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THE MULTIDIMENSIONAL TEACHING TECHNIQUE AND THE BENEFITS PROVIDED TO LOCAL STARTUPS: A STUDENT'S PERSPECTIVE

A TÉCNICA MULTIDIMENSIONAL DE ENSINO E OS BENEFÍCIOS PROPORCIONADOS ÀS STARTUPS LOCAIS: UMA PERSPECTIVA DOS ALUNOS

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ABSTRACT

The objective of this research was to analyze the return to startups based on the adoption of an active method, the Multidimensional Teaching Technique (MTT), in the opinion of the students who attended the Technological Entrepreneurship class of the Business Administration Course at UNIFEI. Therefore, the case study was used as method. For data collection, two sources were used: documents (45 reports delivered by students in the period from 2012 to 2016) and questionnaires (122 valid answers, applied by the Survey Monkey® tool). Regarding the analysis of the documents, content analyses by frequency and categories were used. To analyze the questionnaires, multivariate techniques were used: cluster analysis and discriminant analysis (Stepwise method). The results evidenced that there were implications of MTT for the society (startups), being evaluated as positive for students. MTT also proved to be a relevant tool for administrator training, specifically in the context of startups, as it provided students with learning and experience exchange within a context. It was evidenced that with the maturation of the technique over the years, students' acceptance of the method increases, and this is perceived by the students who have been enrolled in the class over the last three years with greater dedication to the project.

Keywords: Technological Entrepreneurship. Active Methodology. Multidimensional Teaching Technique (MTT).

RESUMO

O objetivo dessa pesquisa foi analisar o retorno para as *startups*, a partir da adoção de uma metodologia ativa, a Técnica Multidimensional de Ensino (TME), na opinião dos alunos que cursaram a disciplina de Empreendedorismo Tecnológico do Curso de Administração na UNIFEI. Para tanto, utilizou-se como método, o estudo de caso. Para coleta de dados, utilizou-se de duas fontes: documentos (45 relatórios entregues pelos alunos no período de 2012 a 2016) e questionários (122 respostas válidas, aplicados pela ferramenta Survey Monkey®). Quanto às análises dos documentos, utilizaram-se de análise de conteúdo por frequência e categorias. Para a análise dos questionários, utilizou-se de técnicas multivariadas: análise de *cluster* e análise discriminante (método *Stepwise*). Os resultados evidenciam que houveram implicações da TME para a sociedade (*startups*), sendo avaliadas como positivas para alunos. A TME também mostrou-se como uma metodologia pertinente para a formação do administrador, especificamente no contexto das startups, visto que proporcionou ao discente aprendizagem e troca de experiências situadas em um contexto. Foi evidenciado que com o amadurecimento da técnica ao passar dos anos, aumenta a aceitação dos alunos a metodologia, e isso é percebido pelos alunos que cursaram a disciplina nos últimos três anos com maior dedicação ao projeto.

Palavras-chave: Empreendedorismo Tecnológico. Metodologia Ativa. Técnica Multidimensional de Ensino (TME).

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1 INTRODUCTION

The University's context of action, as well as its surroundings, has been experiencing several alterations upon contemporary transformations. Among many changes faced by these institutions are the transformations in teaching-learning conceptions (FRANCISCO et al., 2017). Universities can be considered central actors in society, since they act in citizen's formation and also promote innovation and entrepreneurship environments, providing assets that can be transferred to social agents (GIMENEZ; BAMBINI; BONACELLI, 2016).

In this context of transformations, a new type of organization emerges, named startups or technology based firms (TBFs). Among the characteristics of this kind of business is the intensive use of scientific and technological knowledge, thus the approach of these companies to universities becomes fundamental. In this regard, the university contributes by developing technologically qualified specialists to act as skilled labor and founders of new startups (BOLLINGER; HOPE; UTTERBACK, 1983; GUERRERO; URBANO, 2011; NACU; AVASILCÃI, 2014), providing economic development.

However, this relationship is still restricted to technical nature concepts, making it increasingly necessary to develop management specialists for these businesses. Such an argument can be justified as TBFs die even before their consolidation due to several managerial problems (CHAVES; SILVA, 2004, ANDINO; FRACASSO, 2005, ENGELMAN; FRACASSO; BRAZIL, 2011).

Therefore, the role of universities (especially the technology production ones) is to perform its activities focused on the development of faculty and students, preparing them to meet the needs of businesses (SCHMITZ et al., 2016). Thus, such problems move from the business arena to classroom, especially in the field of business administration. Hence, technological entrepreneurship gains prominence.

Technological entrepreneurship can be characterized as a new business concept in technology, which also involves risk management (NACU; AVASILCÃI, 2014). However, one of the problems of technological entrepreneurship is the difficulty of aligning the teaching of technical subjects – innovation and technology – with business subjects – business plan, financial market, strategy and others. (KELLEY; SINGER; ILERRINGTON, 2011). A possible alternative is the use of active methodologies, which are methodologies based on the problematizing pedagogy used in the solution to contextualized problems (BERBEL, 2012, SOUZA; SHIGUTI; RISSOLI, 2013).

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

Among the possibilities of active methodologies is the Multidimensional Teaching Technique (MTT), which is inspired by multidimensional didactics, where it seeks to integrate theory, individual and results for society. This methodology is formed by several actors besides the student and teacher, who are inserted in society and can represent different learning possibilities. Thus, MTT is not limited to the diffusion of knowledge, but rather to its development, as well as the involvement of the student with a new context for learning (FRANCO; PIMENTA, 2016).

Given the above, this approach leads us to the following reflection: How can MTT, as an active teaching methodology, generate concrete results for startups?

Considering this, the aim of this study is to analyze the return of MTT to startups, based on the opinion of students who attended the Technological Entrepreneurship course of the Administration Course at the Federal University of Itajubá (UNIFEI) between 2012 and 2016. To this end, the following specific objectives were established: (i) To evaluate the students' opinion on the return to society at the time of the discipline; and (ii) To evaluate the students' opinion on the return to society after they have attended the discipline. To this end, document analysis and multivariate analysis were used, with the techniques of cluster and discriminant analysis.

This article is divided into four sections in addition to this introduction. The theoretical background addresses the university and technological entrepreneurship, and the active methodology and MTT. The following are methodological aspects. The analysis and discussion of the results and the final considerations and limitations of this study are later presented.

2 THEORETICAL BACKGROUND

2.1 UNIVERSITIES AND THE TECHNOLOGICAL ENTREPRENEURSHIP

The knowledge society characterized by dynamic and continuous flows has reshaped the concepts of university and provoked discussions about its role for society (GUERRERO; URBANO, 2011). For Etzkowitz and Klofsten (2005), the emphasis on knowledge as a key factor of economic and social development, made universities, as an agent of creation and dissemination of knowledge, assume a new role in social spheres.

In this sense, for Schmitz et al. (2016), the university is constantly being challenged to become, in fact, a more active social institution. In the authors' view, this new positioning of the university has been treated within the perspectives of entrepreneurship and innovation.

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The reason for this is the fact that, when universities encourage and promote entrepreneurship and innovation, they will be more attentive to society's desires and can contribute more effectively to the economic and social development of the community they are inserted in.

An effective way that the university has to contribute to the development of its environment is the knowledge dissemination built there, that is, expanding the discoveries beyond its walls and bringing them to serve the community; so that the knowledge generated can be applied and used in income generation and improvements to social conditions (SCHMITZ et al., 2016).

Another form of contribution to community development, in accordance with Santos and Cunha (2004) and Freire et al. (2014) is the promotion of technology-based companies (TBF). In this regard, the concept of technological entrepreneurship can be identified as a new business concept in technology, also involving risk management (NACU; AVASILCÃI, 2014). According to Menck and Oliveira Filho (2009) this type of entrepreneurship is composed of a peculiar type of company: startup (OAKEY, 2012).

Startups present themselves as a key part of the global scenario. However, it should be noted that there are many challenges for the success of these companies, due to their origins and size. In order to minimize these obstacles, several incentives are directed to the development of these enterprises, such as investments in high-tech groups in Silicon Valley (OAKEY, 2012; PORTO, 2013).

In Brazil, the movement of TBFs Incubators and Scientific Technological Parks reinforced the development of technological entrepreneurship (PORTO, 2013). In addition to these programs, the foundation in 2011 of the Brazilian Startups Association (ABStartups) stands out with the purpose of encouraging an internationally recognized national Startups ecosystem (GODOI-DE-SOUSA; LOPES, 2016). These initiatives are linked to universities, which began to encourage the development of innovative and high-tech research, many of which are partnerships or creation of TBFs incubators (PORTO, 2013), development of spin-offs (ETZKOWITZ; LEYDESDORFF, 2000), boosting academic entrepreneurship, technology transfer (HAASE; ARAÚJO; DIAS, 2005) and specialized labor training (ROSENBERG; NELSON, 1994).

In this sense, Menck and Oliveira Filho (2009) state that although the use of business incubators is increasingly present in universities or their surroundings, these enterprises still

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

face several challenges to achieve their goals. Thus, it is necessary that researchers, managers and institutions become aware of these enterprises' challenges, and reinforce these initiatives.

Finally, it should be noted that universities should not isolate themselves in "ivory towers" (MOWERY; SAMPAT, 2004), on the contrary, they should be inserted into society's problems. To this end, it is important to apply the theoretical concepts, through faculty action, in order to make the student reflect and become aware of their actions in society (transformative learning), instead of merely reapplying such methods (FRANCO; PIMENTA, 2016).

2.2 ACTIVE METHODS AND THE MULTIDIMENSIONAL TEACHING TECHNIQUE

Active methodologies emerge as an alternative to reshape the traditional teaching-learning process. Active methodologies can be seen as tools intended for the critical development of future professionals in various areas. They are able to provide the learner with more autonomy in the learning process, in addition to enabling the development of interpersonal skills, which may be considered essential for social practice, as well as for the student's professional context (BORGES; ALENCAR, 2014).

In the teaching-learning process, active methodologies consider the immersion of students in real or simulated experiences that require problem solving consistent with the social practice of the studied area (SOUZA; SHIGUTI; RISSOLI, 2013). Therefore, active methodology considers the student as the main actor in the learning teaching process (ARAÚJO, 2015). Snyder (2003) adds that the student has a participatory role, since active methodology provides different ways to challenge students, stimulate them to understand the theoretical concepts and seek information (HARTZ; SCHLATTER, 2016).

Snyder (2003) and Kitchens, Means and Tan (2018) point out that among the characteristics of active learning are: (i) greater emphasis on the development of analytical and critical thinking skills; (ii) students will do something different instead of listening passively; (iii) students will get involved in an activity; (iv) there will be a focus on exploring attitudes and values; and (v) situations will provide greater knowledge absorption.

There are several active methodologies, among them: Problem-Based Learning, Case Studies, Debates and Games (SNYDER, 2003; HARTZ; SCHLATTER, 2016; KITCHENS; MEANS; TAN, 2018) and Multidimensional Teaching Technique. Franco and Pimenta (2016) point out that multidimensionality considers the totality in teaching, i. e. it creates new

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meanings for the learning process of the student, highlighting both the cognitive and behavioral development of the individual and the situations that emerge so that the learning is meaningful.

Complementarily, Mena (2017) characterizes in didactic multidimensionality a development process of written and oral skills, favoring social integration possibilities. Pasquarelli and Oliveira (2017) emphasize that multidimensional didactics provides techniques and strategies to students for a teaching-learning process that prioritizes citizen practice, to intervene and participate in society.

Franco (2013) and Franco and Pimenta (2016) reinforce that multidimensional didactics aims to produce intellectual activity for the student, considering the contexts in which the processes of teaching and learning are inserted. Teaching requires a consonance in the acts and ways of teaching. The action of teaching is a social practice represented by several interactions between teachers, students, institution and society, inserted in sociocultural and historical contexts.

The teaching-learning process is perceived when there is an articulation between the theoretical, human and political-social dimensions (CANDAU, 2012). It is necessary to establish a process that enables the student to learn new concepts (theory), development of new personal skills (individual), as well as involvement with the context in which it is inserted (society). Thus, MTT is shown to be composed of these three dimensions: (i) Theory, (ii) Individual and (iii) Society.

In the theoretical or technical dimension, Rangel (2010) and Gomes et al. (2015) reinforce that the main objectives for a learning process are the content learned and understood by the learner through the teacher. This approach considers how the content is organized to provide knowledge access (RANGEL, 2010). In other words, it is considered in this process: (i) the theoretical objective to be worked on, (ii) the content selection to be studied, and (3) the most appropriate form of assessment. Furthermore, Candau (2012) adds that the content to be studied and the definition of which method should be used, is more meaningful if addressed in a contextualized situation.

In the human or individual dimension, Lemos et al. (2011) add that the administrator's education needs to be focused on the development of skills and abilities for positions in private, public or non-profit institutions. In this manner, Candau (2012) and Hummel, Pifaff and Rost (2016) reinforce that the development of personal, ethical, behavioral and

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

interpersonal skills, as well as the improvement of attitudes, such as: empathy, value, proactivity are an essential part of the human dimension of the learning process.

Lastly, the society or politico-social dimension relates the student in direct contact with an institution, which may be represented by public, private or non-profit organizations. This dimension goes beyond the classroom limits and occurs in a specific culture, dealing with concrete facts and people inserted in the context in which they live (CANDAU, 2012; FRANCO; PIMENTA, 2016). The connection with a real world provides students with a reflection of their experiences and involvement with the researched object. The learner has autonomy to develop their role in the context that is inserted (GOMES et al., 2015).

In this sense, it is necessary to understand the use of MTT as a teaching technique and to verify whether the social dimension can really benefit from a teaching-learning process of students.

3 METHODS AND PROCEDURES

The research method used was the case study, characterized by Yin (2001) as a type of critical and deep analysis of an investigation phenomenon. As for its nature, mixed methods were used, which combines quantitative and qualitative approaches, which provides a better understanding of the research problems than isolated approaches (CRESWELL; CLARK, 2006). In order to investigate a representative case, it was decided to carry out a study of the Technological Entrepreneurship discipline of the Business Administration course at UNIFEI. In this discipline, the technique has been applied since 2012, involving a total of 167 students and 23 startups.

One of the activities of the discipline considers the development of a Technological Entrepreneurship Project, called Angel Hunters, in which students, teachers, investors and startups are considered as part of the teaching-learning process. Such a project focuses on the insertion of students in the Technological Entrepreneurship environment through the execution of a project for a TBF. For the development of this project, the benefited companies are chosen by the teacher. The students get to know it throughout the semester, develop instruments to contact angel investors, search for investors interested in the company's field of action and mediate the initial meetings between them. In addition to inserting students into the learning environment, the project allows students to visualize management problems and improve their business model.

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

Regarding the data collection method, two primary sources were used: documents and surveys. The documents collected are represented by the 45 final reports submitted by students enrolled in the discipline in the period from 2012 to 2016. The information on the benefits provided to the companies, in the opinion of the students who developed the project, was collected.

Regarding the surveys, an electronic survey was used applied through the Survey Monkey® tool. The purpose of the instrument was to assess the students' opinion on the return to startups after completing the course. The startups are the representation of MTT's social dimension.

The survey consisted of a five-point agreement scale with the following legend: (1) totally disagrees, (2) partially disagrees, (3) indifferent, (4) partially agrees and (5) totally agrees. In addition, the instrument was divided into five large blocks, namely: general and demographic information; theory; individual; society; and evaluation of MTT. Furthermore, a pre-test was performed in the first half of June 2017, with a return rate of 75% (15 surveys). Chart 01 shows the variables that make up the dimension of society, as well as the variables of the dimension "MTT Assessment", used in the research.

Chart 01 Variables that form the "Society" dimension and "MTT Assessment"

Variables that constitute the survey	Dimensions
The company's activities and its performance in the market were clear to the group.	Society
The response of the requests for information made to the company occurred in sufficient time for the execution of the work.	
There was confidentiality on the part of the students regarding the confidential information obtained from the companies.	
The schedules between entrepreneurs and angel investors were reconcilable for the interviews planned by the students.	
The company data was easily accessed.	
The Canvas prepared by the group was used by the company.	
The developed Pitch was used by the company.	
The students provided other services to the company (such as: folders, review of the executive summary) that helped promote the business.	
The company has improved its business model or plan through the contacts provided by the students.	
The group sought contacts beyond angel investors to assist in the company's business.	
The group increased the publicity of the company with the contacts provided.	
The group provided contacts with angel investors or angel investor groups.	
Conversations between entrepreneurs and investors have helped the company to gain new insights into its business.	
The contact with angel investors provided by the group helped in the company's networking.	
The angel investors intermediated by the group helped the company with mentoring on the focus of the business.	
In the conversations between investors and entrepreneurs the possibilities of joint projects between them were identified.	

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Variables that constitute the survey	Dimensions
The group registered the company in angel investment bases.	
A theoretical relationship is identified between the content and the activities developed in the "Angel Hunters" Project.	MTT Assessment
Learning situations are created outside the classroom context, where the student can develop personal skills.	
The exchange of experience between students, entrepreneurs and "angel" investors provides benefits for the parties involved.	
The contact with entrepreneurs and investors helps in the learning process.	
The Multidimensional Teaching Technique can be an active alternative for the learning of students in Administration.	

Source: Developed by the authors.

With regard to the analyses, for the analysis of the documents, content analysis by frequency and by categories was used. The content analysis by frequency consists on the identification of the interviewees' answers and groupings according to each question, using descriptive statistics (BARDIN, 2016). On the other hand, the thematic, or categories, analysis aims to identify the nuclei of meanings that make up a communication on a given theme present in the respondents' speeches (MINAYO, 2000).

For the analysis of the surveys, multivariate techniques were used and the ordinal scales were assumed to be interval scales. A total of 167 surveys were sent to the population during the months of June to July 2017, and 73.05% were returned (122 surveys). Thus, the sample was considered satisfactory. According to Hair Junior et al. (2005), the sample size for analysis should not be less than 50.

For multivariate analyses, the SPSS (Statistical Package for the Social Sciences) software was used. First, the variables that make up the "Society" and "MTT Assessment" dimensions were subjected to the Cronbach's alpha reliability test (HAIR JUNIOR et al., 2005). After data reliability was verified, the analysis of agglomerates (or clusters) for the predictor variables of the construct society was performed. Finally, a discriminatory analysis was performed in order to characterize and analyze in a specific manner the clusters extracted in the previous step. The Stepwise Method (in steps) was chosen for estimating the discriminatory functions, in which the independent variables enter sequentially according to the discriminatory power that they add the accuracy in the group (HAIR JUNIOR et al., 2005).

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

4 RESULTS ANALYSIS AND DISCUSSION

The results and discussions are presented in three stages: (i) Students' opinion on the benefits to society at the time of the course; (ii) Students' opinion on the benefits to society after they have completed the course; and (iii) synthesis and discussion.

4.1 OPINION OF STUDENTS REGARDING THE BENEFITS TO SOCIETY DURING THE CLASS

In order to corroborate the research on the benefits of MTT to society, represented by the startups participating in the project, the 45 final reports delivered by the students of the discipline were analyzed. The documents were analyzed through content analysis by frequency and theme.

The structure of the report contained a summary of the participant startup, the strategy and execution of the project, the theoretical learning of the students, the opportunities for personal development and the benefits generated for the company. In this stage, the item of benefits generated from the 45 reports were analyzed, distributed among students participating in the discipline from 2012 to 2016.

Table 1 summarizes the predominant results during the 5 years of MTT application, in the society dimension. With regard to the way in which the results are presented, the results are initially shown each year, and then a general summary.

Table 1 Prominent results for Society

Year/ Dimension	Society (startups)
2012	- Improvement of the Canvas or Business Plan and Company Publicity (44.4%).
2013	- Canvas elaboration and the contact with several investors with (90%); - The elaborated pitches (70%).
2014	- Elaboration of Canvas, pitch and contact with several investors (100%).
2015	- Elaboration of Canvas, pitch, mentoring of investors (71.4%).
2016	- Contact with various investors (100%); - Pitch and Canvas elaboration (66.7%).
Overall	- Canvas elaboration (75.5%); - Contact with various angel investors (68.8%); - Pitch elaboration (66.7%).

Source: Research Data.

In the results provided by the company based on the opinion of the students while they attended the course, there is greater evidence in relation to the management instruments developed by students and used by the company, in addition to the contact with various investors, which is cited in the years 2013, 2014 and 2016. In the final result, the preparation

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

and review of the Canvas is the most significant result, followed by contact with several angel investors, who support with managerial mentors for business-enhancement.

In a complementary way, some excerpts from the reports that reflect the contribution of students to startups are presented

> We did a consultancy for the commercial area of the company, developed the pitch and the Canvas, and several investors were contacted. Contacts with angel investors can increase the startup's relationship network, in addition to increasing business visibility (REPORT 7, 2013).

> Through our mediation, an invitation was made to present the startup at the Anjos de Minas Nucleus, contact was made with a Venture Capital fund, the company was registered in several angel investment platforms, we helped the company in the platform tests. We created a communication plan for the company with a brief summary, pitches and institutional video. The resources we developed helped the company qualify for a statewide acceleration program (REPORT 3, 2014).

> (...) In summary, the greatest results and benefits we believe we have added to the company have been: (1) contact with Venture Capital funds: (2) pitch legacy, deck, Canvas, news portfolio and explanatory folder, which until then the company did not have; (3) registrations in investment platforms such as X and Y, as well as in accelerators such as M and N; (4) publicity of the startup through social media, since the site is not yet ready; (5) opportunity in the Entrepreneur's room; (6) Calendar of events and registration deadline in accelerators. Indirectly we also helped entrepreneurs to have more clarity and organization in the information about the company to launch it to the market, such as opportunity, solution, differentials, etc., considering that to provide us with such information, they had to meet and discuss them. This culminated in the adoption of a greater focus on small and medium-sized industries as the initial target audience and the goal of achieving an investment of R$250,000.00 to leverage the company and produce a lot of 100 units (REPORT 6, 2015).

The reports complement the results obtained in the analysis of content by frequency and highlight the relevance of the project for the company's reflection on commercial and marketing aspects, as well as concrete investment possibilities for the startups participating in the project.

4.2 OPINION OF STUDENTS REGARDING THE BENEFITS TO SOCIETY AFTER TAKING THE CLASS

After completing the discipline and already being in other terms of the course. The students answered a survey on their opinion regarding the benefits provided to society. For analysis, multivariate analyses were performed.

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Initially, the Cronbach's Alpha of the constructs of the study (society and MTT assessment) was analyzed. The society dimension presented an alpha of 0.866. The MTT assessment dimension obtained a result of 0.999. In this direction, it is observed that the constructs and variables are reliable from the parameters proposed by Hair Junior et al. (2005). In the authors' conception, the minimum required value must be above 0.60; the value obtained shows that the data from this analysis are highly reliable.

Subsequently, a cluster analysis was carried out in order to identify the students' profile regarding the implications of MTT to the society. Thus, the results point to two distinct clusters: i) a cluster formed by 95 respondents (78%); and ii) a cluster composed of 27 respondents (22%).

In order to explore the profile of the two groups, all variables of characterization of the respondents were submitted to the Chi-square test, considering a significance level of 5% (HAIR JUNIOR et al., 2005). Table 2 shows the relationships between the extracted groups and the significant variables, such as: (i) the gender of respondent (p-value = 0.014); (ii) the year the respondent took the course (p-value = 0.017); and (iii) the biweekly dedication of students (p-value = 0.023). The values indicate that there are differences between the groups in these variables with significance level lower than 5%. Thus, the groupings are predominantly composed of:

Table 2 Characterization of Groups

	Cluster 1	Cluster 2
Gender	Female sex (63.1%)	Male sex (62.9%)
Year that took the course	Between years 2014 and 2016	Years 2012 and 2013
Biweekly dedication of students	Above 4 hours (36.8%)	Between 2 to 3 three (40.7%)

Source: Research Data.

In view of the presented profiles, after the cluster analysis, a discriminatory analysis was performed in order to identify the relationship between the analyzed variables and the clusters. In this case, the MTT assessment variables and the variables of the society dimension were analyzed. In addition, it was assumed as a null hypothesis that there would be no differences between the clusters. Therefore, the variables were submitted to the Wilks' Lambda test, which showed the rejection of the nullity hypothesis at a significance level of 1%, thus indicating that there are differences between the clusters.

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The Stepwise Method was used to obtain the discriminatory variables. As results, the variables discriminated in the society dimension were: (i) conversations between companies and investors, provided by the group, helped the company; (ii) learning situations were created outside the classroom; (iii) the company improved its business model or business plan; (iv) the exchange of experiences between students, companies and angel investors provided benefits; (v) the angel investors, through the group, helped the companies with mentoring about the business; and (vi) the group sought contacts beyond investors to assist the company.

The discriminatory function of the variables of the society dimension presented canonical correlation of 0.674. Furthermore, 99.2% of the respondents presented the same characteristics of their respective cluster, indicating that the variables were able to discriminate the clusters.

Based on the discriminatory variables, Table 3 shows the relationship between the clusters and the discriminatory variables.

Table 3 Correlation between respondents of Clusters and discriminatory variables

	Cluster 1	Cluster 2
Conversations between companies and investors provided by students helped the company	77.9% partially or fully agree.	74% disagree.
Learning situations were created outside the classroom	93.7% partially or fully agree.	48.1% disagree or are indifferent
The company has improved its business model or business plan	63.2% partially or fully agree, 30.5% were indifferent.	66.6% disagree, being 29.6% indifferent.
Exchange of experiences between students, companies and angel investors provided benefits	94.8% partially or fully agree.	62.9% disagree or are indifferent.
Angel investors, through the group, helped companies with mentoring about the business	68.4% partially or fully agree.	100% disagree or are indifferent.
The group sought contacts beyond investors to assist the company	83.1% partially or fully agree.	44.4% disagree or are indifferent.

Source: Research Data.

Therefore, considering the results presented, Cluster 1 was named "Consentient" and Cluster 2 "Dissentient" to the implications of MTT for society.

The "Consentient" are mostly female respondents, who attended the discipline between the years 2014 and 2016 and who dedicated more than four hours every fifteen days

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

to the project. For this group, the relationship between companies and angel investors is important, given that the exchange of experiences between them can provide several benefits. Furthermore, the group values the mentoring of angel investors for companies, but agrees on the relevance of the external search for information to assist the company and its business. Additionally, the group believes that the project provided learning and experience outside the classroom.

The "Dissentient", on the other hand, are predominantly formed by male respondents, who possibly attended the subject between 2012 and 2013, and dedicated between two and three hours every two weeks to the execution of the project. This group does not believe that the mentoring offered by angel investors or the relationship with the investor contributed to the company's business. However, only part of the group sought external contacts in order to help the company. In addition, for part of the group, the project provided learning and experience outside the classroom.

4.3 DISCUSSION

4.3.1 Universities and society in the context of technological entrepreneurship

Franco and Pimenta (2016) and Sobrinho (2015) point out that the university needs to be immersed in the problems of society, assuming its social role in the development of individuals. One way to emphasize this social function is through the action of teaching, making students aware of their actions. Candau (2012) reinforces that it is necessary to situate teaching-learning in the politico-social context so that learning has more meaning.

It should be noted that the experience, by itself, can be considered as a trigger or a form of learning, which when shared and reflected, is able to promote new concepts and advances, helping those involved in a process of reworking knowledge (ANDRADE; OLAVE, 2015). Therefore, the learning resulting from this project "Angel Hunters" is able to provide benefits to companies, students and angel investors, in which there is application of technical knowledge seen in the classroom by students, as well as provides the development of skills by them, through a reflexive and critical process, in a situated context.

The results of cluster analysis and discriminatory analysis showed two distinct groups. It is observed that Group 1, called "Consentient", is in agreement with the implications of the technique for society. The respondents of this group positively evaluated the exchange of experience and the relationship between startups, students and angel investors. Moreover,

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

they believe that the project contributed to the development of management techniques and instruments, thus promoting a dialogue between university and society, and they consider that there was learning outside the classroom. This reflects the legitimate role of the university, and specifically of the teacher, to expand the student's learning possibilities, providing means for all content to be situated and make sense for them (MOREIRA, 2010).

The "Dissentient" group, on the other hand, did not perceive the benefits derived from the relationship and the exchange of experiences. The group was also indifferent to the applications of management tools in the project. As possible justifications for the emergence of this group, they may not have adapted to the teaching strategy, or did not have sufficient interest in the discipline's theme.

Even in this regard, Berbel (2012) states that it is essential to create a learning environment for the student. Therefore, it is necessary to listen to students, value their ideas and opinions, answer their questions and encourage them, in order to motivate them to build their own knowledge. Thus, the student will be able not only to learn how to learn, but, in fact, reflect their own action (DIESEL; BALDEZ; MARTINS, 2017). However, it is important to note that the "Dissentient" group also agrees on the creation of learning outside the classroom, and it can be observed that 89.3% of students involved in the project consider the MTT effective in the relationship with society.

In general, it is possible to state that the teaching-learning process, using MTT, is an active, situated and critical activity. In other words, it becomes active, since it places the student at the center of its own learning process, respecting the dignity and history of the subject (student), as well as attributing autonomy and responsibility due to the project that the student is inserted. Such aspects are proposed by Mitre et al. (2008), Berbel (2012) and Araújo (2015). It also becomes situated, since the context outside the classroom involves more than theory and students can learn from the demands of society, on the culture of the place where they are inserted, and by business practices, as pointed out by Cunha (2012), Jackson et al. (2017) and Jones (2014). And, finally, critical, since through contextualized practice (real problems), the student goes from being a mere receiver of knowledge, passive in the classroom, and becomes a transforming agent, capable of developing logical, analytical and critical reasoning to the situations, contents and day-to-day problems of the entrepreneur, in order to meet established goals, in this case the approach of startup to angels investors. This aspect is addressed by Berbel (2012) and Souza, Shiguti and Rissoli (2013).

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

4.3.2 Benefits to startups

The teaching technique proposed in the discipline under analysis seeks to insert students in technological environments, through the startups participating in the project. The students get to know the startups and develop during the semester a set of instruments and contacts that can help the company in its development. This aid corroborates the proposal of Menck and Oliveira Filho (2009) that the university can support technological ventures around the university.

The analysis of the documents showed that the students reported that they provided benefits to the participating startups while they were studying the subject, the most relevant in the 5 years analyzed being the "Elaboration and Review of the Canvas", the "Contact with several angel investors" that support with managerial mentors for improvements in business, and the "Elaboration of the Pitch". In addition, the reports reinforce the support in the development of instruments that help in the disclosure of the company.

In a complementary way, based on the analysis of the reports, the relevance of the project to the involved startups was observed. Through the reports it is observed that the companies, besides using the tools developed by the students, had an experience of reflection on their own strategies. In this manner, the startups are benefited in this project, which helps them to face the inherent challenges of their origin and size as evidenced by Oakey (2012) and Porto (2013).

It should be emphasized that MTT is a technique that has managed to establish the alignment between the teaching of technical and management disciplines, which is one of the barriers to teaching Technological entrepreneurship, as pointed out by Kelley, Singer and Ilerrington (2011).

This factor contributes not only to the students, but also to the entrepreneurial society, since the university, therefore, develops its social role of molding qualified and ethical subjects, enabling a concrete return for the startups involved. More specifically, startups can obtain qualified professionals not only in the technical areas, but also in a professional body capable of instructing and managing this new organizational model that suffers from various management problems due to the aspects of its smallness and novelty (STOKAN; THOMPSOM; MAHU, 2015). Moreover, the university reinforces its role as motivator and supporter of startups, which are key to the global scenario in the perception of Porto (2013).

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

5 FINAL CONSIDERATIONS

The objective of this study was to analyze the return of MTT to the startups (society), based on the opinion of students who attended the Technological entrepreneurship course of the Administration Course at the Federal University of Itajubá (Universidade Federal de Itajubá - UNIFEI) between 2012 and 2016. To this end, the following specific objectives were established: (i) To evaluate the students' opinion on the return to society at the time of the discipline; and (ii) To evaluate the students' opinion on the return to society after they have attended the discipline.

For the first specific objective, the reports submitted by the students were analyzed. The topic benefits for startups was analyzed. The most relevant results were "Elaboration and Revision of the Canvas", "Contact with several angel investors", and "Elaboration of the Pitch", besides evidence of aid in the publicity of the company.

The second specific objective was achieved through multivariate analysis. The results from cluster analysis and discriminatory analysis presented two distinct groups. Cluster 1 was named "Consentient" and Cluster 2 was named "Dissentient" to the implications of MTT for society.

After analyzing the results, it was observed that there were implications of MTT to the society, being evaluated as positive by the students. Among the most significant results are: conversations with angel investors helped in the management of the company, improvement of the business model or business plan, and the exchange of experiences between students, companies and angel investors provided benefits to the parties involved. In addition, MTT has provided students with learning outside the classroom, as well as narrowing the gap between theory and practice.

It is worth mentioning that the results show that with the maturation of the technique over the years, the acceptance of students to the method increases, and this is perceived by students who have attended the discipline in the last three years with greater dedication to the project. Meanwhile, the first students who attended the discipline (2012 and 2013) were indifferent to the results to society and were less dedicated to the project.

Given this, MTT proved to be a pertinent tool for the training of the administrator, specifically in the context of startups, since it provided students with learning and exchange of experiences situated in a context.

DOI: http://dx.doi.org/10.5007/1983-4535.2020v13n1p70

Among the limitations of the study, only the students' perception of the technique stands out. In addition, the results should be carefully analyzed, as they are based on a discipline and do not allow generalizations.

As propositions of future works, it is suggested to evaluate the perception of the participating companies, and also to evaluate the results of this technique with the application in different contexts. Furthermore, future studies could investigate the process of construction of the technique, in the perception of the teacher who conducted it.

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