz A. Gargione is a consultant to regional companies and is the Dean of Planning at Universidade do Vale do Paraiba.