PROMOTING THE CULTURE OF INNOVATION THROUGH ENTREPRENEURSHIP WITH MIDDLE SCHOOL STUDENTS

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Abstract—Modern scholars uphold entrepreneurship is the force pushing innovation forward. Thus, a way to sow the culture of innovation into the new generation mindset is through the development of entrepreneurial skills in teenagers. Our research explores this premise aiming at the proposal of an educational methodology to promote the innovation culture through the development of entrepreneurial skills in high school students. In this work, we consider the term entrepreneurship directly linked to the capacity to do something new that leads to innovation in practice. So, we present a proposal based on practical workshops, composed of seven meetings to foster the ten personal entrepreneurial characteristics advocated by David McClelland. For their capstone project, students have to present creative interventions to improve their local community. In this sense, we promote the innovation and entrepreneurial culture by nurturing teenagers' interest in entrepreneurship as well as exploring the development of skills that seek to bring innovative solutions to society. This initiative has been carried out in the context of a university extension project conducting in partnership with entities representing the business environment and the city's public education system. Results show the proposal achieves its goal, but many challenges, especially regarding students' sensibilization in the recruiting process, remains.

Keywords—Development of entrepreneurial skills, Entrepreneurship, Innovation through entrepreneurship, Workshops for teenagers.

1 INTRODUCTION

Nowadays, entreprenology (i.e., the science that studies entrepreneurship) already accepts a more comprehensive epistemology, in which entrepreneurial skills and characteristics can and should be developed by anyone since its usefulness goes beyond the (still) common sense that an entrepreneur is the one who creates companies to make money (SOUZA NETO, 2017). Although this broader understanding of entrepreneurship was conceived a while ago, this perspective still brings fertile ground for research and development of novel educational approaches.

David McClelland (1961: 65) says in his book, at the height of the Cold War, that "[a]n entrepreneur is someone who exercises control over a production that is not just for his personal consumption. According to my definition, an executive at a steel producing unit in the Soviet Union is an entrepreneur." In this controversial definition for the time, a perspective on entrepreneurship was instigated beyond the capitalist society. Furthermore, McClelland also brought new ideas in a time when discussions concerning whether

entrepreneurship skills could or not be learned, launching the personal entrepreneurship characteristics that could be developed by anyone. As time goes on, the understanding of entrepreneurship and innovation evolves, tangling, and strengthening those concepts together as import drivers to society development.

According to Dolabela (1999), the etymology of the word entrepreneur has French origin "entrepeneur," which means to do something new. Therefore, the entrepreneur is the one who promotes innovations. Thus, the development of innovations depends on entrepreneurs. In this logic, the improvement of the society is realized by entrepreneurs, while the speed and intensity in this process are proportional to their quantity in action.

Following the vision of those pioneers in the science of innovation and entrepreneurship, we conduct researches aiming at devising new ways of promoting the culture of innovation through the development of entrepreneurial skills. In this sense, we explore the development of personal entrepreneurship characteristics (PEC), such as advocated by McClelland, through practical workshop outlined to be applied to teenagers. Therefore, we expect to nurture teenagers' interest in entrepreneurship, developing their skills in this field, as well as promoting an innovation culture that seeks to bring innovative solutions to society.

In this paper, we present our research on the design of the proposed workshop. To show evidence on the effectiveness of the proposed workshop, we present the results of its application in the context of an extension project funded by our university. The workshop application targeted high school students from public schools, being realized in partnership with a private business association (i.e., ACI del-Rei) and the public school's administration in the region of São João del-Rei (Minas Gerais, Brazil). Student's capstone projects and questionnaires applied at the end of the workshop reveal the potential of the proposed initiative, as well as bring attention to crucial matters that need attention and further development.

The rest of this paper is organized as follows. The next section presents a broader overview of the theoretical background considered in this research development. The methodology employed in this research is detailed next. The presented results comprise the description of the workshop meetings and the evaluation of the outcomes – capstone projects and questionnaires answers. The last section concludes this paper.

2 THEORETICAL BACKGROUND

According to Dornelas (2008), entrepreneurship can be defined as the capacity to transform ideas into opportunities through the involvement of people, resources, and processes. On the other hand, for Fillion (1997) entrepreneurs are creative people capable of reaching goals and possessing a high level of consciousness about the environment they are living, using such features to look up to business opportunities.

The term entrepreneurship debated in economic, behaviorist and administrative literature is related to the ability to create riches (SMITH, 1776), develop economy (SAY, 1851) and innovate (SCHUMPETER, 1911; 1942). It is defined as a new and unknown process to create business until then, assuming all risks and responsibilities to release something (e.g., product, service, trade, company) in the market (SOUZA NETO, 2008, DOLABELA, 1999). Entrepreneurs identify opportunities and turn them into something profitable, that bring personal and professional satisfaction (MCCLELLAND, 1961), contribute to the increase of riches, create employment and income, promote economic growth and improve living conditions of cities, states and countries (BARON & SHANE, 2008). Therefore, it is considered a growth engine inside of the capitalism system (SCHUMPETER, 1942).

Education on entrepreneurship is a process looking for the development of abilities and features to turn someone into an entrepreneur. In this perspective, entrepreneurship is treated as a behavioral aspect with essential features to any professional scope and to reach results in many areas (SOUZA NETO, 2017).

Over the entrepreneur's activity, consumer goods and services are created, as well as new ideas. Entrepreneurship can make excluded groups from the productive society organize and develop their activities, providing income and support to their belongings. Based on this perspective, we highlight social entrepreneurship and solidarity economy projects, which the main objective is not capital accumulation but a positive return to society.

3 METHODOLOGY

In this work, we research the creation of a workshop to foster the development of personal entrepreneurship characteristics (PEC), such as advocated by McClelland, targeting to be applied to teenagers. The goal is to nurture interest in entrepreneurship since youth, developing valuable skills in this field, as well as promoting an innovation culture that seeks to bring innovative solutions to society. The research is developed in the context of an extension project funded by our university. The presented research was delineated using the methodological approach of Design Science Research (DSR), defined by Hevner and Chatterjee (2010) as a research paradigm where a designer answers questions relevant to human problems through the creation of artifacts. In this sense, a brief description of this approach is initially presented, and then its constructs are detailed.

3.1 DESIGN SCIENCE RESEARCH

The DSR approach to conduct research advocates scientific production through the creation of artifacts. According to Van Aken (2005), the main goal of DSR is to develop knowledge in a certain domain that professionals can use to design solutions for their field problems. This mission can be compared to one of the "explanatory sciences," like the natural sciences and sociology, which is to develop knowledge to describe, explain, and predict. Hevner *et al.* (2004) state that the main purpose of DSR is achieving knowledge and understanding of a problem domain by the building and application of a designed artifact. It is essentially a problem-solving paradigm that defines the creation of innovative artifacts through the design, implementation, and use (Hevner and Chatterjee, 2010).

The application of DSR relies on three cycles (Hevner, 2007), such as presented in Figure 1. The relevance cycle (RC) initializes DSR by defining the context of the use and identifying the development requirements. RC identifies the problems and opportunities across the environment to be taken into account by the design cycle (DC). It also establishes the acceptance criteria for artifact evaluation. Opportunities and problems are defined according to the characteristics of the problem, such as the people involved, the existing organizational, and technical systems. The artifact resulting from the DC must return to the environment to be evaluated in the application domain. The outcome of the evaluation will determine how many RCs will be required for the DSR or may provide and/or address previously defined requirements.

Rigor cycle provides prior knowledge to ground the proposed innovation as well as seeks to contribute to the scientific body of knowledge. Through this, theories and methods for the construction and evaluation of the artifact are selected and applied. Evidence obtained from the design process – the experiences, processes, and artifacts investigated in the application domain – is added to the knowledge base, fostering new theories, methods, and practices.

Finally, the DC consists of generating alternative designs of the artifacts and processes, evaluating them to refine the designed object until a satisfactory result is achieved. Both activities – designing and evaluating – should follow the theories and methods established in the Rigor Cycle, and also according to the requirements defined in the Relevance Cycle. Once a satisfactory design is achieved, the artifact must be evaluated in the actual context of use and its contributions are added to the knowledge base.

Figure 1. Design Science Research Cycles (Hevner, 2007)
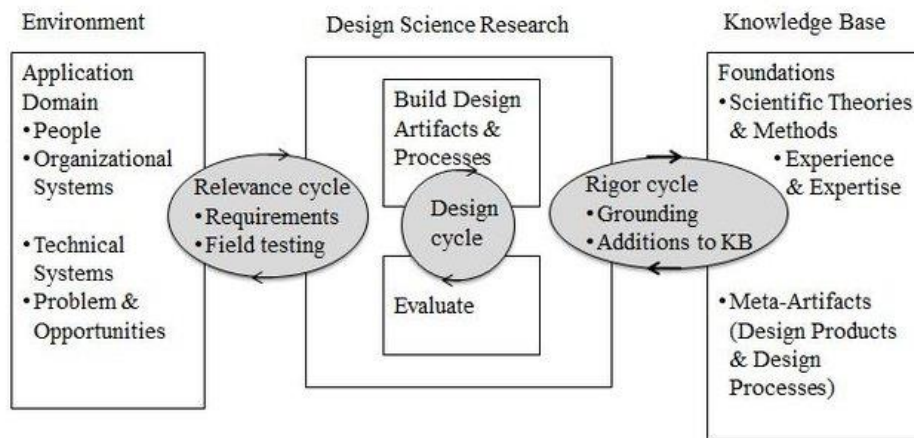
3.2 THE EXTENSION PROJECT

The presented research is developed in the context of the extension project "Semeando o Empreendedorismo" (Sowing Entrepreneurship), which is promoted by the Entrepreneurship and Innovation Technology Nucleus (NETEC) of the Universidade Federal de São João del-Rei (UFSJ). The project idea emerged from the observations of its idealizers, Professor Dárlinton Carvalho and Professor Fabrício Mendonça, who noticed the lack of projects about development of entrepreneurship in the formation of the youth in the region of São João del-Rei/MG (Brazil).

Following the guidelines presented in UFSJ's technological innovation policy, the proposal was submitted to the extension projects funding committee, which was approved and granted starting in 2019. This initiative counts with many partnerships among public and private entities aiming to sow entrepreneurship culture in the surrounding region. The project is coordinated by its idealizers, the workshop dynamics' creation was developed by Tiago Lasmar and the workshop application was fulfilled by the students Isabel and Victor.

3.3 WORKSHOP DESIGN

According to the DSR, the artifacts created must be useful to the research process and be represented in such a way suitable to its nature, ranging from formal logic through mathematical rigor, to natural language descriptions. The construction of the artifact is based on theoretical conjectures (rigor cycle) concerning the application domain (relevance cycle). In this paper, we present the workshop describing the lessons, covering the knowledge and strengthening of the PECs.

The workshop design considers the community's background, especially addressing needs, behavior, and desires. We opted for a teaching method based on active and immersive learning in a holistic structure. At each meeting, theoretical knowledge was worked together with practical activities, promoting interactive and pleasant education for the students. So, each workshop meeting was organized in two very distinctive moments, being the first characterized by presentation, explanation, and development of two out of the ten PECs and the second moment characterized by creation and development of a capstone project thought to be presented in the last meeting. The class is arranged in smaller groups of students to enable better execution of the activities. Resources such as slide presentations, videos, pictures and examples of success cases were used besides providing discussion among the students to assure their level of understanding about the subject treated, as well as supporting them in arguing and exposing their ideas. The success case demonstrates the significance of the topic in addition to present forms of application figuratively, promoting the student's resemblances with the theoretical subject.

Regarding the capstone project, the groups are fully free to propose projects, without restrictions, but we asked them for it to be something economically, socially, or environmentally sustainable. The purpose of this project development is to train and improve the PEC's, bringing them the problematization concern to identify in society points with less attention, problems and a challenge to propose a possible solution or innovate in a new entrepreneur. At the end of each lesson, 20 minutes were reserved for discussing their ideas and helping with the project construction.

3.4 EVALUATION

The evaluation of the proposed workshop is performed through its application offered to freshman and sophomore high school students from public schools of the region of São João del-Rei. The recruitment process was accomplished through school visitation, local radio news propaganda, and online disclosure of the subscription call.

Upon enrollment and at the end of the workshop, students answered a self-assessment questionnaire regarding the personal characteristics of entrepreneurs, which had the objective of evaluating in each enrollee the development of these characteristics throughout the project. The results enabled to show evidence regarding the impact of the proposed workshop.

4 RESULTS

4.1 WORKSHOP MEETINGS

Since, the employed educational method is based on active and immersive learning, in a holistic structure, each workshop meeting starts with theoretical explanation, which content is worked together with practical activities, promoting an interactive and pleasant education for the students. Therefore, at each meeting one or more activities are presented to practice the theoretical content, as detailed below.

1ˢᵗ Meeting – Self-confidence and commitment to the work contract

It was developed the presentation dynamics called "The Box" in which each participant, when introducing himself, should take a phrase – announcing something personal (e.g., my favorite food is) – out of the box and complete it according to their own ideas and feelings. The purpose of the dynamic was to promote interaction and increase knowledge among participants.

In addition, it was developed an activity to work on students' self-esteem. A blank sheet of paper was delivered to each one saying that it represented our self-esteem and then a list of situations that could detract from it was read. For each situation in which the individual felt that his self-esteem had been shaken, he should tear a piece of paper in the same proportion. Subsequently, they should perform the inverse action, with the intention of regaining their self-esteem and the pieces too, listening to positive phrases that motivated them, joining the pieces of torn paper.

2ⁿᵈ Meeting – Search for opportunities and ability to take risks

To elucidate this characteristic, we realized the dynamics of the "Surprise Box", which consisted of a carton of wrapped cardboard containing chocolate and several chopped papers. It was told to the students that there would be a challenge within the box to be realized by those who opened it. The box was passed from hand to hand among students as they were instructed to take risks as well as their chances of loss and gain. In the end, anyone who made the decision to open it would find the chocolate, rather than a challenge.

3ʳᵈ Meeting – Search for information, persuasion and networking

To begin, the teenagers were asked to line up. At the beginning of this line, a cardboard box was placed. The last student in line was given a ball of paper, and it was his task to try to hit the cardboard box alone, overtaking it all in front of him. Knowing the difficulty in hitting it without the help of others in the line in front of us, we explained the importance of networking and people and again we asked the last one to

try to hit the box, but with the help of who were in front of him. The student was passing the ball to each participant until they hit the box, thus completing the purpose requested.

In order to work on persuasion and search for information, a sales theater was carried out, which consisted in the sale of a lot of medicine. The group was separated into two groups: the first being a representative of a multinational pharmaceutical company and the second a humanitarian aid NGO. It was the goal of each one to profit the sale and buy at the lowest possible price, respectively. With this sales theater, we tried to test and demonstrate the importance of the topics worked, in addition to testing the creativity of each member.

4th Meeting – Definition of goals, planning and systematic monitoring

This dynamic was divided into smaller ones. It was first demonstrated the importance of setting goals to achieve a particular one. A volunteer was called, and he was asked to come forward, close his eyes, turn around and try to return to the place where he was sitting. While trying to reach his goal, we explained the importance of setting goals to achieve the desired goal by comparing blindfolding with pursuing a goal without first setting goals. The second dynamic consisted of training how to set goals. After explaining how to assemble them, the young people were asked to write a goal on a paper. Then we gathered the paper and redistributed among them, asking each one to talk about the goals that should be achieved to achieve the goal that was in their hands.

A dynamic called "My Own Home Challenge" was also held. The objective of the dynamics was based on the observation of the problem of homelessness that is strongly present in the city of São João del Rei and the participants should develop a plan of action to solve this problem, presenting the proposal of the group through mockups. For the construction of the model were available recyclable materials such as cardboard, glue and adhesive tape. The objective of the activity was to develop the ability to identify problems, develop action plan, resource search and group work. Figure 2 shows the models that represent the idealization of each group.

Figure 2. Models with the solution idealization for the "Challenge My Own Home"

5th Meeting – Efficiency, quality and persistence

At the beginning of this meeting, the class was split into pairs to test their persistence. Each of the duo had a role, one should close his hand and the other try, from his arguments, to convince him to open it. During the process the participants should always try to change his tactics, arguments and approaches to test persistence and not stubbornness. In the end, the dynamics were used as a basis for explaining the differences between persistence and stubbornness. To train the topics of this meeting as well as the others worked until then, the class was again separated, but this time in three groups. The new dynamic was aiming at negotiating between three different companies, each with its own needs and objectives. The first was the only producer in the world of a rare orange species, the "kaikai." They would receive two different medicine manufacturing companies with an interest in buying this rare citrus. Thus, the second group represented a

drug manufacturer that had intended to buy the fruit to use only its bark in the production of a medicine to cure rhinitis. The third group represented a company that had an interest in buying the fruit to use its juice for the production of a medicine that would cure AIDS. Neither company was aware of which part was interesting to the other. An average value for sales of the oranges was transferred to the producer, and for the companies an average value for purchase, which could be served or not, since the intention was to train their entrepreneurial skills. After a time of meeting each other and assembling their arguments, companies should negotiate the sale of the product always seeking to achieve the goal that was the purchase / sale for a price close to the estimated.

6th Meeting – Finalization of projects and dynamics

An activity was developed in which the participants experienced a job interview. They were divided into two groups in which a team went through a company with a job vacancy and the others would be interviewed. Respondents would have to work hard to get the job and interviewers should choose the best candidate. The purpose of the dynamic was to develop self-knowledge skills, persuasiveness, leadership, and the ability to make choices.

7th Meeting – Presentation of the projects

To take the stress out of the presentation and create a pleasant atmosphere for everyone to make them confident, a dynamic was made. It was given 14 answers before the 14 questions were asked. For this, a paper and pen were given to each student and asked to list from 1 to 14 and write for each number a response to what was requested. For example, 1st A measure number in centimeters. After all the written answers, the instructor would ask a question to answer with the corresponding number, for example: "1st How big is your wife's shoes?" The answer would be the centimeter value they wrote at number one. There was a great appreciation of the joke and a very relaxed atmosphere among the group, leaving aside the tension for the presentation of the projects.

4.2 EVALUATION

The first workshop had the participation of eight students belonging to five different schools. The participating schools were: State School Doctor Garcia de Lima, Tiradentes College of Military Police, State School Governador Milton Campos, State School Iago Pimentel and State School Conego Osvaldo Lustosa.

During the workshops the participants formed two groups of four members each, in which they should develop a project to be presented as the final work of the course. During the meetings, the entrepreneurial skills that were used throughout the development of the final work were worked out with the students. Regarding the themes of the projects, they were given the freedom of choice, however, it was proposed that they observe in the society sectors that present business opportunities.

The themes chosen by the groups for the development of the capstone project were Financial Education and Knowledge Exchange. Both projects are proposed to be developed initially in the city of São João del-Rei, but with the possibility of long-term expansion and without immediate objective of financial return to the creators.

The Financial Education project aims to educate in the area of personal finance targeting students of basic education (i.e., K12) by offering an extracurricular course. According to the group, the idea came about through the observation of students that the theme is not a regular curricular component and most of the Brazilian population has little or no knowledge about investments and personal finances. Thus, the project designed by the students aims to disseminate knowledge about personal finances, budget, planning, investments. In this way, it has a role to prepare and raise awareness among children, adolescents and young people so that when they are in adulthood, they can have a good financial health, deal strategically with their money and already help with household finances.

The proposed project demonstrates students' view of a fairly common problem in society, the inability to control financial life. The proposed solution, the extracurricular course on financial education,

would reach a portion of the society that could later compose and add up to the current 20.6 million defaulters aged 22-37, according to data from the National Association of the Credit Bureaus (ANBC). The project realization has various indirect benefits that can be achieved as the aggregation of value to the local merchants who can suffer from the large number of debtors.

The other project, called Exchange of Knowledge, has a social aspect, which purpose is to encourage the exchange of books and consequently knowledge. Instead of paying for a new book, the reader will take one of your belongings to exchange for a desired one. This creates the habit of detachment offering the opportunity of reading to people who would not be able to buy a book. The idea was born from the observation of the group about the low reading index in Brazil. Data from the research of the 4th edition of the Portraits of Reading research in Brazil, which is developed by the Pro-Book Institute, demonstrates a low reading rate of the Brazilian, about 2.4 books per year.

It has been proposed to develop different ways to put this project into practice and make it innovative. One example is the creation of reading clubs, in which people could exchange knowledge acquired through books. As one of the reasons for lack or incapacity in increasing reading according to the research was the lack of time, it was proposed to offer cozy places, so that during the day-to-day running, people could find there a quiet place to reading. Another alternative is to partner with taxis and local passenger transport applications to expose books and enable people to read and exchange books while traveling. These points would be a way of reaching a large part of the population and serving as a way of publicizing the Exchange of Knowledge book fair.

Each project received feedback for its development and was also asked about key points for its creation, in order to evaluate the capacity of creation and elaboration of the proposed activity. After the presentation of the projects, an invitation was made by the evaluation bank to both groups, which if they had an interest in continuing the projects would have support from the UFSJ Business Incubator INDETEC. The main objective of the partnership is guidance and support so the students could advance in the development of the proposals mainly through the search for partners.

Upon enrollment and at the end of the project, the students answered a self-assessment questionnaire regarding the personal characteristics of entrepreneurs, which had the objective of evaluating in each enrollee the development of these characteristics throughout the project. Table I presents the score of each student, with general average in the last row. The names of the students were omitted to preserve their identity. Students 2 and 5 have not responded to the first questionnaire.

TABLE I
STUDENTS SELF-ASSESSMENT REGARDING THE PERSONAL CHARACTERISTICS OF
ENTREPRENEUR UPON ENROLLMENT AND AT THE END OF THE WORKSHOP

Student	Upon enrollment	At the end of the Workshop
1	6	8
2	-	7
3	6	8
4	6	6
5	-	8
6	6	5
7	6	5
8	5	6
Average	5.8	6.3

By analyzing Table I, we notice a relative increase in the scores obtained in the self-evaluation, comparing the first with the later questionnaire. Therefore, the project's ability to assist in the awakening and development of personal entrepreneurial characteristics is evidenced. The cases in which the score did not increase or remained the same indicate the proposed methodology still requires enhancements.

The final questionnaire also reaffirms the premise that there is little knowledge of teenagers about

what entrepreneurship is, as well as the main characteristics of an entrepreneur that can be developed by any individual. Besides this assessment, the participants answered another questionnaire that sought to collect information regarding the course quality. This questionnaire had four statements to be evaluated from 1 to 5, with 5 being the most consistent with the proposed statement:

- Q1: The time and content of the Project and its utilization was adequate.
- Q2: I believe the Project has added value to me.
- Q3: I believe that the training satisfies my expectation.
- Q4: The distribution between theoretical and practical classes is good.

The results presented Table II show the satisfaction of the students regarding the course, having a general average above 4. This result demonstrates that the content taught, and the organization of the classes are fulfilling the purpose of having an active and immersive learning in a holistic structure. Thus, we see that the structuring of workshops is going according to the need and affection of target audience.

TABLE II
WORKSHOP ASSESSMENT QUESTIONNAIRE

Student	Q1	Q2	Q3	Q4
1	4	5	4	3
2	3	3	2	3
3	5	5	4	5
4	5	5	5	5
5	4	5	5	4
6	5	5	5	5
7	5	5	5	5
8	5	5	5	3
Average	4.5	4.8	4.3	4.1

5 CONCLUDING REMARKS

During project dissemination activities within high schools, we observed that many adolescents have little objectification about their future, do not have the practice of goal setting and personal planning. In addition to this lack of perspective for life, they did not present knowledge about the theme of entrepreneurship. This situation reinforces the importance and need of offering workshops such as proposed in this research to foster the personal transformation of students, considering them as the future of society, the project is justified on the premise that they are the future driving force of society.

Since the student's admission was considered low, it is worthwhile to mention the impressions encountered during the execution the workshop disclosure process. This may have been caused by a lack of knowledge regarding the subject (i.e., entrepreneurship), the hours of the workshop meetings or because they were not as motivated as their future professionals. Thus, for a more significant number of students, the challenge seems to be strengthening the partnerships with schools to encourage students to participate.

Through the workshops, the participants were able to experience new experiences, with an intense exchange of knowledge. The knowledge about entrepreneurship presented in the course promoted the gain of new skills of both technical and social nature. Project extension activities allowed for greater integration between university academics, market professionals and the community of São João del-Rei, contributing to a critical reflection on community interests, social problems and professional training with more citizenship.

Observing the actions developed and the presented results, we noticed that these are being positive and that the project took an important first step to fulfill its purpose of diffusing the entrepreneurial culture in the region. As a result of the first group, two business projects with high potential were developed, which would positively impact society after its implementation. But the development of the projects were not the only positive results of the project. Contact with participants demonstrated the ability of young people to

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diagnose a problem and propose creative alternatives to solve it, as well as personal growth through entrepreneurial skills.

Thus, we concluded that the proposed workshop has the potential to transform the lives of adolescents, who can arouse interest in the area and become future entrepreneurs and active agents during society. The proposed approach fulfills its purpose and the initial results justify and reinforce the need for improvement, as well as the continuity of action.

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