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# Developing entrepreneurial competencies of Biology Study Program students through a business unit on plant tissue culture training

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**Abstract.** Student entrepreneurship must be developed through lecture and direct training in entrepreneurial activities. Consequently, a business unit should be established. This activity would establish a new business unit of plant tissue culture (PTC) training and apply the entrepreneurial competencies of students of Biology Study Program. This activity could be useful in improving the quality of graduates. The methods followed some steps include selecting entrepreneurial students, establishing the business unit, training, mentoring, and evaluating. Students' entrepreneurial skills were evaluated by observation and the data were descriptively analysed. The 12 biology students were elected as research subjects. The established business unit was named *Sasana Kultura*, which provides four types of consultation and technical training packages related to PTC. It was found that in 2017 the *Sasana Kultura* had started running by serving nine training packages. After being trained and mentored in *Sasana Kultura*, students generally understand and are skilled in some aspects of entrepreneurial competencies, include communication, interpersonal relationship, creativity, innovation, and business management. On the average, students' entrepreneurial competencies reached the sufficient category. Based on the results, it can be concluded that the *Sasana Kultura* business unit could improve the entrepreneurial competencies students.

## 1. Introduction

Biology Laboratory at Universitas Negeri Semarang (UNNES) has 14 laboratory units. Beside providing infrastructure for laboratory activities and research, the several laboratory units have provided various public services. One of the laboratory units, namely Plant Tissue Culture (PTC) Laboratory, has also provided tissue culture training for some Biology teachers in several cities/districts. The training was expected to improve the quality of biology learning (especially biotechnology topic) in senior high school. The training has received positive responses from societies, but its implementation in actual learning was still constrained due to the absence of a tissue culture laboratory in senior high schools. Therefore, the training participants proposed to be held a service unit that provides opportunities for students of senior high school to carry out laboratory activities at the PTC Laboratory of UNNES.

The service unit was conducted by lecturers and students of Biology Study Program (BSP) of



UNNES. The students have been trained and experienced in PTC research. This activity was expected to provide an opportunity to foster the entrepreneurial competencies of BSP students. Students need to be encouraged to have entrepreneurial skills because the course alone could be not enough for the future. When graduates are still waiting or having difficulty getting a job, entrepreneurship could be an alternative to set up a business to survive. The main obstacle in developing student entrepreneurship is the low mentality in starting a business. Most students prefer to be job seekers rather than being job creators.

The job opportunities and working independently through entrepreneurship are widely opened. Entrepreneurship does not only mean skill in doing business. Entrepreneurship is also a way of thinking, studying, and acting based on business opportunities, with a holistic approach and balanced leadership [1-2]. Therefore, certain competencies are needed. Entrepreneurship competence consists of several aspects, involves 1) communication and interpersonal relationship competencies, 2) creativity and innovation competencies, 3) selling soft skill products and services, and 4) business management competencies [3].

It is proven that entrepreneurial competencies positively affected business performance [4], or firm performance through organizational capability and competitive scope [5]. The entrepreneurial competencies of BSP students have been developed through entrepreneurship courses. However, this is proved insufficient. Therefore, it needs to be supplemented by direct training in entrepreneurial units. The entrepreneurship can be trained in various fields, but in a university the perfect field is related to the research outcomes, as in PTC research.

The PTC technique requires aseptic or sterile conditions. This condition needs standard infrastructures. Infrastructure facilities require a high financial support and are not always available anywhere. The simple alternative tissue culture could be done by modify standard tools and price materials with economy-priced tools and materials. The basic principle of each stage of PTC are summarized and changed from sophisticated laboratory conditions to the household scale laboratory. The experiences show that the use of alternative tools and materials are effective in supporting the success of PTC. Thus, the PTC technique has an excellent opportunity to be carried out by senior high school students and public society.

Based on the situation analysis above, there can be identified several problems, i.e. the results of PTC research had not been disseminated to the community, the BSP students' entrepreneurial competencies were still low, and the PTC laboratory had not been optimally used for entrepreneurship training. Therefore, aim this activity edit developing student entrepreneurial competencies through business units. The business unit was expected to be able to improve the quality of graduates and diversity of the entrepreneurial units in UNNES.

## 2. Methods

This activity followed several stages bellow.

### 1. Student selection

The selection of BSP students considered students' skills of PTC technique. The skills may be get from the experience in doing a PTC research or becoming a teaching assistant in a PTC course.

### 2. Business unit establishment

The established business units were PTC training and consultation services. In principle, the business unit was established to improve the PTC knowledge and experience of senior high school students, teachers and societies. There were four service packages, namely a) consultation about laboratory development; b) training for the teacher; c) training for student, and d) training for agribusiness practitioners. The business unit activities were done at PTC Laboratory, Biology Department of UNNES. The laboratory is located at about 50 m from a campus highway and is easy to reach by vehicles. The PTC Laboratory has adequate equipments distributed in five rooms, namely the discussion room, preparation room, kitchen, planting room, and incubation room.

### 3. Entrepreneurial student competencies training and mentoring

Entrepreneurial competencies of BSP students were trained at all stages of business unit activity, i.e. planning, marketing, and servicing.

The marketing was carried out in various techniques, include positioning statements, pricing strategies, promotion strategies, and developing relationships. The servicing was done as the standard quality principles.

#### 4. Students entrepreneurial competencies observation

The observation and assessment of entrepreneurial competencies of BSP students were done in the implementation stage of business units. Each competency involves several abilities, each of which was measured at different times (Table 1).

**Table 1.** Description of entrepreneurial competence, time and methods of measurement

No	Competencies	Description of abilities*	Measurement time	Methods
1	Communication and interpersonal relationships	a. Presentation skills b. Leadership ability c. Motivating ability	a. Preparation of activities b. Coordination meetings for program evaluation c. Implementation of consultation services d. Implementation of training services	Observation
2	Creativity and innovation	a. Able to develop creativity in service products b. Able to produce superior service products c. Able to innovate management	a. Preparation of activities b. Coordination meetings for program evaluation	Observation
3	Selling products and services	a. Able to plan sales techniques b. Ready to make sell presentations c. Able to negotiate	a. Preparation of activities b. Marketing	Observation
4	Business management	a. Able to manage finances b. Able to manage business risk c. Able to make decisions to improve plans d. Able to develop business	a. Coordination meetings for program evaluation b. Implementation of service activities	Observation

\* modified from [3]

Measurement results were expressed in the categories follow: 1 (very poor), 2 (poor), 3 (moderate), 4 (good), and 5 (very good). The average rating was then calculated for each and data were analyzed descriptively.

### 3. Results and Discussion

The student random selection based on their PTC skills found 12 students from various semester. The established business unit was named "*Sasana Kultura*" which means a place to do tissue culture-based activities, especially plant tissue culture. The *Sasana Kultura* has a logo (Figure 1A). The logo describes a tube that symbolized a container of plant culture. On above of the tube, there are three green leaves. They are meant as the growth of shoots or prospective new plants. The tube resemblances the S letter

which is the acronym of *Sasana*.

In the first year, the clients of *Sasana Kultura* were teachers and students of senior high school, vocational high school, students of Biology and Biology Education Department from some private universities, and the general public who interested in ornamental plant entrepreneur. The marketing was held through several methods, especially by maximizing the use of promotional media, including a brochure and electronic media such as Facebook, Twitter, Instagram, and email. The promotion was also served through the website at <http://sasanakultura.com>. The marketing was managed by a team of 5 people.



**Figure 1.** The *Sasana Kultura* business unit. (A) Business unit logo, (B) Administration room, (C) Part of the production room.

Until 2017 *Sasana Kultura* managed to sell nine kinds of services. The number of products sold in general had met the target, but the price was still below expectation. Based on the activities that had been done, it can be stated that the *Sasana Kultura* had great hopes to develop. The trainees have a great curiosity about PTC and take the training programs seriously (Figure 2).

Based on the feedback questionnaire by the clients, it is found that the *Sasana Kultura* business unit could enrich the knowledge and skills of students, lecturers, teachers, and the public society; as well as bring up the idea of establishing entrepreneurial innovation.



**Figure 2.** Training activities of several groups. A. Making culture medium, B. planting explant in laminar air flow (LAF), C. one group of trainees after completing all steps of training.

The assessment of entrepreneurial competencies showed that each student had a different level of competence, with scores ranging between 3.1 and 4.6. From these results there tendency, the higher the grade (the duration of being student) the higher the competencies acquired. The competencies achieved good category namely the ability to present, manage finances, make decisions to improve plans and manage the business. The ability to manage business risk, lead, motivate, and conduct innovation management is relatively lower than the others even though it is still in the good category (Table 2).

The ability to present is the part of human relation competency, beside the finances manage, make decisions to improve plans and manage the business are the parts of business and management competencies. According to research results of [6], the two most significant competency groups influencing the success of entrepreneurial are human relation, business and management competencies.

These competencies had significant effects on some dimensions of entrepreneur success. The study on empirical cases of two entrepreneur groups found that human relations competencies have greater influence in achieving successful business model canvas [7].

**Table 2.** Results of assessment of entrepreneurial competencies of BSP students

No	Competence	Skill description	Score for student numbers												Average	
			1	2	3	4	5	6	7	8	9	10	11	12		
1	Communication and personal relationship	a. Presentation	5	5	4	4	3	4	3	4	4	4	4	4	4	4.0
		b. Lead others	4	5	4	3	3	3	3	3	3	3	3	3	3	3.3
		c. Motivate	4	4	4	4	3	4	3	3	3	3	3	3	3	3.4
2	Creativity and innovation	a. Develop creativity	5	4	4	4	3	3	4	3	4	4	3	3	3	3.7
		b. Produce superior service products	5	5	4	4	3	3	4	3	4	3	3	3	3	3.7
		c. Conduct innovation management	4	4	4	4	3	3	4	3	4	3	3	3	3	3.5
3	Competence of product and service sell	a. Plan sales techniques	5	5	4	4	3	3	4	3	4	3	3	3	3	3.7
		b. Make presentations to sell	5	5	4	4	3	4	3	4	4	4	4	4	4	4.0
		c. Negotiate	5	5	4	4	3	3	4	3	4	3	3	3	3	3.7
4	Management of business	a. Manage finances	5	5	5	4	4	4	4	4	4	4	4	4	4	4.2
		b. Manage business risk	3	3	3	3	3	3	3	3	3	3	3	3	3	3.0
		c. Make decisions to improve plans	4	4	4	4	3	3	3	3	3	3	3	3	3	4.3
		d. Develop business	4	4	4	4	3	3	3	3	3	4	3	3	3	4.3
Average			4.6	4.6	4.1	3.8	3.1	3.4	3.5	3.3	3.7	3.4	3.3	3.2	3.7	

The entrepreneurial competencies only reached moderate category. It was believed because this business unit was a pilot programme and has just been running for 1 year. Managing a business unit is a new experience for students so that their skills still need to be trained with real experience. The ability to conduct innovation management that was relatively low is in line with the results of [8] which concluded that the lowest dimension of the entrepreneurial spirit of student is creative dimension. In fact, creativity will generate important innovations in entrepreneurial development [9]. Therefore, aspects of creativity and innovation of students require more attention to be developed.

Entrepreneurial training in higher education needs to be applied to all students regardless of the field of science being studied, because entrepreneurial training is not business education [10]. Training is positive and significantly affected on all competencies. Therefore, it is important to emphasis on training in order to enhance the entrepreneurial competencies [11].

Entrepreneurial training in universities is related to building entrepreneurial character, entrepreneurial mindset, and entrepreneurial behavior that must be always creative and innovative to increase extra-value of products, taking advantage of opportunities and taking risks. Facing the challenges of a very competitive future, entrepreneurial behavior is urge in all fields of job or profession [12]. Moreover, in conducting student entrepreneurship training, it is necessary to pay attention to

several main things, i.e. entrepreneurial attitude, knowledge of entrepreneurship and entrepreneurial skills. It could help students to advance their career (13). In addition; besides skills, characteristic adaptations and identity should also be developed in entrepreneurial education programs for students [14].

#### 4. Conclusion

Based on the results it is concluded that the new business unit based on PTC "*Sasana Kultura*" can be prospectively established and run well. The business unit in the first year has been able developing the entrepreneurial competencies of students and achieving sufficient categories. Along with the experience of the business unit, it is believed that the entrepreneurial competencies of students will be also better. This business unit has also optimized the use of PTC laboratories as a public training center.

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#### References

- [1] Clarysse B, Wright M, and van de Velde E 2011 *J Manage Stud* 48(6) 1420
- [2] Payumo J G, Arasu P, Fauzi A M, Siregar I Z and Noviana D 2014 *World Patent Information* 36 22
- [3] Direktorat Jenderal Pembelajaran dan Kemahasiswaan, Ditjen Pendidikan Tinggi Kementerian Pendidikan dan Kebudayaan Republik Indonesia 2013 *Modul Pembelajaran Kewirausahaan*
- [4] Barazandeh M, Parvizian K, Alizadeh M and Khosravi S 2015 *JGER* 5:18
- [5] Sánchez J 2012 *Rev Lat Am Psicol* 44 (2) 165
- [6] Leithy W E 2017 *J Entrepren Organiz Manag* 6 215
- [7] Sundah D I E, Langi C, Maramis D R S and Tawalujan L 2018 *J Phys.: Conf. Ser.* 953 012040
- [8] Suroto B, Nofrizal, and Fatkhurahman 2016 *Jurnal Benefita* 1(3) 154
- [9] Drucker P F 2007 *Innovation and Entrepreneurship: Practice and Principles*. Oxford: Butterworth-Heinemann
- [10] Sternberg R 2014 *Technovation* 34(3) 137
- [11] Wickramaratne A, Kiminami A, and Yagi H 2014 *ASS* 10(18) 50
- [12] Tarres, Serarols C, Urbano D, Vaillant Y and Bikfalvi A 2009 *IJTTC* 8(4) 356
- [13] Ernest K, Somiah K, Matthew, and Samuel A K. 2015 *HES* 5 (1) 20
- [14] Schneider K 2017 *SJEDU* 5 (6) 252