

Pre-Service Elementary Teachers (PETs) Perception toward the Scipreneur's Concept (Entrepreneurship in Science)

Idam Ragil Widianto Atmojo^{1, a)}, Sajidan², Widha Sunaryo³, Ashadi⁴ and Dewanto Harjunowibowo⁵

¹*Doctoral Program of Natural Science Education, Universitas Sebelas Maret
Jl. Ir. Sutami No 36A Surakarta, Central Java, Indonesia*

^{2,3,4}*Faculty of Teacher Training and Education, Universitas Sebelas Maret
Jl. Ir. Sutami No 36A Surakarta, Central Java, Indonesia*

⁵*Department of Architecture and Built Environment, Faculty of Engineering,
University of Nottingham. University Park, NG7 2RD Nottingham, UK*

^{a)}Corresponding author: idamragil@fkip.uns.ac.id

Abstract. The purpose of this research was to know the perception of pre-service elementary teachers (PETs) to the entrepreneurship concept which integrated with science learning (scipreneur). This research was designed as a qualitative research. In total, 361 PETs at Universitas Sebelas Maret were participated in this study. Data were collected through questionnaires. Furthermore, the data were evaluated through descriptive and content analysis. The results illustrated that the perceptions of 361 PETs showed a limited and inadequate understanding deals with scipreneur concept. From these results, it can be concluded that there was a need to develop a framework of a scipreneur learning model that can improve the knowledge and experience of PETs.

INTRODUCTION

The entrepreneur is a must-have ability in the 21st century [1][2][3]. Nowadays, entrepreneurship is also developed in the education field not only in the economic field [4][5]. Entrepreneurship can be used as one of the competencies that must exist in the Indonesian Graduate Competency Standards. According to the director general of knowledge and high technology resources in Indonesia in 2018 implemented optimization of the role of higher education to determine some competencies needed by experts (educators). The curriculum-oriented education and higher education policy of the digital age and industrial revolution 4.0 also spread to the obligatory of entrepreneurship in college. Global competition (MEA) preparing college graduates freely from graduates from abroad [3]. PETs need to be directed and supported not to be job-oriented (job seekers) but able and ready to be job creators [4][6][7]. Entrepreneurship in Universitas Sebelas Maret (UNS) has become slogan as one of work culture, besides entrepreneurship in the form of the compulsory subject for all UNS students by way of the new entrepreneur to be born. Entrepreneurship has been integrated into various countries in ASEAN such as Singapore, and Malaysia [8][9]. Beginning in 2015 researchers will try the categories of value available to entrepreneurs in subjects such as biology (bioentrepreneur), chemistry (chemoentrepreneur), engineering (technopreneur) and other materials for the purpose increase and instill the entrepreneur spirit [3][10][11][12].

Integration of entrepreneurship values with science learning materials (scipreneur) is an effort to form elementary school teachers who have entrepreneurial competence [4]. Integration of the scipreneur is the process of uniting certain materials so that the understanding of the PETs of a material becomes a unified whole in the learning process [12][6]. A teacher is actually an entrepreneur because in front of the class the teacher should be able to attract students' attention [13][1]. However, the entrepreneurship ability is owned differently by each teacher [3]. Being an entrepreneur do not only master technical knowledges or skills but also the orientations towards mental attitude through process of self-motivated practices and experiences [14]. Teachers play an important role to instill good mental attitude of their students through the learning process. In learning science there are 3 aspects of science process such as skills, scientific attitudes, and knowledges [15]. The values of the entrepreneur can be integrated with those three aspects. Learning science that is integrated with the value of entrepreneurship needs to be understood by the teacher, therefore in the implementation they can take the suitable role according to the goal.

Several studies have been conducted to explore the responses of PETs on integrating entrepreneurship values in non-science learning materials, one study indicated that PETs desperately need to further instill entrepreneurial values [9][16]. Meanwhile, other studies have shown that PETs felt less comfortable if the learning materials were integrated with entrepreneurial values, the materials that were being studied became more complex and complicated, yet they realized that integrating entrepreneurship values has a positive impact in improving teaching ability and entrepreneurship of pre-service teachers [17][18]. While some other aspiring elementary school teachers delighted to learn the materials which integrated with entrepreneurship, it made the learning material more holistic, complex and practical [11][17]. This information was useful for the development of science learning, but it was not sufficient to describe the views of PETs on the important aspects and challenges confronted in integrating entrepreneurial values in science learning. The purpose of this research was to know the perception of pre-service elementary teachers (PETs) toward entrepreneurship concept integrated with science learning (scipreneur) and to know the PETs about transferring entrepreneurship concept in science learning to students. The benefits of integrating entrepreneurship in science learning for PETs was the understanding of science material to be integrated, holistic, understanding of relationships among several subjects deeper, thinking ability becomes sharp and systematic, creative and innovative, dare to risk, competitive, view and create opportunities, quick response, social and characteristic[4][14].

METHOD

This research was a descriptive research to describe PETs' perception toward the integration of entrepreneurship values in science learning at Elementary School Teacher Education Study Program at Universitas Sebelas Maret.

Population and Sample

Respondents involved in this study were 402 even semester PETs in the academic year 2017/2018 who had passed the basic science concept courses. Initially, the questionnaires were distributed to 402 even semester students, but there were only 361 students (63 men and 298 women, ranging from 19 to 22 years old) who filled out and gave the questionnaires back.

Research Instruments

The instrument used to collect data was a student's perceptions questionnaire on integrating entrepreneurship values in science learning. The perception scale used 5 levels of agreement that were strongly disagree, disagree, neutral, agree, and strongly agree. The questionnaire used in this study has been passed the validity and reliability test. Questionnaires from students' perceptions of integrating entrepreneurship values in science learning consisted of two domain skills, namely entrepreneurship skills in learning as well as entrepreneurship skills in life and career. Each domain has several aspects of the skill. Entrepreneurship skills in learning consisted of critical thinking skills, problem-solving skills, communication skills, collaborative skills, observational skills, and creativity and innovation within 35 questions. Life and career skills comprise aspects of market insight, risk-taking, networking and persuasive skills within 25 questions. The distribution of question items for both dimensions can be seen in table 1.

Data from questionnaires were collected, encoded and tabulated to make the analysis. Further analysis and data interpretation were conducted to obtain a description of PETs' perceptions of integrating entrepreneurship values in their science learning according to the domain or skill aspect being explored.

TABLE 1. Description of Research instrumen

Aspects of Entrepreneurship Skills In Learning						
Critical Thinking	Skills Problem-Solving	Skills Communicating	Skills Collaborative	Skills Observing	Creativity and Innovation	Total Items Questionnaire
6	6	6	6	5	6	35
Aspects of entrepreneurship skills in life and career						
Aspects of Market		Insights Risk Taking		Capabilities Building Networking	Persuasion Skills	Total Item Questionnaire
7		5		6	7	25

RESULT AND DISCUSSION

Entrepreneurship Skill in Learning

Based on the analysis of the questionnaire data, it was found that the perceptions of prospective elementary school teachers in the scipreneur was in the category of both creativity and innovation (A-1), communication skill (A-2), problem-solving skills (A-5). While on the aspect of collaborative skills (A-4), critical thinking (A3) and observing skills (A-6) of the students' perceptions were in fair category. The results of data analysis are shown in figure 1.

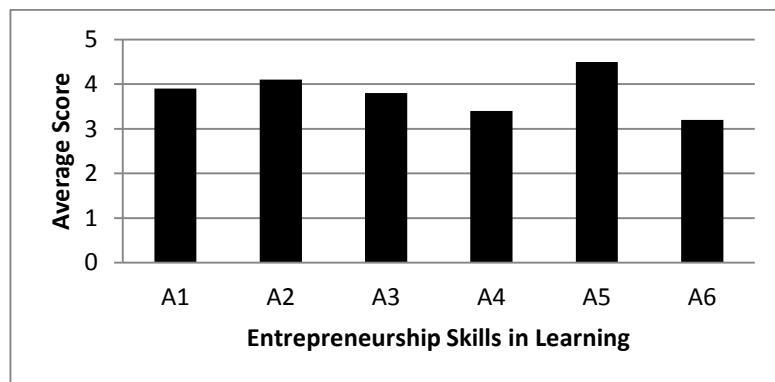


FIGURE 1. Graph of students' perceptions of entrepreneurship skill in learning

The highest score of perception was derived from the thinking aspect by 4.5 and followed by the importance of the communication skills aspect of 4.1 then creative thinking and innovation with 3.9. In general, PETs stated that they were happy with the scipreneur learning, learning and science practice activities to produce products, from products produced by PETs can directly implement entrepreneurship skills. They were challenged to sell products that were produced with the ability of communicating and networking. In addition, PETs believed that scipreneurs improve their understanding of concepts, practice skills in applying scientific methods, practice product-producing skills,

package products to distribute them, helping to understand abstract concepts, and can train a sense of responsibility and honesty [13].

The lowest perception score was found in the observation skill aspect of 3.2 and followed by the aspect of collaboration skills on 3.4, and critical thinking skills 3.8. Aspects of entrepreneurship skill in learning, PETs stated that direct practice activities have not been maximized in training critical thinking skills, collaborative skills, observation. Furthermore, the students stated that the observation skill that appropriated to the scipreneur was the observation skill on the products before they made a new product that was not yet on the market. This skill can be done via the internet or directly observing the similar products in the market, in addition it enhanced the other skills such as creativity and innovation [4][7].

Life Skills and Career

Scipreneurs were explored including life skills and career domains that include market insight (B-1), network-building (B-2), risk-taking (B-3), and persuasive skills (B-4). Based on the analysis of questionnaire data, it was found that perception of PETs about life skills and career on scipreneurs was in the medium category with an average score of 3.62. The results of the data analysis are shown in figure 2. It has been seen that domain life skills and career which were mostly understood by PETs was the ability to take risk and market insight. While domains belonging to the least-owned students were networking capabilities and persuasive skills. However, the final score for the four skill domains was still in the medium category.

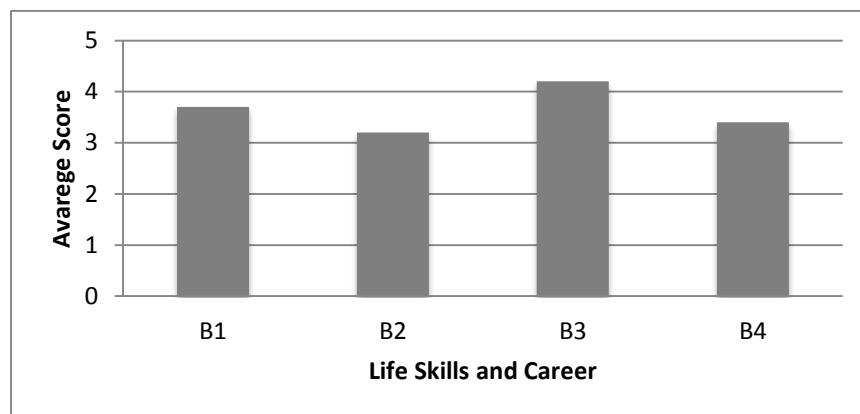


FIGURE 2. Graph of students' perceptions in life skill and career

The highest score of perception was obtained from the ability to take risk equal to 4.2 and followed by the importance of the market insight aspect with 3.7. In general, the students stated that they enjoy learning science that was integrated with entrepreneurship, and hoped that any concept of science that can produce marketable products will be supported by entrepreneurship activities [5][7]. They were challenged to have the ability to take risks from science experimental products and have market insights to market their products. In addition, students believed that the scipreneur can improve their understanding of concepts, practice skills in persuading and building networking [1][14].

CONCLUSION

Based on the results of research and discussion, it can be concluded that the integration of entrepreneurship in science learning (scipreneur) that has been done in Universitas Sebelas Maret is in a fair category. Students provide the highest perception scores on problem-solving skills and communication. While the lowest score is given on aspects of observation and collaboration skills. The perceptions of PETs on the scipreneur at Universitas Sebelas Maret are in the medium category. The lowest scores to the highest scores of the perception of the scipreneur are in the domain of

entrepreneurial skills in life and career; networking ability, and persuasive skills. From these results, it can be said that there is a need to develop a framework of a scipreneur learning model that can improve the knowledge and experience of PETs.

ACKNOWLEDGMENTS

The research was funded by the Ministry of Research, Technology and Higher Education of the Republic of Indonesia through a Doctoral Research Grant scheme at Universitas Sebelas Maret. The research team expressed gratitude for all the facilities provided.

REFERENCES

- [1] V. Y. Ismail, E. Zain, and Zulihar, "The Portrait of Entrepreneurial Competence on Student Entrepreneurs," *Procedia - Soc. Behav. Sci.*, vol. 169, no. August 2014, pp. 178–188, 2015.
- [2] V. Bikse and I. Riemere, "The Development of Entrepreneurial Competences for Students of Mathematics and the Science Subjects: The Latvian Experience," *Procedia - Soc. Behav. Sci.*, vol. 82, pp. 511–519, 2013.
- [3] S. Mitarlis, S. Ibnu, and S. Rahayu, "Environmental literacy with green chemistry oriented in 21 st century learning," *AIP Conf. Proc.*, vol. 20020, pp. 20020–20025, 2017.
- [4] P. A. F. Islami, H. Elmunsyah, and Muladi, "Contribution entrepreneurial knowledge, skills competence, and self-efficacy to student entrepreneurship readiness of multimedia expertise at vocational high school in Malang," *AIP Conf. Proc.*, vol. 1887, 2017.
- [5] A. Sutadiningsih, A. Sonhadji, E. Sutadji, and L. Nurlaela, "Entrepreneurial Character Development Model: Responsible and Discipline Integrated in Business Plan Based Learning Project," vol. 30050, 2016.
- [6] Marniati, "Entrepreneurship motivation of vocational high school student," *AIP Conf. Proc.*, vol. 1778, 2016.
- [7] A. A. Gümüşay and T. M. Bohné, "Individual and organizational inhibitors to the development of entrepreneurial competencies in universities," *Res. Policy*, vol. 47, no. 2, pp. 363–378, 2018.
- [8] N. P. Tee, "Innovation and enterprise in Singapore schools," *Educ. Res. Policy Pract.*, vol. 3, no. 3, pp. 183–198, 2004.
- [9] R. Bakar, M. A. Islam, and J. Lee, "Entrepreneurship education: Experiences in selected countries," *Int. Educ. Stud.*, vol. 8, no. 1, pp. 88–99, 2015.
- [10] O. Elijah, "Technopreneurship: A View of Technology," *Glob. J. Res. Eng.*, vol. 17, no. 7, pp. 40–46, 2017.
- [11] M. Paristiowati, R. Slamet, and R. Sebastian, "Chemo-entrepreneurship: Learning Approach for Improving Student's Cooperation and Communication (Case Study at Secondary School, Jakarta)," *Procedia - Soc. Behav. Sci.*, vol. 174, pp. 1723–1730, 2015.
- [12] M. O'Neill and J. Scanlan, *Academic innovation: so you want to be a bio-entrepreneur?* Woodhead Publishing Limited, 2012.
- [13] Widiyanti, "Needs analysis in developing the entrepreneurial interest of vocational education students," *AIP Conf. Proc.*, vol. 20072, p. 20072, 2017.
- [14] P. A. F. Islami, H. Elmunsyah, and Muladi, "Contribution entrepreneurial knowledge, skills competence, and self-efficacy to student entrepreneurship readiness of multimedia expertise at vocational high school in Malang," *AIP Conference Proceedings*, vol. 1887. 2017.
- [15] A. Tasdemir, T. Kartal, and Z. Kus, "The Use of Out-of-the-School Learning Environments for the Formation of Scientific Attitudes in Teacher Training Programmes," *Procedia - Soc. Behav. Sci.*, vol. 46, pp. 2747–2752, 2012.
- [16] I. Ismail, N. A. Rahim, M. H. M. Kamal, R. C. Mat, and N. Husin, "Investigating the Needs for Achievement, Risk Taking and Tolerance for Ambiguity toward Entrepreneurial Passion among Single Mother Entrepreneur in Malaysia," *Procedia Econ. Financ.*, vol. 31, no. 15, pp. 110–116, 2015.
- [17] I. Deveci, "Perceptions and competence of turkish pre-service science teachers with regard to entrepreneurship," *Aust. J. Teach. Educ.*, vol. 41, no. 5, pp. 153–170, 2016.

- [18] C. Education and I. Technologies, “A Comparative Study on Entrepreneurship Tendencies and Individual Innovativeness Perceptions of Pre-Service Teachers,” *Int. J. Soc. Sci. Educ.*, vol. 3, no. 4, pp. 1085–1097, 2013.