# Creative Entrepreneurial Abrasion in Higher Education

João José Pinto Ferreira
*INESC Porto, Faculdade de Engenharia, Universidade do Porto, Rua Dr. Roberto Frias, s/n 4200-465 Porto, Portugal; jjpf@fe.up.pt*
Milton Sousa
*SPI, MIETE teacher miltonsousa@spi.pt*
José Oliveira
*Auto Sueco, MIETE teacher, jooliveira@autosueco.pt*

*In a group setting, the exposure to different thinking styles and people promotes what is called creative abrasion, which, if properly managed, can greatly enhance the innovation potential. This is the philosophy behind MIETE, which was conceived in 2004 to promote innovation and entrepreneurship with multidisciplinary teams. With this in mind, MIETE aims at adapting itself to the profiles of candidates from different areas including, amongst others, Management, Engineering, Biotechnology, Sciences and Design.*

*In this paper the authors, report their experiences during the feedback sessions of the last two years with MIETE students, particularly in the 'Implementation and Strategies for Technology Comercialisation' workshops.*

## 1. INTRODUCTION

Much has happened since the early years of the first "T-group" learning experiences of the 1940s started by Kurt Lewin. In such groups, "learning is best facilitated in an environment where there is dialectic tension and conflict between immediate, concrete experience and analytic detachment" (Kolb, 1984). This conceptual framework, which is a cornerstone of modern management training, forms a key pillar of MIETE's approach to learning. In MIETE, groups are formed with students from different backgrounds (all highly entrepreneurial and ambitious individuals) with the mission of developing a complete business plan based on an existing technology with the ultimate goal of bringing that technology to the market. Taking Yalom's (1995) four key elements of the T-group, one can clearly identify the basic characteristics of the MIETE's group learning experience:

- Feedback: groups are provided feedback on a regular basis about intermediate goals, outcomes, team dynamics and steps to follow. This feedback can be positive, expanding the group's energy, or negative, focusing the group's energy (in MIETE this is done through bi-weekly feedback sessions with dedicated coaches);
- Unfreezing: within the context of MIETE, this process refers to the need of demystifying the field of entrepreneurship and alerting for the needed sacrifices, persistence and patience that entrepreneurs must face. It is important that individuals understand their values and beliefs and how that relates to an entrepreneurial path (MIETE tries to "unfreeze" students through personality tests, continuous dialogue and by bringing "real" entrepreneurs to share their experiences);

- ▪ Participant observation: members need to get emotionally involved in the group's mission and observe each others' behaviour while reflecting on what needs to be improved (MIETE tries to structure this by instilling peer evaluation and inter-group feedback. Feedback sessions also stimulate this by involving several groups in the dialogue process, inducing self-reflection);
- ▪ Cognitive aids: in order to structure the work process, students get several seminars with external experts on the relevant subjects for the work at hand (in this case, MIETE provides several seminars on subjects important for building a business plan).

One other important aspect of MIETE is group diversity. This is a key element of creativity and innovation. As described by Leonard and Swap (1999, p. 20) on producing creative options: "… you must select group members who, in combination, will provide you with requisite variety…. these group members must somehow be induced to do something with that variety, including debating – sometimes vigorously – the options. Group members will need to challenge one another and to welcome differences in intellectual background. Through this process, dubbed "creative abrasion" by Henry Hirshberg, the group can unleash the creative potential that is latent in a collection of unlike-minded individuals". In MIETE, as technologies from the University "given" for groups to work on are usually "raw", fuzzy and deprived of a clear market use, creativity and diversity are essential in order to make sense of that technology with a clear and innovative business rational.

One final element of the MIETE program is the role that coaches, in this case the authors of this paper, play in the guiding process of students and groups. While the coaches provide a mix of academic and professional experience that can be used to structure discussions, they also provide a means of reflection and continuous evaluation. The MIETE coaches act as change agents during the personal unfreezing process mentioned before and as facilitators towards optimized group behaviour. With this change agent perspective, self-awareness is paramount. As change agents, the MIETE coaches need to have a high level of awareness about the impact they make and their ability to make choices to direct and modify that impact (Curran, Seashore and Welp, 1995).

Such a learning environment, with high diversity and interaction, raw and fuzzy technology and ambitious entrepreneurial students, raises effectiveness and real learning, but provides also a seedbed for unexpected challenges. This paper tries to highlight some of these challenges that emerge mostly during the feedback sessions with MIETE students.

## 2. BACKGROUND: THE MIETE COURSE

### 2.1. In a Nutshell

In a group setting, the exposure to different thinking styles and people promotes what is called creative abrasion, which, if properly managed, can greatly enhance the innovation potential. This is the philosophy behind MIETE, which was conceived to promote innovation and entrepreneurship with multidisciplinary teams.

With this in mind, MIETE aims at adapting itself to the profiles of candidates from different areas including, amongst others, Management, Engineering, Biotechnology, Sciences and Design.

Throughout the program, the teams develop key integrated competencies on innovation, entrepreneurship and technology that will ultimately enable the students to create and develop new technology-based businesses.

## 2.2. Target

MIETE is designed for highly qualified people with a strong will to start new technology-based businesses, regardless of their educational and professional background.

People attending MIETE are usually middle managers from the private sector, faculty staff and researchers or recent graduate students wishing to major on innovation and entrepreneurship. Students applying to MIETE should have completed at least their bachelor degree (or the 1st cycle as defined in the Bologna treaty).

## 2.3. MIETE Unique Offer

Master programs that take their participants through the entire venture creation process are rare in Europe[20], especially when compared with the United States, where this kind of formal "hands-on'" training is very much advanced. MIETE started with the support of the North Carolina State University during its 1st Edition (2004/06) in the implementation of the so-called "Technology Commercialization Sequence".

MIETE tries to take its participants through the entire venture creation process, by combining real training in the innovation process and technology commercialization with the interaction of its students with researchers from different fields at the University of Porto (UP) and external experts and entrepreneurs.

## 2.4 Entrepreneurial Project

### 2.4.1. Training in New Business Construction

MIETE promotes an innovative combination of training in technology (any topic from the different faculties of the University of Porto), Creativity, New Product Development and Management, promoting, whenever appropriate, the valorisation of technologies through the construction of commercialisation strategies and their implementation through licensing or through the creation of new businesses.

In this context, where innovation is approached as a conscious and consistent effort for identifying new opportunities, MIETE aims at bridging the gap between the technology discovery – conducted at Faculties, Research Institutes and Enterprises – and the commercialisation of innovative technology-based products and services, both through the construction of new businesses or through the transfer of technology to existing companies.

### 2.4.2. MIETE as Pivot in the Technology Transfer Process

The model with which MIETE started in September 2004 relied heavily on the interaction of MIETE teams and R&D groups at the University of Porto. In September 2006 the new MIETE students were offered additional training in the usage of creative processes and techniques to support the early ideation phases. In parallel, the course started establishing bridges with enterprises. This connection to the private sector is crucial for the role that MIETE wants to play in the modernization of the Portuguese economy. The picture below illustrates the current operational model in which MIETE, through training of multidisciplinary teams, plays an interface role between the University, established enterprises, potential investors and new businesses.

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[20] We would highlight the Innovation and Entrepreneurship Master program at the University of Oslo

By promoting this close relationship with R&D groups in the University and enterprises, MIETE wishes to explicitly position itself as a Pivot in the innovation process, stimulating technology transfer and new venture creation.
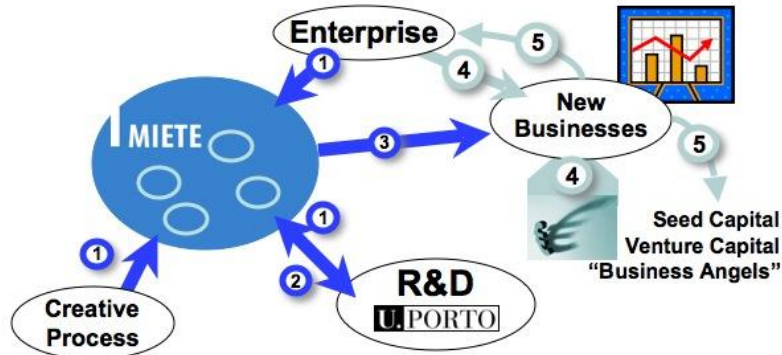


*Figure 1*.  MIETE operational model

## 3. MIETE 2006/2008 EXPERIENCE

In this section, the authors bring some of their experiences during the feedback sessions held with the MIETE groups.

### 3.1 Interaction with students

The three authors of this paper have been engaged in MIETE since its 1st edition. João José Ferreira as Course Director, and both Milton Sousa (strategy, organization and innovation classes) and José Oliveira (financial and accounting classes) as MIETE teachers. This paragraph focus in the experience the latter had while supporting the students during the so-called Technology Commercialization (TEC) Sequence and, in particular, on the last course "Implementation Strategies for Technology Comercialisation", which occurs on the 3rd semester. Throughout the whole TEC Sequence, which aims at developing a complete business plan based on a technology from the University, the students should acquire the following competencies

    1. Be able to identify technologies with potential for economic valorisation;
    2. Be able to drive the creative process to generate business opportunities from existing technologies;
    3. Be able to implement the process of technology valorisation;
    4. Be able to evaluate a technology's commercial feasibility;
    5. Be able to build a business plan based on: opportunity analysis, implementation strategy, investment needs and implementation plan.

During the "Implementation Strategies for Technology Comercialisation" course, students and the authors have the opportunity to meet, twice a month during a semester, to share views on each group's business plan progress.

The course also includes 6 special sessions with invited speakers, covering subjects such as legal procedures, finance, putting business plans to practice, new product

development and several soft skills (e.g. presentation techniques, negotiation, team management)..

During this course, students have the opportunity to further develop their business plans, on which they have been working since the beginning of the TEC sequence within their groups (with a particular technology selected during the 1st semester). The feedback sessions are open to all the groups, but interaction is focused and done sequentially on a group by group basis, addressing their specific needs.

During the feedback sessions, the groups need to make a short presentation on their progress. The 'Implementation Strategies for Technology Comercialisation' course ends up with a formal presentation and evaluation of the business plan.

### 3.2. The challenges of the feedback sessions

The two main questions that need to be answered during this course are:
1. "What is the Product Value Proposition?" That is, what is the value of this product/technology for a particular market?
2. "What is the Business Value Proposition?" At this point in time students should have a very good idea of the market size, the need for the product/service and, finally, the business value for the investor.

To answer these two questions, several others arise that pose many challenges as described below:
1. **'Who will sell what to whom?'** This is probably the most common question asked to students during the 1st semester classes of the TEC Sequence. It is however frequent, as students often loose their focus, to come back to this question during the 3rd semester feedback sessions.
2. **Sizing the market:** Students often struggle to estimate their product/service market size, and usually delay this exercise as much as they can. Most powerful research databases, such as 'Datamonitor™ are not freely available at the University, which means that students need to use other sources and techniques to get market data, including cold calling and direct interviews. While this is on its own a great learning experience, it demands more time and energy from the students as they need to build a picture of the market from scattered bits and pieces.
3. **Defining the product as the client wants it to be:** This involves a very structured iterative process applied to tuning product features to the actual market needs. 'Engineering background driven' groups are usually less careful about what their future customers/clients really want. It is sometimes hard to take these groups out of the 'laboratory view'.
4. **Technology patent issues:** When using technology developed by the University of Porto researchers and students need to come to terms on the legal support and IP rights of the technologies. This only happens when the students are indeed interested in starting a company, which is often the case. These negotiation processes can take a long time, demanding a lot of attention from both the students and the group coaches (the authors). The process itself is a great opportunity to learn from a real example on how to negotiate IP rights, but if taken too long, it can linger the commercialization process.
5. **Realistic expectations about product development, financing and market entry:** Most of the students don't have a clear idea of how much time they need until their projects are ready for take off. Most of them underestimate the timing needed to get the first customer, and usually don't know when to start the fund

raising process. Other problems concern the product development plan, mainly when students don't have a strong product development background, limiting their ability to clearly develop an objective and realistic timeline.

6.  **Lack of seed capital:** Students often find interesting technologies or develop interesting concepts that still need a "proof of concept". Students can get frustrated as there is a clear lack of seed capital in Portugal from both Business Angels and the University to support this early-stage projects. Other financing sources include private companies that could become a future supplier, customer or even shareholder of the new company to be created. This is again usually a long process that can lead to frustration and disappointment. This is nothing different from what entrepreneurs face on a daily basis. While this is again a great learning experience, it is important to motivate students to overcome the frustrations associated with these issues.

7.  **Is this work academically acceptable?** Most of MIETE teachers combine some working experience in private companies with some academic background and try to bring real live examples to classes. However, MIETE is formally a MSc Course and consequently the students' evaluation is formal. For some of the students this mix of academic content and evaluation with practical entrepreneurship can be quite confusing. Our understanding is that this mix, albeit potentially confusing, is of great value as it brings real hands-on experience with solid academic foundations. It is important that the coaches keep this message clear throughout the whole course.

8.  **From producers to consultants:** Students that are 'building' a new product, often expect to build the entire 'factory' to produce it. Students are taught about the importance of keeping fixed costs low and of following asset-light strategies in a new start-up, where cash is vital. However, even asset-light strategies based on outsourcing can prove expensive and hard to finance. Students often finish the course in a position where they can only sell or license the knowledge about the product and technology they worked on. It is important for the coaches to make students alert about their added value in the process and of the importance of networking and outsourcing. This can help them to clearly define their position in the market.

9.  **From a Group to several subgroups:** The existing money restrictions to hire and pay for the necessary skills needed to complete the product development process, require groups to seek help from undergraduate or PhD students that receive grants from the State. Students often become project coordinators, and are usually not 'hand on' technicians. This allows students to get project management skills. There are however several challenges to this as students don't have enough authority over project team members to guide the development process within the schedule and specifications defined by them. The coaches often advise students on how to improve their ability to exercise influence and power in those circumstances.

## 4. CONCLUSIONS

The MIETE experience proves that technology based entrepreneurial teaching in higher education is more effective under the following circumstances:

- Students are from different backgrounds and organized in diverse groups, inducing creative abrasion.

- The groups work on existing technologies from the University (or from enterprises) with the aim of brining that technology to the market. This allows students to get confronted with real-life situations and to face the frustrations entrepreneurs face when starting their companies. Even if students are not able to start a company at the end of the MIETE program, their learning experience is far more valuable than pure academic or case study teaching.

- There are structured feedback sessions that allow students to discuss and understand how they are progressing.

- There are cognitive aids based on seminars or classes that provide a solid academic foundation, guiding this way the learning process.

- The groups are coached by professionals with a mix of solid academic foundations and professional experience. These coaches need to act as change agents, motivating students, facilitating discussions, stimulating students to participate and supporting them through the different challenges posed to them. With this respect, the coaches need to "unfreeze" students from their pre-conceptions so that they understand what it takes to be an entrepreneur. Coaches also need to be highly aware of their impact in the students' progress.

The difficulties and challenges associated with this learning model are far greater than those in more traditional programs. The teachers and team coaches need to be highly skilled in their profession and academic theory, but also in managing team dynamics and the relation between different stakeholders. However, the benefits of this approach reflected on the learned skills and knowledge and successful technology transfer (often with the creation of new companies), outweigh by far the necessary sacrifices that students, teachers and coaches need to endure throughout the program. As the proverb goes: "No pain, no gain!"

## 5. REFERENCES

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