



Preparing Excellent Graduates Through the Implementation of IPjBL Model at Vocational School-Center of Excellence (SMK-PK)

Sunardi Sunardi^{1,*}, Sardi Salim², Muhammad Yasser Arafat¹, Buyung R. Machmoed¹

¹ Mechanical Engineering Education, Universitas Negeri Gorontalo, Gorontalo, Indonesia

² Urban and Regional Planning, Universitas Negeri Gorontalo, Gorontalo, Indonesia

*Corresponding author. Email: sunardi@ung.ac.id

ABSTRACT

The Center for Excellence Vocational School (SMK-PK) is the driving force for the creation of superior and competent graduates, namely graduates who are ready to work armed with academic skills, technical skills and employability skills. The preparation of students at SMK-PK to master these skills stems from a productive and innovative learning process. One manifestation is in the form of implementing the Interdisciplinary Project-Based Learning (IPjBL) Model. This research aims to analyze the effect of IPjBL implementation in practical learning on the employability skills of students at the Center for Excellence Vocational School. This research is quantitative research using quasi-experimental methods. The sample in the research was 22 students of the Machining Engineering Skills Competency at SMK Negeri 1 Paguyaman. Employability skills data were collected using a questionnaire and analyzed using descriptive statistics and t test. Based on data analysis, it is known that the mean value of the employability skills of the experimental group is higher than the control group ($85.663 > 73.104$). The p-value is 0.000, which is smaller than 0.05, which indicates that there is a significant difference in the value of employability skills in learning that applies the IPjBL model.

Keywords: IPjBL, Employability Skills, Vocational School-Center of Excellence

1. INTRODUCTION

Current technological developments require the availability of a competent and reliable workforce in various fields so that a country is able to survive in an era full of competition and at the same time open and take advantage of every opportunity. To increase a country's economic growth, a strategy that is considered effective is industrialization. Industrialization, to a certain degree, will imply a shift in the production process from laboring to manufacturing in the sense that human labor is replaced by hard technology. This means that industrialization requires skilled workers who are not only able to operate the technology, but also maintain it. Industrialization also has the potential to create unemployment if the shift in the production process is not accompanied by a change in educational orientation from academic to vocational.

The conditions above require that the world of

integrated manner taking into account the goals and needs of the world of work. Thus, it is necessary to design a form of education that is oriented towards the world of work. Vocational Schools aim to produce skilled workers who have the ability to meet the demands and requirements of the world of work, and are able to develop their potential in adopting and adapting to developments in science, technology and art.

To answer these challenges, the President of the Republic of Indonesia issued Presidential Instruction Number 9 of 2016 concerning the Revitalization of Vocational High Schools in order to improve the quality and competitiveness of Indonesia's human resources [1]. In order to realize the mandate for vocational education development which has been outlined in Presidential Instruction Number 9 of 2016, one of the strategies that will be implemented is improving the quality of vocational school education through the implementation of the Center of Excellence Vocational School Program

(SMK-PK). The SMK-PK program is outlined in the Decree of the Minister of Education, Culture, Research and Technology of the Republic of Indonesia Number 165/M/2021 concerning the Vocational High School Program-Center of Excellence.

In 2021, the Ministry of Education and Culture launched the Independent Learning Vocational School Center of Excellence (SMK-PK) program to become a driving force in improving the quality and superior performance of vocational schools so that they meet the standards of the world of work [2]. The SMK-PK program is expected to have a vision to move schools to be able to improve the quality of student learning outcomes, as well as being able to develop vocational education that is increasingly relevant to the demands of society's needs which are constantly changing according to developments in the world of work, as well as being a supporter of local wisdom/excellence in the economic development sector. certain or supporting government policies with other specificities so as to increase the number of vocational school graduates who obtain jobs and become entrepreneurs.

The SMK-PK program aims to produce graduates who are absorbed into the world of work or become entrepreneurs through in-depth and comprehensive alignment of vocational education with the world of work. This harmony certainly requires vocational education institutions in today's vocational schools to be able to produce graduates who have balanced academic skills, technical skills and employability skills. One effort to prepare students to master these skills stems from a productive and innovative learning process, one of which is project-based learning (PjBL). The PjBL model supports the implementation of the independent SMK-PK curriculum and is considered suitable for integration with technological developments.

Project-based learning is a learning model that emphasizes creative thinking, problem-solving activities and communication skills [3]. Students' understanding is built through everyday life phenomena which are used as contextual problems and solving problems independently or in groups through work [4]. Project-based learning (PjBL) is one of the innovative learning models recommended for technology and vocational education. PjBL is very appropriate to apply to vocational education which is oriented towards making products by students [5].

Implementation of PjBL in vocational education must reflect three basic components, namely project planning, project implementation, and project evaluation [6]. IPjBL (interdisciplinary project-based learning), where students work in

groups to develop projects that can include an interdisciplinary dimension, because the projects they work on are related to several subjects [7]. IPjBL is an interdisciplinary project-based learning model, where students are stimulated to integrate ideas, link topics and link aspects of different disciplines focused on a specific project. IPjBL makes the learning process easier because it has a framework that functions to make it easier for students to solve complex problems.

IPjBL is a learning approach that integrates several scientific disciplines in one learning project. IPjBL aims to develop students' critical thinking, creativity and collaboration skills in solving complex problems. At IPjBL, students work in groups to complete projects involving various disciplines. IPjBL can also increase students' motivation in learning because there is a connection between learning material and the real world. Thus, IPjBL has the potential to develop and improve multi employability skills [8].

It is believed that an interdisciplinary approach can help overcome today's complex problems including employability skills because this approach is able to facilitate comprehensive understanding [9]. This belief has led to increased interest in implementing interdisciplinary learning, one of which is implementing this learning at the Center of Excellence Vocational School. One of the vocational schools in Gorontalo Province which is a center of excellence school is SMK Negeri 1 Paguyaman, starting in 2021.

Based on the study above, the aim of this research is to analyze the effect of IPjBL implementation in practical learning on the employability skills of students at the Center for Excellence Vocational School of Machining Engineering competency at SMK Negeri 1 Paguyaman.

2. RESEARCH METHODS

This research is quantitative research using quasi-experimental methods. In this study there were two groups, namely the experimental group and the control group. The experimental group applied the IPjBL model in implementing practical learning in Machining Engineering while the control group used the conventional model. The sample in the research was 22 students of the Machining Engineering Skills Competency at SMK Negeri 1 Paguyaman who were divided into 2 groups, namely 11 students in the experimental group and 11 students in the control group. Data collection on employability skills was carried out using a questionnaire adopted from research [10]. Data analysis in this study used descriptive

statistics and t tests using the IBM SPSS version 22 program.

3. RESULTS AND DISCUSSION

The research results focused on analyzing the effect of IPjBL implementation in practical learning on the employability skills of students at the Mechanical Engineering Vocational School at SMKN 1 Paguyaman. Table 1 below shows the average employability skill value of the control group and experimental group.

Table 1. Average aspects of employability skills in the control and experimental groups

Employability Skills Aspect	Control Class Mean	Experimental Class Mean
Communication skills	74.12	85.45
Teamwork skills	71.56	89.29
Problem solving skills	73.24	85.17
Taking initiative and making efforts skills	71.94	86.96
Planning and organizing activities skills	70.91	88.05
Self-management skills	75.24	83.68
Skills in learning	74.68	82.38
Skills in using technology	73.83	84.52
Occupational health and safety skills	71.25	85.46
Individual qualities	74.27	85.67
Average	73.104	85.663

Based on table 1 above, it can be seen that there are differences in the mean values of the control and experimental groups in each aspect of employability skills. In the control group, the highest mean score was in the self-management skills aspect, namely 75.24, while the lowest mean score was in the skills aspect of planning and organizing activities. In the experimental group, the highest mean score was 89.29 in the teamwork skills aspect and the lowest was 82.38 in the learning skills aspect.

Next, a t test was carried out to prove the hypothesis (H1) that there is a significant influence of the IPjBL model on practical learning of Machining Engineering compared to conventional learning. Data on mean values, standard deviation, t-test and significance values for the control

group and experimental group are presented in the following table.

Table 2. Mean, Standard Deviation, t-test and Significance Values of Control and Experimental Groups

Control Groups		Experimental Groups		t-test	p-value
Mean	SD	Mean	SD		
73.10	1.56	85.66	2.02	-14.133	0.000
4	2	3	4		

Based on table 2 above, it can be seen that the mean value of employability skills for the experimental group is higher than the control group (85.663 > 73.104). The t-test value is -14.133 which shows that the difference between the scores of the two groups is quite high. The p-value is 0.000, which is smaller than 0.05, which indicates that there is a significant difference in employability skills values in learning that applies the IPjBL model and learning that applies the conventional model for Machining Engineering students at SMK-PK SMK Negeri 1 Paguyaman.

The research results show that IPjBL is more effective in increasing students' employability skills in practical learning of Machining Engineering when compared to conventional learning. This is in line with the results of previous research that employability skills can be taught through an appropriate learning approach allowing students not only to learn academically, but also to develop interpersonal and group skills needed for teamwork, develop leadership skills and improve communication skills [11]. The results of this research also strengthen the findings of [12] which stated that project-based learning is able to increase learning motivation and also the ability to solve problems. Project based learning is able to increase the value of soft skills because project-based learning requires students to interact in teams, present the results of group discussions, explore information from various sources for an assignment, and also learn based on the problems they face [13].

Employability skills can be developed through academic assignments, work practices, industry-based learning, and work-integrated cooperative learning [14]. Apart from that, it can also be carried out in various activities such as work experience, problem-based learning, and project-based learning [15]. Learning at the Machining Engineering Skills Vocational School is carried out using problem-based learning (PBL) and project-based learning (PjBL) models involving interdisciplinary science. Both learning models are learner-centered learning which makes it possible to help students acquire generic skills or employability skills because PBL and PjBL provide a contextual environment that makes learning interesting and relevant [16]. PjBL

can be used by educators to help students improve various skills needed in the world of work [17].

Project based learning is a learning model with a constructivist approach that is able to train 21st century skills, namely digital era literacy, inventive thinking, effective communication and high productivity [18]. The advantages of project based learning are: (1) developing various employability skills, (2) increasing student engagement, creativity and innovation, (3) increasing the skills needed for a career in the workplace, (4) increasing the effectiveness of learning, (5) help students solve real life problems, (6) hone cognitive, manipulative, design, use of technology, and combine cognitive and psychomotor knowledge, and (7) arouse curiosity and trigger creative imagination and critical thinking [19].

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the implementation of IPjBL in practical learning of Machining Engineering contributes significantly to the employability skills of students in the SMK-PK Program at SMK Negeri 1 Paguyaman. The mean value of the employability skills of the experimental group is higher than that of the control group ($85.663 > 73.104$). The p-value is 0.000, which is smaller than 0.05, which indicates that there is a significant difference in the value of employability skills in learning that applies the IPjBL model. Therefore, it can be said that the implementation of IPjBL is an innovative learning model that can develop the employability skills of vocational school students.

REFERENCES

- [1] Instruksi Presiden Republik Indonesia (Inpres) No. 9 Tahun 2016 Tentang Revitalisasi Sekolah Menengah Kejuruan Dalam Rangka Peningkatan Kualitas dan Daya Saing Sumber Daya Manusia Indonesia, Jakarta: Sekretariat Kabinet Republik Indonesia, 2016, <https://www.kemdikbud.go.id>
- [2] Keputusan Menteri Pendidikan dan Kebudayaan Nomor 17/M/2021 tentang Program Sekolah Menengah Kejuruan Pusat Keunggulan, 2021, <https://www.kemdikbud.go.id>
- [3] J. Karnando, I.K. Rezki, & E. Tasrif, Efektivitas E-Modul Berbasis Project based learning Selama Pembelajaran Jarak Jauh, JAVIT: Jurnal Vokasi Informatika, 2021, pp. 1-4. DOI: <https://doi.org/10.24036/javit.v1i1.17>
- [4] A.R.K. Nisa, Efektivitas Model Pembelajaran Berbasis Proyek dalam PJJ Terhadap Pemahaman Materi, Alinea: Jurnal Bahasa, Sastra, dan Pengajaran, 2021, pp. 61-68. DOI: <https://doi.org/10.35194/alinea.v10i1.1186>.
- [5] D.A. Sudjimat, M. Romlie, W. Solichin, Teaching Factory Berbasis Project-based Learning untuk Implementasi Pembelajaran Interdisipliner di Fakultas Teknik Universitas Negeri Malang, Malang: Universitas Negeri Malang, 2021.
- [6] Z. Zhang, Application of Project-Based Learning in Teaching of the Curriculum of Combining Study with Work of Higher Vocational Education, Proceedings of the 2013 the International Conference on Education Technology and Information System (ICETIS 2013), 2013, pp. 729-732. DOI: <https://doi.org/10.2991/icetis-13.2013.165>
- [7] M. Biasutti & H.E. Deghaidy, Interdisciplinary project-based learning: an online wiki experience in teacher education. Technology, Pedagogy, and Education, 2014, pp. 37-41. DOI: <https://doi.org/10.1080/1475939X.2014.899510>
- [8] J. Hart, Interdisciplinary project-based learning as a means of developing employability skills in undergraduate science degree programs, The Journal of Teaching and Learning for Graduate Employability, 2019, pp. 50-66. DOI: <https://doi.org/10.21153/jtlge2019vol10no2art827>
- [9] W.H. Newell, Decision Making in Interdisciplinary Studies, In G. Morçöl (Ed.), Handbook of Decision Making, New York: CRC, 2007.
- [10] Sunardi, Purnomo and E. Sutadji, Employability skills measurement model of vocational students, Proceedings of the International Mechanical Engineering and Engineering Education Conferences (IMEEEEC 2016), 2016, pp 1-5. DOI: <https://doi.org/10.1063/1.4965777>
- [11] S. Lane, Developing Employability Skills by Using Blended Learning, American Journal of Educational Research, 2016, pp. 47-53.
- [12] C.L. Chiang & H. Lee, The Effect of Project-Based Learning on Learning Motivation and

- Problem-Solving Ability of Vocational High School Students. *International Journal of Information and Education Technology*, 6(9), 2016, pp. 709–712. DOI: <https://doi.org/10.7763/ijiet.2016.v6.779>
- [13] S.R. Made, S. Wayan, & P. Made, Pengembangan Perangkat Pembelajaran Fisika SMK dengan Setting Project Based Learning (PjBL) untuk Mengembangkan Soft Skill Siswa, 2018, pp. 81-89.
- [14] M. Cleary, R. Flynn, S. Thomasson, R. Alexander, & B. McDonald, Graduate employability skills: Prepared for the business, industry and higher education collaboration council, Melbourne: Precision Consultancy, 2007.
- [15] M. Smith, M. Duncan, & K. Cook, Graduate Employability: Student Perceptions of PBL and its Effectiveness in Facilitating their Employability Skills, *Practice and Evidence of Scholarship of Teaching and Learning in Higher Education*, 2013, pp. 217-240.
- [16] P. Sunardi & E. Sutadji, Pengembangan Employability Skills Siswa SMK Ditinjau dari Implementasi Pendekatan Saintifik. *Jurnal Pendidikan: Teori, Penelitian, dan Pengembangan*, 2016, pp. 1391-1398.
- [17] N.A. Jamaludin & S. Sahibuddin, Challenges of Project-Based Learning Towards Requirement Engineering, *International Journal of Computer Application*, 2012, pp. 1-5.
DOI: <https://research.ijcaonline.org/volume50/number3/pxc3880802.pdf>
- [18] T. Mayasari, A. Kadarohman, D. Rusdiana, & I. Kaniawati, Apakah Model Pembelajaran Problem Based Learning Dan Project Based Learning Mampu Melatihkan Keterampilan Abad 21?, *Jurnal Pendidikan Fisika Dan Keilmuan (JPFK)*, 2(1), 2016, p. 48. DOI: <https://doi.org/10.25273/jpfk.v2i1.24>.
- [19] Sunardi & Hasanuddin, Pengembangan Employability Skill Mahasiswa Vokasi Melalui Pembelajaran Stem-Project Based Learning, *Seminar Nasional Teknologi, Sains Dan Humaniora*, 2019, pp. 210–217.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

