

PBL APPLIED IN ENTREPRENEURSHIP CLASS: A MODEL FROM BRAZILIAN-FINNISH CASE STUDY

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Abstract

Project-based Learning (PBL) is a learning approach where students are in the centre of the learning process as actors and owners. In a project-based learning process the students organise themselves into teams, supported by teacher guidance and have the opportunity of work collaboratively to aim learning goals. Since late 2015 PBL has been adopted as an innovative method for an entrepreneurship classroom in a management undergraduate course in Rio de Janeiro state, Brazil. PBL methodology has been adopted as an experimental implementation of learning models from a Finnish-Brazilian training program experienced in 2014-2015. The Teacher Education Programme "VET Teachers for The Future" (30 ECTS) training program has been happening in Häme University of Applied Sciences (HAMK), Finland. The process of the learning paradigm changes from more traditional, teacher-centred approach to student-centred which was demanded in the Brazilian learning context. The reported experiment has required significant changes in the teaching and learning methods and a significant cognitive and emotional effort not only from the teachers but also from the students. The presented research aims at analysing and verifying the experienced process and results about Brazilian student's PBL experience and report their reflections on the student-centred approach. The research also offers a theoretical overview and earlier experiences in applying PBL to entrepreneurship in undergraduate courses. The preliminary results indicate that PBL as a student-centred approach applied to entrepreneurship classroom from an undergraduate course in Brazil was effective as a learning approach since it has helped to develop not only student's technical competencies but also personal, social and communicative student's skills.

Keywords: Project-based learning; entrepreneurship education; student-centred approach, changing learning paradigm, educational change

1. INTRODUCTION

Brazil is a large country in the American continents with a territory of 8,515,767 km². The Brazilian population is approximately 205,691,000 inhabitants and from these geographical aspects, the challenges in different social fields are enormous as they are, for example, in Education (IBGE, 2016a). The Brazilian government is promoting several actions to increase the quality of education however the challenges are happening

despite the Brazilian territory magnitude and population. Since 1997, the literacy rate has been decreasing but through government efforts from 2011 to 2012 this rate has increased, breaking down a long term tendency (IBGE, 2016b).

Recently, the Brazilian government has begun international partnerships in education with other countries including Finland. Finland is one of the Nordic countries and has a territory of 338,424 km² and a population of 5,487,616 inhabitants (Statistics Finland, 2016). Even though a small country, Finland is currently a world reference in innovative and disruptive learning approaches; as an example there is a project to eliminate subjects in favour of topics or themes within curricula reform context (Garner, 2015; MacDonald, 2015).

The "VET Teachers for The Future" (30 ECTS) is a Finland teacher training program promoted by the Häme University of Applied Sciences (HAMK) and other Finnish universities. The author participated in 2014-2015 program version of this course organised by HAMK in Finland together with the Federal Institutes of Education, Science and Technology in Brazil, supported by the Brazilian Government Education Board (CNPq). This training has begun to a new point of view not only for the author but to the more than one hundred teachers that have participated in the program from 2014 until 2016.

This manuscript is proposing to share concepts, experiences and result analysis acquired from an experience of the disruptive paradigms in a entrepreneurship classroom from a undergraduate course in Brazil. From this experience it is possible to refer to positive and negative results for future related experiments. Therefore, PBL concepts are presented as assessment methods followed by methodology, result analysis and considerations related to the experience.

2. PROJECT BASED LEARNING (PBL) AND STUDENT ASSESSMENT APPROACHES

The student-centred approach is grounded in Vygotsky's (1978) sociocultural constructivist theory. The student-centred learning design helps to create a learning environment where social engagement and knowledge construction provide an effective context for learning. The use of authentic context in learning situations is seen as an engaging way of sociocultural learning. All these elements are based on learning authenticity. According to Herrington et al. (2010) authentic learning happens when the learners are engaged in inventive and realistic tasks which provide opportunities for complex collaborative activities. Additionally, designing and implementing authentic learning requires the teachers to take risks. Thus, an authentic approach requires more effort than in standard academic lectures traditionally adopted by teachers. Authentic learning and its approaches are often based on open-ended and student-centred constructivist learning. In this learning context researches have indicated that effective results are demanding effective group dynamics and collaborative learning approaches in projects-solving and problem-solving learning (Dennen & Wieland, 2009; Johnson et al., 2000).

In the context of student-centred learning problems and projects learning approach have been adopted since 60's in medical schools. Spreading for other academic areas the Project-based Learning (PBL) consists in an excellent way to promote real professional experiences among students (Powell & Weenk, 2003). Since students usually construct their knowledge under projects developed in teams, some elements such as dialogue and authenticity are essential for an effective learning process (Enqvist & Aarnio, 2004).

PBL adoption in the medical area is not recent, and it can be applied to other areas like Business Management and Engineering. The Finnish Universities of Applied Sciences have implemented Project-Based Learning (PBL) actively as a part of their Bachelor and Master's Degree Programme education. An example is the agricultural education in Mustiala Campus of HAMK that offers a Bachelor's Degree in Natural Resources. The studies are organised in student-centred and active learning where students work cooperatively in a experiential learning process. In this illustrative example, the students learn about Finnish agriculture, economy and business from their own experience from a entrepreneurship agribusiness project. In a practical point of view the student learns about marketing and other academic fields in his/her own business project since he/she needs to conceive and sell his/her own agribusiness products to the customers as a part of his/her study curriculum (Mustiala, 2016).

Another example of learning by doing from PBL is the ProAkademia. Proakademia (or ProAcademy) is a entrepreneurship-centred learning model from the Tampere University of Applied Sciences in Tampere (TAMK), Finland. After a basic cycle, students can choose between continuing their studies in the traditional learning approach centred in subjects or trying a learning approached centred in project developing. In this second alternative, ProAcademy implements PBL in teams of students since the teams create the so-called learning team enterprises. Over 30 learning enterprises have been established by teams of ProAcademy students since 1999, with 3-4 new ones starting every year. The teams work internationally. The Proacademy

facilities are being shared by TAMK alumni who are working as entrepreneurs, side-by-side with the new generation of up-and-coming entrepreneurs (ProAkademia, 2016). Both Agribusiness co-operation in Mustiala and Proacademy in Tampere, seem to be very motivating and effective in the learning methods for the students. They learn skills and competences in authentic, real life situations and take responsibility of their own learning as well as their own business. Teachers facilitate them to reach their learning goals through intensive, learning-by-doing process.

Adoption of PBL learning approach, as reported in the examples, can be disruptive in some academic areas where it is not commonly adopted. Since new learning approaches are being proposed, new assessment approaches are welcome too. According to Scriven (1967) and Boud (1995) there are basically two different and inseparable assessment approaches: Summative where the goal is a judgment for accreditation or certification and Formative that the goal is to give a feedback support for students' learning endeavours such as teacher teaching. Since Summative assessment is usually adopted as a way to students' technical knowledge certification, Boud (1995) and Ramsden (1987) demonstrates that good assessment is not only an issue of finding the best method, but an issue related to the assessment process where tutor and students work on engagement and partnership to find a relational and effective assessment process.

3. PBL ON ENTREPRENEURSHIP CLASSROOM

The experiment related to these studies took place in late 2015 among 36 students from Business Management and Production Engineering undergraduate courses sharing the same entrepreneurship classroom in a Brazilian college.

In the previously years of entrepreneurship class the teacher-centred approach had been adopted in a chalk-and-talk explanation about the structure of a business plan. This Project-based Learning (PBL) methodology was implemented in the Brazilian college as an experimental implementation of learning models experienced by one of the authors in Finland, in Finnish-Brazilian Teacher Education Program "VET Teachers for The Future" (30 ECTS) carried out in 2014-2015 in HAMK. The initial goals for trying different learning approaches in entrepreneurship classes came from an experiential author feeling that entrepreneurship class could be more effective if students learnt experientially by doing.

Despite the TAMK's ProAkademia and the HAMK's Agribusiness business undergraduate courses have adopted PBL in its whole as an innovative approach resulting in subjects' elimination, the Brazilian academic context does not allow a so-disruptive movement as a first step. From this observation it was possible to conclude that the adoption of a non-subject model in the whole Business Management Brazilian course could be very disruptive at first step but perfectly suitable for an entrepreneurship classroom.

At first, the students were invited to participate in a new experiment where the goal would be to try a new learning approach. From this call the students became aware that if they accepted the challenge some regular rules related to guidance and assessment would be broken off. From the beginning, the main motivation for their agreement to the challenge came from the possibility that they could not be assessed only in a summative-content approach. And once the methodology was being collaboratively constructed, the following five steps had been thought together by students and teacher.

In the first step the teacher had suggested to the students some policies about the subject. The first rule was about students' self-regulation. The students had been invited to get control of their self-learning scenario. Once students had accepted the challenge of a student-centred learning approach for entrepreneurship classroom with formative assessment, related in detail by Uebe Mansur *et al* (2016), it was evident that to everybody that critical times were coming since the disruptive change of paradigms had started to promote surprising and uncomfortable feelings among the students as confirmed in Figure 1:

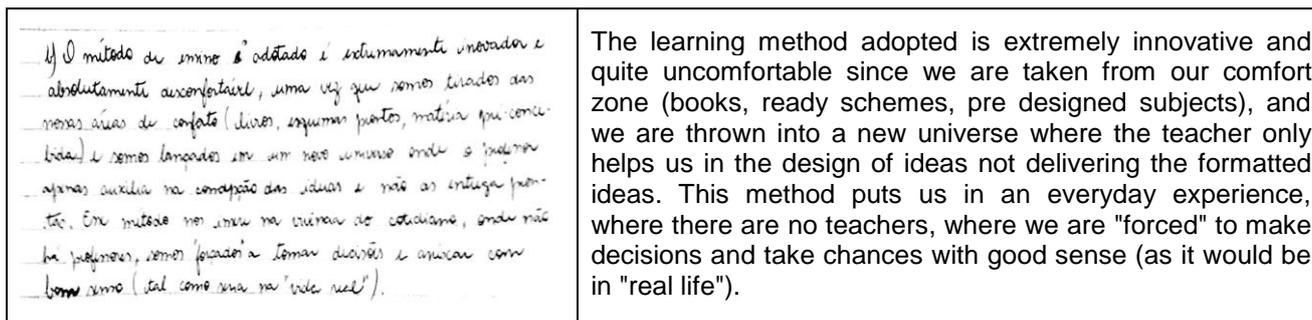


Fig.1 - Student testimony about disruptive learning paradigms

At the beginning of the experiment two PBL students had tried to have a meeting with the course coordinator to complain that they had missed the regular chalk-and-talk teaching approach as they were feeling lost in the classroom having taken decisions and having dealt with self-guidance as showed in figure 2:

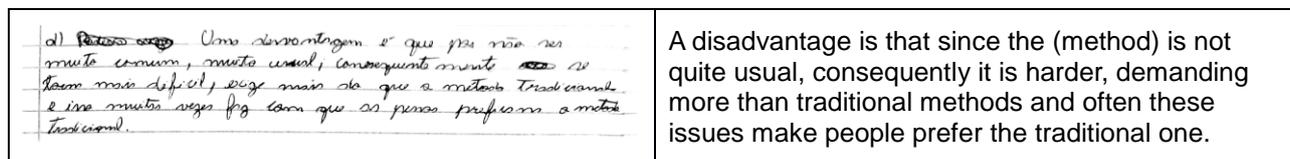


Fig.2 - Student testimony about method preferences

From this evidence confidence among participants seems to be mandatory to avoid unnecessary stress from students. Despite a confidence environment from dialogue among teacher and students since beginning of the process it is possible to conclude that empirical dialogues are not so effective and adoption of specifically models like DIANA (Enqvist & Aarnio, 2004) focused to improve authentic and dialogical learning could decrease a student's discomfort and support a teacher's effort to promote an environment of confidence.

The second step is the breaking of the regular learning paradigms. In this context the teacher has informed to the students about a different learning way from the traditional learning approach for the business plan development. In this context the students were notified that they needed to manage the business plan development by themselves. From this starting accordance the teacher's role would be only small interventions like suggestions on the decisions taken by students in their meetings. To promote a conceptual archetype about these new paradigms the teacher had recommended the students that they should see themselves as entrepreneurs developing a product that should be the business plan.

The third step is promoting new rules for student's guidance since regular ones were broken off. Despite the democratic environment, it was important to establish new rules for guiding students' behaviour and teams' development tasks. In this context the students had been empowered to take decisions about the rules for business plan development as well as formative assessments issues like characteristics and deadlines.

In this step the students had been invited to freely form teams for the PBL development. Usual requirements from teacher like predetermined number of members in each team was not demanded since they were free to schedule and structure the tasks in a way they figured are the best. The only rule demanded by the teacher had been the need for seven teams in accordance of each structure element of the business plan: (a) Executive summary; (b) Description of Company; (c) Description of Product or Service; (d) Market Analysis; (e) Marketing Plan; (f) Operation; (g) Financials.

Concerning the assessment method, some rules had been collaboratively established after a debate among students and teacher. From this debate it was decided that two summative assessments would take place. The first one would assess the quality content from the Business Plan. The second would assess small individual and team tasks developed as a part of the operational plan. It is interesting to highlight that the second summative assessment was not in the original teacher's plans for assessment since it was suggested by his own students who realised the need for checkpoints of team tasks according to the academic calendar.

In addition to the summative, two formative assessments had been established by the teacher. The first one consisted of a Peer Assessment presented in detail by Uebe Mansur *et al* (2016). The second comprised individual feedback about the PBL learning experiment. This second one is detailed in topic four of this manuscript.

The fourth step is centred in learning-by-doing where students take decisions mainly focused in decisions about business plan developed as well as self-assessments. In this step the students were asked to choose what kind of business they would like to drive the business plan to. The students in their whole have agreed to a colleague's suggestion about a Food Truck business since he had a real interested in this entrepreneur opportunity.

After this step definition a tension moment took place, principally promoted by a teacher provocation to the students: "Now students, it is your turn! Make it happen!". The students froze, shocked, without reactions. It was one of the weirdest and interesting moments of the experiment as it highlighted how the students were not prepared for proactive behaviours. In an analogue comparison it would be like a bird that has lived in a cage in its entire life and could not recognise as way out from the cage door when was suddenly opened.

After this stressing moment, the teacher has returned himself momentarily to the role stage (the comfortable place of students in the teacher-centred approach) and recalled for them some Management theories as Fayol's Managerial Principles like Planning, Organising, Guiding and Controlling (Fayol, 1930). From this theoretical explanation the students were invited by the teacher to assume their role in the process where they become more confident in recognising a connection between theory and practice as seen below:

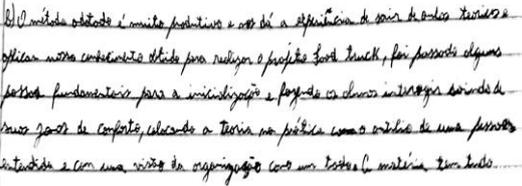
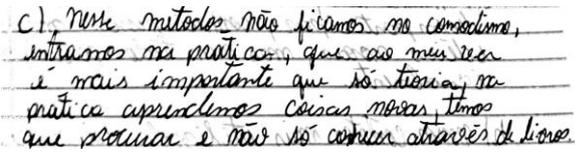
	<p>The adopted method is very productive and gives us an experience to go out from theoretical classes and apply our knowledge to develop the Food Truck business project. Some basic steps have been introduced forcing the students to interact and move from their comfort zone (...)</p>
	<p>In this method we (students) are not accommodated. We are going in practicing that from my point of view is more important than theory itself. In practice we are learning new things. We need to search for (new things) and not only know things through the books</p>

Fig.3 - Students testimony about learning by doing

For instance, as a short assessment the students themselves have defined a team report about a theoretical background taken from the film "Chef" that brings a history about a master chef that once resigned from a job in a restaurant began his own food truck business. The students have decided that this film could bring basic background about subjects related to the project challenge. During the PBL development a lot of small tasks/checkpoints were applied to the students like the watching of the related film. Some tasks have been applied on demand from the teacher and others from the students in accordance to the project development needs.

The fifth step is the student's assessment. For this step summative and formative approaches were adopted. The summative assessment took place in two ways. Firstly the quality of the business plan and its structure were assessed by the teacher. Some criteria like data consistence, market scenario description according to reality, marketing analysis were used to compose the final grade to the summative assessment. For the summative assessment of the business plan a unique global grade was considered for all the teams since the evidence of an effective result given by the business plan quality and value was the most important aspect. Together with the business plan assessment and complementing the final grade to summative assessment the students have received an individual grade from their participation in tasks and checkpoints. The small tasks developed by students were: (a) Summary from the film "Chef"; (b) Financial summary as operational, marketing and strategic plans; (c) Meeting for Strategic Planning check list; (d) Lecture about entrepreneurship & Companies Incubator; (e) Meeting for Final Presentation check list; (f) Final presentation. The figure bellow presents the five step model:

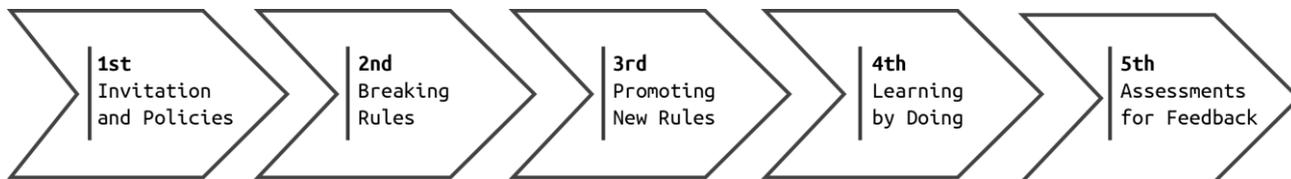


Fig.4 – The five step model

The formative assessment took place in two ways. The first one was a Peer & Self-Assessment analysed in detail by Uebe Mansur *et al* (2016). The goal of this Peer & Self-Assessment has focused on students 'and teams' performance on the PBL project. The second assessment goal was to verify the students' perception concerning personal and professional skill improvement from their PBL experience. The results from the second assessment goal has been analysed in the present manuscript. Students were invited to participate on a self-assessment following the driven questions: (a) Describe the developed project in details; (b) Describe the adopted learning method; (c) Describe some advantages that you have observed from the adopted learning method in comparison (or not) to the traditional learning method; (d) Describe some

disadvantages from the adopted learning method; (e) Did the adopted learning method some new knowledge benefit for your personal or professional life? Which?; (f) Has the learning method helped you take a whole view of the Business Plan? Or, has your point of view got restricted to any specifically structure element of the project?; (g) Describe your interaction among your cohorts highlighting your personal relationship during the project development; (h) Describe your interaction among your colleagues highlighting technological challenges and solution have been taken to communication; (i) Has any event taken place during the project development where you were prepared to help your cohorts?; (j) Has any event taken place during the project development which has driven you to look for further information directly related (or not) to the project tasks?; (k) Do you have any personal or professional subject interest arising from learning experience? (l) Have you got further suggestions to promote method improvement? (m) Have you got further comments not considered in the previous questions? (n) Which score have you assigned to your overall performance in this project?

Despite the teacher proposing the driven question to the students, the grade scoring rules were not previously defined unilaterally by the teacher. Despite more conservative scientific branches being more comfortable working on previously defined methodological paths, other contemporary researchers like Glaser & Strauss (1967), Moraes & La Torre (2006), Brown (2012) and Uebe Mansur (2014) are more comfortable working with the Complex Approach (Morin,2008). This contemporary approach is reinforced by the words of the spanish poet Antonio Machado "Wanderer, your footsteps are the road, and nothing more; wanderer, there is no road, the road is made by walking. By walking one makes the road, and upon glancing behind one sees the path that never will be trod again".

From this reason the teacher has waited for the final student's presentation to debate among them how they could be scored from summative and formative grades. They all have decided that the grade could be calculated using the weighted average as shown below:

Table 1 - Assessment scoring for students' global grade

Type	Description	Weight (%)
Summative	Business Plan delivering and final presentation	15
Summative	Small individual and team tasks during project development	15
Formative	Peer & Self-Assessment (Uebe Mansur <i>et al</i> , 2016)	60
Formative	Self-Assessment (in present research)	10

From the table is possible to notice that formative assessment has received more weight than other assessment types. This decision comes from the teacher promise to students that assessment approach would be formative-centred. Other reason for decision is to attribute more weight to formative assessment comes from the main methodological focus for highlights the personal and professional students' skills instead of technical knowledge as usually has been adopted as assessment approach.

4. RESULT

The result emerged from data analysis has consisted in quantitative analysis of students' performance in summative assessment as well as a qualitative analysis from formative students' self-assessment. The table below presents the percentage of 36 students involved in small tasks proposed by the whole group and referring to a summative assessment stage according to Table1:

Table 2 - Percentage of students involved on small tasks

Small Tasks	Students involved (%)
Summary from the movie "Chef"	50
Delivering of summary from financial, operational, marketing and strategic plans	80
Meeting to strategic planning checklist	30
Lecture about entrepreneurship & Companies Incubator	60
Meeting to Final Presentation checklist	40
Final Presentation	80

It is possible to notice that the third and fifth tasks had a low percentage. The low percentage of the third task can be explained from the lack of student's motivation in earlier times. For most of them, it was difficult breaking off the self-paradigm of having someone sending them and assuming a self-guidance. According to this statement a student has said:

<p>d) Desconforto, pelo fato dos alunos nunca terem estado em contato de ensino</p>	<p>Discomfort. Since the students had never been in touch with that learning method before</p>
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Fig.5 - Student testimony about discomfort feelings

Some reasons for students' discomfort feelings in the project dawn which has come from the fear of the unknown as soon as a lack of leadership emerging from students themselves. One reason for this aspect of student leadership lack, can be the students' missing of a teacher authoritarianism as a Cartesian and directive guidance usual in teacher-centred learning approach:

<p>a) Insegurança em não conseguir atingir as metas pelo medo do desconhecido.</p>	<p>Insecurity given for failing to achieve the goals. Fear of the unknown.</p>
<p>b) Apenas senti falta de um líder geral, que delegasse funções. Nós ficariamos tão perdidos.</p>	<p>I just miss a general leadership to delegate the tasks. With him/her we should not be so lost.</p>

Fig.6 - Students testimony about reasons to discomfort feelings about method

This issue of leadership lack was solved only after a total failure of students in a data tabulation task from a marketing research demanded by the project. In a meeting guided by the teacher to analyse the causes of the bad performance, the students had a disruptive insight about changing their entrepreneurship behaviour and getting control of the process since they need to define a more effective leadership role among them. It is important to highlight that this paradigm change comes from relationships stress among them and that at no time the teacher had guided the students to a ready solution. The teacher only have counselled them, making sure they monitored the scheduling and tried to trace the wrong procedures, making a failure analysis. From the summative assessment for business plan the teacher has concluded that the main points of the business plan were achieved.

There is no conclusive analysis about reasoning to the low percentage in the fifth task. In Brazil a lot of students have a job concomitant to their academic life. For this reason as well as an academic assessment period maybe the fifth task cannot be considered as indispensable for them.

<p>m) Embora seja um método novo e interessante de ensino, para pessoas que trabalham o dia todo e em outras disciplinas em conjunto com esta, é muito complicado se dar por completo e aprender 100% do conteúdo.</p>	<p>Although this is an interesting new learning method, for those who have a daily job and concomitant subjects it is very difficult to drive full dedication to it as well as learning 100% of the content.</p>
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Fig.7 - Student testimony about personal engagement difficulties

Despite the challenges reported the students had not great difficulties in the adoption of digital technologies. About this issue it is important to highlight that the use of a digital social network was crucial to students' interaction. They had created a virtual meeting group using the Whatsapp cell phone applet as well as specifically Whatsapp groups to discuss the business plan parts.

<p>4) Dificuldade Tecnológica não houve pois o whatts no aplicativo bastante, a unica dificuldade foi na tabela que fizemos para controlar o custo dos sucos, pois os frutos não são todos iguais sempre</p>	<p>We had not technological difficulties since whatsapp helped us a lot. The only difficulty had happened when we were accounting juices' costs to make the prices since the fruits had very different characteristics</p>
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Fig.8 - Student testimony about using of technologies

About the project finishing in the end of the semester, the students gave propitious feedback concerning the learning methodology:

<p>m) Esse método adotado poderia ser proposto as outras materias, assim, a forma de aprender fica mais dinâmica e interessante.</p>	<p>This adopted method could be proposed to other subjects once the learning process turns it more dynamic and interesting.</p>
<p>l) A vantagem do método adotado em relação ao tradicional, é que o indivíduo aprende não se limitando a uma lista de informações já previamente estabelecidas, mas através da aprendizagem por descoberta.</p>	<p>The advantage of the adopted learning method comparing to the traditional ones is that the student learning is not delimited by a previously information set, which usually makes learning boring</p>
<p>c) A vantagem sobre o método tradicional é que temos que buscar e compartilhar o conhecimento, ou seja não é imposto do ponto de vista do professor, cada aluno com sua limitação tem que buscar se interior e pesquisar para adquirir o conhecimento necessário para contribuir com o projeto de forma que cada um com sua habilidade e percepção contribua para melhoria contínua.</p>	<p>The over traditional method is that in this new method we need to search and share knowledge. That is, the teacher's point of view is not imposed on students. Each student with their personal limitations needs to do their part and research to acquire the knowledge demanded in the project. Each one with their own ability and perception can contribute to continuous improvement.</p>
<p>c) A grande vantagem é fazer o aluno pensar, tirá-lo de uma zona de conforto e fazê-lo refletir sobre suas decisões e em como elas vão influenciar o todo. A autonomia de criar conhecimento é extremamente marcante e agrega grande valor a um método.</p>	<p>The great advantage is putting the student to think. It gets him out of the comfort zone and makes him reflect about decisions and how decisions can affect the environment. The autonomy to create knowledge is extremely remarkable and aggregates great value to this method.</p>

Fig.9 - Students testimony about PBL experience

The effects on students go beyond the Business Plan learning and classroom experience. The students' feedback was positive when they were asked if the adopted learning approach had brought new knowledge benefits to their personal or professional life:

<p>e) Sim,GRADE! Me fez ter mais interesse em ler, buscar novos conhecimentos, projetos. Fez despertar o interesse de ler e fazer o melhor por os meus colegas.</p>	<p>Yes, It has! I have had more interest in reading and in looking for new knowledge and projects. I have felt my interest arising and doing the best for my cohorts.</p>
<p>l) Sim, passou a ser mais comunicativa, perd a vergonha de opinar em grupo e é o que é importante discutir ideias para uma bem comum. Estou mais confiante que esticli a graduação certa.</p>	<p>Yes! I have begun to be more communicative, I have lost my shyness in given my opinion among my group mates. And I could notice that is important to discuss ideas for the common welfare. I am more confident that I have chosen the right undergraduate course.</p>
<p>l) Se queria que todos estivessem tratando o projeto como realidade e não como uma matéria da faculdade.</p>	<p>I would only like my colleagues were considering the project like real life and not like a college subject.</p>

Fig.10 - Students testimony about further personal skills from the project experience

Six months after the PBL project finished a student came into contact with the teacher by the Whatsapp applet asking for the Food Truck Business Plan since he had not found it in his academic material and since he had the intention beginning his own business. This fact points out how students have developed skills beyond the classroom.

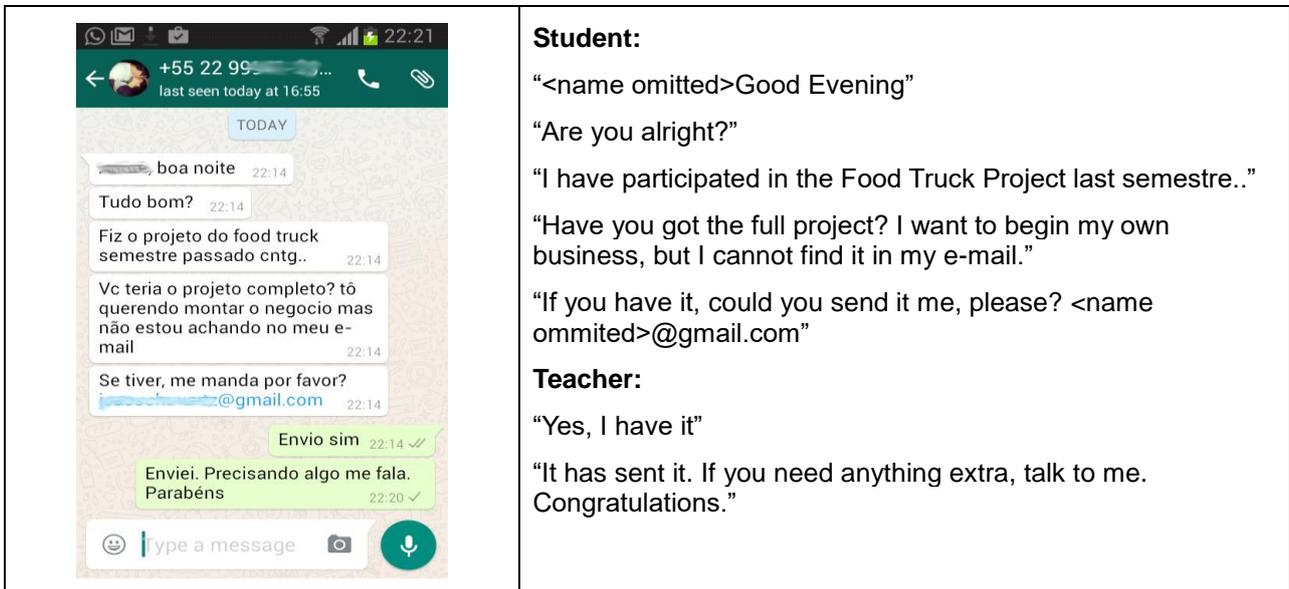


Fig.11 - Example of students going beyond PBL classroom experience

5. CONCLUSION

From data analysis it is possible to conclude that the main goals from this learning experiment were achieved since the PBL approach to the entrepreneurship class has promoted positive changes in students' profile from professional competencies to personal skills.

A highlighted negative aspect from data analysis comes from the psychological impact on students when they were confronted disruptively with new challenges from the PBL experience. As could be noticed students had feelings of discomfort at the beginning of the experiment. Some suggestion to avoid this issue could be the adoption of some method to promote confidence among student group members like DIANA (Dialogical Authentic Netlearning Activity). The DIANA model is comprised of four cornerstones that promote authentic, dialogical and collaborative learning. They are based on learning authenticity. These approaches are often based on open-ended and student-centred constructivist learning. Authentic, dialogical online learning and collaboratively constructed professional expertise can be described in a model which clarifies the components of learning and also the dynamics of the model. (Enqvist & Aarnio, 2004)

New assessment ways were conducted in the experiment. One of them was reported in Uebe Mansur *et al* (2006) and another in this paper. It is even possible to obtain a lot of data from the survey; one of the questions refers to the students' opinion about the questionnaire. The student feedback was quite positive with some interesting suggestions as shown below:

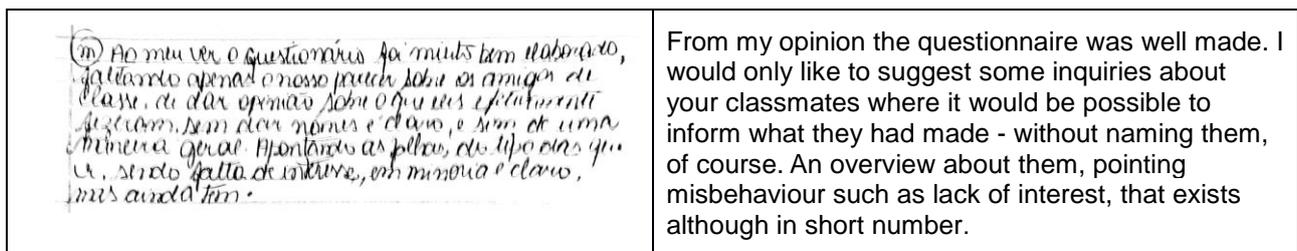


Fig.12 - Student opinion about questionnaire and suggestions

A challenge in the assessment process has happened concerning a student's final grade as it is demanded by college policies. From the summative assessments it was possible to obtain quantitative grades. The same did not happen in formative assessments given its qualitative nature. A final solution was to ask students to self-attribute a global grade in the Peer & Self-Assessment questionnaire. About this solution the results were satisfying since student have had maturity to self-assess as reported in detail by Uebe Mansur et al (2016). Despite the positive results it is a point to be improved.

Taking everything into consideration it is possible to conclude that despite some small adjustments in the implementation process and in the assessment methods, the experiment on the whole, achieved successful results, increasing students' technical knowledge about entrepreneurship and project management. It was possible to notice results beyond the initial goals like evidence of their skills development which is vital for their personal and professional life.

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