

## **Learn by Doing: A Case Study on Enhancing Students' Entrepreneurial Skills**

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### **Introduction**

Small and medium sized enterprises make important contributions to the economy, productivity, innovation, and employment (Sancho, 2010). However, many of these business owners complain about recruiting challenges, as it is difficult to find employees who have the requisite knowledge to execute entrepreneurial strategies that lead to business growth (Bertolucci, 2013). Further, the number of business startups in the U.S. has been declining steadily for the last 30 years. In 2011, the number of U.S. businesses that existed less than one year was just 8.2%, which had dropped from a high of 16.5% in 1977 (Ryan, 2012). Within the agricultural sector, the number of new farms is on the decline, and the number of new farmers and ranchers who are over 35 years old is increasing (U.S. Department of Agriculture, 2014). Many companies do not show enough growth to take off to the next business stage. In particular, agricultural start-up companies have a five-year survival rate of only 47.4% (Shane, 2012).

Innovation and entrepreneurship runs across the food value chain; from hydroponics to food hubs, agricultural entrepreneurs are changing the face of agriculture. Given the pertinent issues of drought, climate change, and increased regulation in agriculture, there is a need to increase entrepreneurial activities in order to create innovative solutions to these agricultural issues and stimulate the economy (The Economist, 2016).

Entrepreneurship education has become more important, especially at the college level. Embedding the teaching of entrepreneurship and innovation into the college curriculum will help students explore start-up ideas before relying on their business idea as a primary source of income. Four decades ago, just 100 universities offered formal courses of study related to entrepreneurship. By 2008, the number of entrepreneurship courses had grown to 5,000 with more than 400,000 students enrolled in entrepreneurial courses per year (Torrance et. al, 2013; Solomon, 2015). The growth in the number of entrepreneurial courses is a result of the desire to hone students' innovative skills as early as freshmen year. Many universities communicate the importance of relentless innovation through a dual approach of entrepreneurship education, which engage students' entrepreneurial thinking through crossdisciplinary institutions such as on-campus centers, and through intradisciplinary group activities such as clubs and classes that are exclusive for certain majors. Both of these approaches develop important entrepreneurial skill sets in students, including becoming result-driven, a critical/systemic thinker, and learning to be a problem-solver (Sancho, 2010).

Entrepreneurship education is especially important for students in agricultural fields such as agribusiness, because it is undergoing rapid growth and encompasses a wide variety of jobs (Medina, 2013). Thus, there is a need for research that explores the ways entrepreneurship and

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innovation can be incorporated into agribusiness education. The purpose of this article is to highlight a case study of an experiential learning approach that teaches entrepreneurial skills to agribusiness students at a university in the Western U.S. Our objective is to explore the self-assessed impact of the “Learn by Doing” teaching approach on students’ ability to succeed in entrepreneurial ventures.

“Learn by Doing” is a form of experiential learning, where students gain hands-on experience solving real-world problems. The Learn by Doing pedagogical approach aims to establish key building blocks in critical thinking and confidence, which provides students with exposure to navigating the entrepreneurial path. Through hands-on exposure to challenges and the use of critical thinking, students experience unstructured problems like in the real world, which develops their entrepreneurial mindset. Learn by Doing creates a fertile ground for teaching entrepreneurship (Schank, 1995). Through our case study, we will explore the impact of two different Learn by Doing approaches that hone students’ entrepreneurial skills for innovative endeavors in the agricultural supply chain: 1) interdisciplinary efforts specific to entrepreneurship, and 2) intradisciplinary group participation in capstone classes and co-curricular activities.

This manuscript aims to provide an initial exploration of different approaches to incorporating entrepreneurial education into an agribusiness program. The article is organized in the following structure. First, we will review previous literature about entrepreneurial skills, entrepreneurial education, and approaches to entrepreneurship education. Then we will highlight the entrepreneurship activities at one Western university as a case study of incorporating entrepreneurship into an agribusiness program. We conclude by summarizing the findings from our case study and discussing opportunities for future research.

## **Previous Research**

### *Entrepreneurial Skills*

An entrepreneurial leader must be able “to challenge, create, and change solutions inside existing organizations and within new startups” (Ansari et al., 2014). Starting a new business is complex and uncertain, and the structure of a traditional learning environment does not necessarily prepare a student for a future in entrepreneurship or innovation (Higgins, Smith, and Mirza, 2013). Furthermore, a changing world requires the need for students to be able to teach themselves (Styron, 2015).

One school of thought suggests that *attitude* is one of the fundamental factors to success as an entrepreneur, while the other school of thought suggests that entrepreneurial *success* is a function of possessing the right skills (Bennett, 2006). Self-efficacy among students is positively linked to the likelihood of taking on entrepreneurial activities and the success of those activities (Ehrlich et al., 2000). Several of the key areas that define future entrepreneurial leaders include the ability to identify opportunities, blend technical and creative aspects of decision making, and move between predictive and creative logics according to the situation’s needs (Ansari et al., 2014). Thus, these key areas rely on an individual’s competency to evaluate, manage, and use information (Korobili and Tilikidou, 2005; Blaszczyński, Haras, and Katz, 2010; Devasagayam, Johns-Masten, and McCollum, 2012). Critical evaluation of information is crucial to an entrepreneur in order to make decisions based on future trends and past failures. As suggested by Sancho (2010), the skills and characteristics necessary for potential entrepreneurs range from being willing to accept risk to being a systemic thinker, and from having experience to relying on intuition (see Table 1 for the complete list).

**Table 1. Characteristics and Skills Needed by Potential Entrepreneurs (adapted from Sancho, 2010)**

Accepting of risk	Honest	Knowledgeable	Results-driven
Agent of change	Independent	Leadership	Self-effective
Dynamic	Initiative	Motivated	Simple
Energetic	Innovative	Open to partnerships and teamwork	Systemic thinker
Experience	Intuition	Problem-solver	Tenacious
Flexible and adaptable	Involved	Responsible	Visionary

*Entrepreneurship Education*

Recognizing the value of entrepreneurial skills, entrepreneurial education has become an increasing focus among institutions of higher education (Robinson and Josien, 2014). Entrepreneurship education has become more mainstream and grown from a handful of courses in 1970s to more than 2,000 classes at 1,600 schools in 2005 (Kuratko, 2005). Colleges offer an increasing variety of courses that focus on the skills and knowledge for an entrepreneurial path (Assudani and Kilbourne, 2015). The E.U. government has placed increasing pressure on European business schools to develop their entrepreneurial education programs (Higgins and Galloway, 2014). Furthermore, policymakers have launched a variety of programs that facilitate enterprise development and enhance innovative activity. One of these White House initiatives is “Startup America”, which aims to accelerate entrepreneurship throughout the nation (The White House, 2015). Startup America’s main objective is to disseminate a national enterprise culture. The initiative increases awareness about the importance of creating enterprises, while teaching individual core competencies such as problem-solving, critical thinking skills, and knowledge (Sancho, 2010).

Entrepreneurial education increases an individual’s entrepreneurial intentions, their confidence to succeed with entrepreneurial activities and their actual entrepreneurial success rates (Ehrlich et al., 2000; Ozgen and Minsky, 2013; Bell, Dearman, and Wilbanks, 2015; do Paço et al. 2015; Kolstad and Wiig, 2015). Traditional “male-centered” views of entrepreneurs are fading among U.S. business students as entrepreneurial education increases the likelihood for students to pursue entrepreneurial activities, regardless of gender (Mueller and Conway Dato-on, 2013). Students that enroll in elective entrepreneurial classes may improve their entrepreneurial competencies, including risk-taking, self-efficacy, and are more likely to be proactive (Sanchez, 2011).

*Approaches to Entrepreneurship Education*

Entrepreneurial skills are not necessarily innate skills, but rather skills that can be developed (Kuratko, 2005). However, the structure of traditional education may be stifling entrepreneurial activity. Previous research suggests that practical orientation courses, as opposed to theoretical orientation courses, lead to higher entrepreneurial intentions (Piperopoulous and Dimov, 2014). Entrepreneurship texts are not enough to increase the likelihood of starting a new venture (Edelman et al., 2008), further suggesting the value of experiential learning as opposed to the transmission of knowledge (Naia et al., 2015). Pedagogical approaches for teaching entrepreneurship are evolving and there are tradeoffs between providing structure versus the realities of ambiguity, self-efficacy and realistic feedback, specificity and imitative learning (Powell, 2013).

To help promote student innovation and entrepreneurship, the National Advisory Council on Innovation and Entrepreneurship (2011) recommends cross-college and cross-discipline approaches, as well university-industry collaborations. Within entrepreneurship education, the feedback from seasoned entrepreneurs is also a valuable tool (Powell, 2013). Furthermore, experiential learning, competitive opportunities, and innovation collaboration spaces are all recommended practices for educating future entrepreneurs (United States Department of Commerce, 2013).

Based on an extensive literature review, Naia et al. (2015) concluded that active participation, experience of failure, and multidisciplinary approaches may be best practices for entrepreneurship educators within the classroom. Elements of good experiential education include a balance of content versus process, being student-based, personal in-nature, holistic rather than reductive, showing emotional investment, reflective and self-examination, and moving outside one's comfort zone (Robinson and Josien, 2014). Adoption of a reflexive pedagogy where "educators and entrepreneurs are co-constructors of the learning experience" may be beneficial (Higgins, Smith, and Mirza, 2013). However, regardless of the approach, innovation and rigor in teaching entrepreneurship are key (Kuratko, 2005; Robinson and Josien, 2014).

Across the literature, it appears that engaging students in projects is a fundamental aspect of entrepreneurship education (Boldureanu et al., 2013). Pizarro (2014) and Kreuger (2009) confirm that applied, hands-on assignments are beneficial toward engaging entrepreneurial thinking among students. The creation of a new venture as a learning tool in higher education is rare, but when it does exist, it can be powerful. Action-based educational strategies create emotional investment (Lackeus and Williams-Middleton, 2011). By asking students to take risks following a Learn by Doing approach, they not only become more comfortable in the face of risk, but they also have the opportunity to learn from both successes and failures (Pizarro, 2014). While success is desirable, failures tend to be even more powerful learning experiences (Shepherd, 2004). Allowing students to take a self-directed path and discovering their own strengths is, in and of itself, a valuable skill for future entrepreneurs (Powell, 2013).

### **Methods and Results: Case Study of Cal Poly, San Luis Obispo**

The Western region of the U.S. is known as an area of entrepreneurial activity, standing out as home to 7 of the 12 cities that Forbes identified as the "Best Cities to launch a Startup" (Post, 2014). The Kauffman Index of Entrepreneurial Activity, the leading indicator of new U.S. business creation, shows that the Western region had the highest entrepreneurship rate while the Midwest had the lowest. Furthermore, four Western states ranked as the top entrepreneurial active locations: Montana, Alaska, California, and Colorado (Fairlie, 2014).

One Western university that is actively engaging in early exposure to entrepreneurship is California Polytechnic State University (Cal Poly) in San Luis Obispo. Cal Poly is located on the Central Coast, which lies between San Francisco and Los Angeles. Cal Poly's motto of "Learn by Doing" is reflected in the role of entrepreneurship on campus (for more information on Cal Poly's Learn by Doing philosophy, readers are encouraged to visit Cal Poly LBD project at <http://morethanamotto.calpoly.edu/project/about>).

Cal Poly's legendary Learn by Doing approach is evident in the Center for Innovation & Entrepreneurship (CIE), which forms the umbrella for Cal Poly's startup scene. Since its inception in 2010, the CIE has promoted regional economic development by helping with the

startup of 52 businesses (Wilson, 2016). Recent examples of startups focus on using magnetic nanotechnology to clean up oil spills, developing a water meter attachment that relays real-time water usage information to the homeowner via mobile and web applications, and creating fully compostable drinking cups and to-go food containers (CIE, 2016). The CIE is active in engaging students through clubs, education, student competitions, supporting the discovery of innovations, and the launch of startups.

In addition to the CIE, which is open to students of all majors on campus, various departments are offering their area-specific efforts to hone their students' entrepreneurial skills. We will focus on Cal Poly's Agribusiness department and highlight its efforts to serving young agribusiness entrepreneurs and innovators.

Using Cal Poly as a case study, we will explore the different approaches that aim at developing entrepreneurial skills among agribusiness students: 1) interdisciplinary efforts through Cal Poly's CIE, 2) intradisciplinary programs such as being a member of a team contest such as the National Agri-Marketing Association (NAMA) case study competition, and teaching of Agribusiness classes that include concepts and applications of entrepreneurship.

#### *Interdisciplinary efforts through Cal Poly's Center for Innovation & Entrepreneurship*

With regard to interdisciplinary efforts, the CIE assists students, staff, and faculty by offering mentoring from California's successful entrepreneurs, Cal Poly's faculty and CIE fellows. In addition, the center serves as an access point for the community. The CIE has two locations: the on-campus Hatchery, and the HotHouse, which is located in downtown San Luis Obispo. Given CIE's on-campus location of the Hatchery, students receive help to form interdisciplinary teams and gain hands-on experience. Lastly, the CIE supports the launch of student start-up companies and provides access to resources and networking opportunities. In order to help with the learning, preparing, and launching of companies, the CIE offers ten different programs. In the following, we would like to give a brief overview of these programs and their Learn by Doing components.

The Cal Poly Entrepreneurs club is open to all majors and has become the largest student club on campus, with a membership of about 10% of all Cal Poly students. The club offers road trips to startups in San Luis Obispo, Silicon Valley, and Southern California. The club organizes the campus-wide Elevator Pitch competition, in which students give a 90-second pitch of their idea for new products, innovative services, or startups to panel of judges. The winning prize of the Elevator Pitch competition is \$1,000 in cash and a trip to the National Elevator Pitch Finals. The competition includes special categories for freshmen, already-formed ideas, and "just ideas." In 2013, an Agricultural Sciences major won the Collegiate Entrepreneur Organizations National Elevator business pitch competition. While in college, she designed four lines of boots and clothing for Ariat International.

Several former agribusiness students benefitted from services of the Entrepreneurs Club and emphasized the value of those Learn by Doing experiences when it came to starting their own businesses. One alumni started a company based on an idea that he developed as a member of the Entrepreneurs club. In his statement, this young business owner pointed out that the interdisciplinary CIE experiences have helped him to accept risk:

*During the research and development phase of my start-up, the CIE provided some invaluable resources that helped to shape my own business. I was turned on to the lean start-up philosophy in which I tested various ideas before over-investing sweat and*

*capital. Furthermore, the CIE student and faculty environment provided a means to interact and network with similar minds and to learn from the trial and error of others.*

The Entrepreneurs club is also in charge of the annual Startup Weekend, where student and community entrepreneurs from all disciplines come together to build a startup in 54 hours. A shorter version of the Startup Weekend is the Design & Develop Hackathon, where students from across campus come together to take an idea from a spark to a reality in 24 hours. Participating teams build a mobile app, a website, or a project. The Hackathon is a great way to connect, learn skills, and get feedback from mentors. Many of these students find out about the CIE during the Hackathon and become curious about its services.

One Agribusiness alumni who had utilized the services of the CIE has started three companies since his graduation, which exemplifies his result-driven character. He started his company based on self-efficacy and intuition, given a life-changing experience that clarified the need for his innovation. He was highly appreciative about the knowledge and motivation that he received from the CIE Hatchery:

*In working with the CIE, I learned so much. I didn't just learn about business or best practices, but I learned that creating a successful company could be a reality. The CIE helped pave my way to success and years later I still use a lot of what I learned with the CIE.*

Startups and small-business owners may obtain insight into pertinent issues through CIE's Entrepreneurship forum series. The CIE offers six forums per year which are open to students, faculty, and the community. The forums bring together panels of expert entrepreneurs offering insight on entrepreneurial challenges and models of success, followed by interactive sessions. One recent forum focused on innovation in food and wine, and addressed issues such as the drought in California, and the increased use of hydroponics and vertical growing systems.

Entrepreneurial learning also takes place in CIE's Innovation Sandbox, which is a physical and programmatic environment where students from all majors across campus come together to explore and develop their early-stage ideas. Innovation Sandbox allows innovations to progress beyond a single classroom project or exercise, and decouples innovation from a particular course or department. It is a hybrid maker space, new technology demonstration/experience area, and student project workspace, which allows students to engage in technology such as a 3D printers, Leap Motion sensors, and Oculus Rift.

Cal Poly students have the opportunity to participate in a Study-Away Entrepreneurship Immersion program for one quarter at Draper University, in San Mateo, CA. This program is broken down into three weeks of intense preparation at Cal Poly, and seven weeks of immersion at Draper University. Courses include topics as venture capital, sales and digital marketing, negotiation, prototyping, and the important lessons of failure (Conti, 2015).

Another popular CIE competition is Innovation Quest, which grants up to \$15,000 in funding and coaching to student-run startups. This annual competition was started by Cal Poly Alumni. It helps students to fund their own startups and encourages innovators to pursue their ideas. Participants may obtain feedback from a large number of entrepreneurial mentors.

During the summer, the CIE offers the Annual HotHouse Accelerator program. Multi-disciplinary teams may apply for this intensive 3-month incubation process. This program provides selected

students and recent grads with seed funding of \$10,000 per team, mentorship, and office space to launch a successful business.

After they have completed the Accelerator, student teams may apply to become part of the 2-year Incubator Program. Selected groups of companies may remain at the HotHouse to continue work on their business and utilize all resources and mentor network to transform their startup into a sustainable company. One example of a company that participated in the HotHouse Incubator Program is VegThisWay. The company was started by four Cal Poly Food Science students who created a healthy snack bar for a national product development competition. The VegThisWay's Co-Founder highlighted the importance of being involved and becoming a systemic thinker:

*If students have an idea or a product that they are passionate about growing into something more they should take advantage of what the CIE has to offer. The support system is unlike any other and there is a whole community rooting for them to succeed. That encouragement and mentorship is hard to find, but at the CIE you're surrounded by it. Having experienced entrepreneurs, teachers, local businesses and other start-ups all in the same space, gave us the opportunity to learn how to start a business. From bouncing around ideas with our peers, pitching in front of the community, participating in weekly workshops, the CIE prepares you for success. Not only will you learn about starting a business, the experience you will help you grow as a company, as a team and as an individual. It's like nothing I have been part of before and I am so grateful for the experience.*

#### *Intradisciplinary Efforts to Teach Innovation and Entrepreneurship*

Intradisciplinary efforts, executed by individual departments, form another way how Cal Poly utilizes the Learn by Doing approach to teach entrepreneurship and innovation. Incorporating aspects of entrepreneurial thinking into individual departmental activities create a student-based comfort zone that is holistic and personal in nature (Robinson and Josien, 2014). Through reflection and emotional investment, students take on risks and responsibility. Although there is no specific agribusiness course solely dedicated to entrepreneurship, there are a variety of upper-division classes that hone the students' ability to work independent and become systemic thinkers. Students apply those skills into a Learn by Doing scenario, often client-based, as part of their senior project capstone experience. These capstone classes give students the opportunity to develop their entrepreneurial skills.

One option of an Agribusiness senior capstone class is the course that is offered for team members who will compete in the National Agri-Marketing Association (NAMA) marketing plan contest. The NAMA competition allows students to experience the reality of creating a marketing plan for a new product, while in a competitive environment. Students work with an industry "client" to build a plan that will help them bring the product to life. Through this process, students are exposed to the challenges of determining their product's niche among product competitors, creating a unique selling proposition for the product, and then coming up with a marketing strategy that will work, given the client's limited resources, to bring the product to market. Two students provided testimonials of their experiences with NAMA related to entrepreneurship. In these testimonials, they highlight several of the characteristics and skills needed by potential entrepreneurs. As such, the first student explained that the group work opened her group to partnerships and teamwork, and how her tenacious effort made them "problem solvers":

*The return on invested time I received from my NAMA experience was outstanding. NAMA helped me develop and build confidence in my business planning and presentation skills. I learned that I loved working with clients to help them build their businesses and loved the idea of bringing products to market. The skills, insights, and experiences gained through my participation in the NAMA team led me to my first job out of Cal Poly and helped me start two businesses. Less than a year after my NAMA experience, I started my first business, and 10 years later I started my second business. My NAMA experience continues to pay dividends 12 years after graduating from Cal Poly.*

A second NAMA team member was successful in starting his own company:

*My experience with NAMA at Cal Poly was truly a transformative one. It not only helped me develop my market research capabilities, it also helped polish my public speaking abilities. The lessons I learned working on the NAMA have paid dividends ever since. I'm speaking from experience, the genesis of the company I founded and am running today was our NAMA project.*

Another agribusiness senior capstone class option at Cal Poly is Agribusiness Marketing Planning, where students develop marketing strategies for a client's product. We would like to highlight the impact of the Learn by Doing approach on the skill sets of two students in particular. Both students worked on a client-based project by the Dean of the College of Agriculture, Food, and Environmental Sciences (CAFES). The CAFES Dean asked the students to conduct a feasibility analysis for a Cal Poly Farm Store (CPFS). The CPFS would be a year-around on-campus store and sell all Cal Poly products grown, processed, and packaged by students, such as meat, dairy, produce, chocolate, candy, honey, jam, wine, eggs, and BBQ sauce. This store in itself would be a showcase of the Cal Poly's Learn by Doing entrepreneurial philosophy. The student teams in the Agribusiness Marketing Planning class coordinated a successful trial of the CPFS concept by selling Cal Poly food products at a booth during the university's Open House weekend and conducting a survey with the consumers at the booth. After presenting their analysis and results to the CAFES Dean and University Provost, the CPFS became a priority in a fundraising campaign and will be built within a few years. Thus, the students helped their client by providing important financial and marketing strategies during the planning stage of this innovation. One female student on the team stated:

*The experience I had during my senior project and developing a business plan for the Farm Store significantly gave rise to the entrepreneurial spirit in me that I may not have discovered if not for my senior project. Being involved with a project that could potentially turn into a real thriving business allowed me to open my mind and envision all the possibilities that could come with starting, owning and running my own business. I am beyond thrilled to say that I am able to take this experience with me into my current job now running the marketing department for my family's business with the plan of creating new business opportunities from within the business.*

The student addresses the "entrepreneurial spirit" and how her perspective changed, which shows the characteristics of becoming a visionary and displaying innovative business techniques. Her team member emphasized that he learned independence, gained knowledge, and entrepreneurial intuition:

*Farm Store project gave me the opportunity to explore the steps required to start a*



*business in a collaborative setting. With the guidance of my professor and peers I was able to develop a plan and gain an understanding of business on a small scale which gave me the confidence and skills to think like an entrepreneur. It showed that with proper planning, communication and dedication a simple idea can blossom into a successful business.*

## **Conclusions**

The future of agriculture is going to be shaped by innovation and entrepreneurial efforts (The Economist, 2016). As this generation of agribusiness students finds their career paths, many of them will consider starting their own businesses based on their novel ideas and product innovations. The entrepreneurship education they receive will not only shape the likelihood to pursue an entrepreneurial career, but also its success (Ehrlich et al., 2000; Bell, Dearman, and Wilbanks, 2015; do Paço et al., 2015; Kolstad and Wiig, 2015; Ozgen and Minsky, 2013). Our case study highlights the inter-and intradisciplinary entrepreneurship education at one university and its Agribusiness Department. Given that the university's interdisciplinary center offers a wide array of programs to all students on campus, it may reach a large number of students across all majors and allow for networking opportunities. The intradisciplinary approach is focused on one department. Starting the entrepreneurial exposure at the department of a student's major may provide a less intimidating and more focused setting for students who are curious about the concepts of entrepreneurship and innovation.

We suggest that teaching innovation through a Learn by Doing approach may give students the opportunity to gain hands-on experiences in developing and launching new products or services. This method has the potential to teach valuable entrepreneurship skills that may prepare students for achieving their entrepreneurship goals. Further, the student testimonials show connections between what they took away from the Learn by Doing approach and the skills identified as being important to the success of an entrepreneur.

We aim at showcasing the variety of efforts that could shape the future of agricultural entrepreneurs. Our research will inform other educational programs and entrepreneurship educators, but also provide insight for practitioners. This case study exemplifies how Cal Poly assists its young entrepreneurs to create innovative solutions for real-world problems by researching promising technologies and developing viable business plans. The student quotes emphasize the profound impact of mentorship. Thus, we encourage industry professions to engage in mentorship and to provide valuable feedback to students about their business ideas.

Further, this study lays the groundwork for future research on the impact of Learn by Doing education on entrepreneurship rates and successes. Future research opportunities abound, include measuring changes in students' interest, skills, and perspectives on entrepreneurship as a result of Learn by Doing activities. Furthermore, it might also be interesting to determine which experiences may have the biggest impact on a students' willingness to consider pursuing entrepreneurship.

As we further the knowledge about the influence and impact of entrepreneurship education, we contribute to the preparation of the next generation of entrepreneurs and support them to pursue efforts that will help alleviate the problems facing today's agricultural environment.

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