**Jurnal Pendidikan Indonesia**
Volume 12, Number 2, 2023 pp. 340-349
P-ISSN: 2303-288X E-ISSN: 2541-7207
Open Access: https://doi.org/10.23887/jpiundiksha.v12i2.57376

# Experiential Learning Model for the Development of Collaborative Skills through Project Based Learning Practicum

**Muhammad Hasan[1*], Nur Arisah[2], Ratnah S.[3], Muh Ihsan Said Ahmad[4], Miranda[5]**

[1,2,3,4,5] Department Economics Education, Universitas Negeri Makassar, Makassar, Indonesia

**ARTICLE INFO**

**Article history:**
Received January 14, 2023
Revised January 18, 2023
Accepted May 29, 2023
Available online June 25, 2023

***Kata Kunci:***
*Pembelajaran Eksperensial, Pembelajaran Kolaboratif, Pembelajaran Berbasis Proyek*

**Keywords:**
Experential Learning, Collaborative Learning, Project Based Learning



***ABSTRAK***

*Untuk dapat meningkatkan hasil belajar siswa dan membangun suasana belajar yang menyenangkan, guru perlu merancang pembelajaran dengan baik, salah satu caranya adalah dengan menerapkan model pembelajaran berbasis pengalaman sehingga siswa dapat mengembangkan keterampilan kolaborasi yang merupakan salah satu keterampilan penting dan dibutuhkan di abad ke-21. Penelitian ini bertujuan menganalisis penerapan model experiential learning dalam mengembangkan keterampilan kolaborasi siswa SMK melalui pembelajaran berbasis proyek berbasis praktikum. Penelitian ini menggunakan pendekatan metode campuran. Informan dalam penelitian ini adalah 3 guru dan 22 siswa SMK sebagai responden. Data yang diperoleh dalam penelitian ini dikumpulkan dengan menggunakan wawancara dan kuesioner. Teknik analisis data menggunakan Sequential Exploratory Design. Hasil penelitian ini menunjukkan bahwa (1) guru telah menerapkan pembelajaran berbasis pengalaman bagi siswa melalui praktikum berbasis proyek; dan (2) pembelajaran berbasis pengalaman melalui praktikum berbasis proyek membuat guru dan siswa merasa bahwa model pembelajaran ini berperan penting dalam mengembangkan keterampilan kolaborasi siswa yang dapat diimplementasikan dalam kehidupan sehari-hari.*

**ABSTRACT**

To be able to improve student learning outcomes and to build a pleasant learning atmosphere, teachers need to design learning well, one way is to apply an experience-based learning model so that students can develop their collaboration skills which are one of the important skills and are needed in the 21st century. This study aims to analyze the implementation model of experiential learning in developing collaboration skills of Vocational High School students through practicum-based project-based learning. This study used a mixed methods approach. The informants in this study were 3 teachers and 22 students of vocational high school as respondents. The data obtained in this study were collected using interviews and questionnaires. The data analysis technique uses a Sequential Exploratory Design. The results of this study indicate that (1) teachers have implemented experience-based learning for students through project-based practicum; and (2) experience-based learning through project-based practicum makes teachers and students feel that this learning model plays an important role in developing student collaboration skills that can be implemented in everyday life.

## 1. INTRODUCTION

Collaborative learning is often defined as two or more people working together toward a common learning goal. They may share tasks in the process of working together, but the main goal is to produce results that collectively advance both individual and collective knowledge (Scardamalia & Bereiter, 2014; Xia, 2022). Collaboration is often difficult to distinguish from cooperation. Collaborative learning involves the joint involvement of students towards shared learning and problem solving goals, whereas collaboration involves a division of labor in which students usually work separately, doing some tasks which are then combined into one product. This definition is useful conceptually, but it is often difficult to separate collaboration from cooperation in real-life situations (Buchs et al., 2017; Van Ryzin & Roseth, 2018). Several recent research studies in learning found that collaboration is an important aspect that needs to be owned and produced in learning (Akhigbe & Adeyemi, 2020; Saito et al., 2021; Soleimanof et al., 2021).

*Corresponding author
E-mail addresses: m.hasan@unm.ac.id (Muhammad Hasan)

Project based learning have a lot of potential for enhancing 21st century skills and engaging students in real-world tasks (Han et al., 2015; Lely et al., 2020). Project based learning is a learning model that involves students in problem solving activities and provides opportunities for students to work together and independently construct their own learning, and ultimately produce valuable student work and realistic learning. Previous research has shown that teachers' understanding of the criteria for an effective project based learning plays an important role in how teachers implement project based learning, thereby influencing understanding of learning materials and developing skills development (Han et al., 2015; Kokotsaki et al., 2016).

Project based learning is characterized by student autonomy, constructive investigation, goal setting, collaboration, communication, and reflection in real-world practice. The link between project based learning and collaborative learning is a mechanism for sharing and distributing cognitive content while articulating thoughts through explanation, argumentation, and investigation. Engaging students in collaborative teamwork leads to increased student learning, satisfaction, and retention. Skills suitable for development through teamwork assignments include problem solving, project planning, coordination, interpersonal and communication skills. As such, projects can serve to build bridges between phenomena in the classroom and real-life experiences, questions and answers that arise in their daily endeavors are given value and shown to be open to systematic inquiry (Kokotsaki et al., 2016; Tika & Agustiana, 2021).

According to previous study project based learning does not have a single precise definition, proponents generally agree on certain basic characteristics of the approach (Grossman et al., 2019). The definition of project-based learning as experiential activities that involve things such as open questions, questions or problems, authentic application of content and skills, student-directed learning, student creation of products, presentations, or presentations to answer questions or problems (Imam et al., 2018; Toma & Greca, 2018). However, when teachers choose to use project based learning in their classrooms, they may face certain challenges. Among these challenges are taking a constructivist approach, adopting new learning strategies, curriculum and topic selection, project based learning management and design, assessing project based learning, and collaboration (Hussein, 2021; Magta et al., 2019).

Instruction in learning is negotiated between students and teachers in a collaborative manner and evolves as students' ideas emerge and grow (Reisman et al., 2018; Schutz et al., 2019; Von Esch & Kavanagh, 2018). It is important to create a classroom environment that supports mastery and develops a constructive outlook from students. Through collaboration, students will try out ideas with their classmates and learn from mistakes. Therefore, collaboration is an important aspect of project based learning and teachers need to ensure that the process produces positive and rewarding experiences that enhance learning performance. In previous research state project based learning actually increases students' knowledge and skills (Kavanagh & Rainey, 2017; Ralph, 2015). Students also feel that project based learning encourages their collaboration and negotiation in groups. However, some students report a lack of motivation for teamwork (Braßler, 2016; Reisman et al., 2018). In addition, previous research also showed that students' knowledge, skills, and motivation increased after project-based learning even though students also reported project-based learning difficulties, for example time-consuming. According to research conducted there are indications that project based learning can be internalized in experiential learning (Kavanagh & Rainey, 2017). Even though the project based learning approach is suitable for all students, the practice of project based learning does not fit all the time in the same pattern (Grossman et al., 2019; Kennedy, 2016), so this research will look at the impact of project based learning if it is internalized in experiential learning. Background and larger learning outcomes must be taken into account in instructional decisions.

Project based learning has been proposed as an approach to foster students' creativity, enthusiasm and familiarity with problem domains in general. The implementation of project activities in the professional development system opens up new opportunities for students (Myalkina, 2019; Sukmawijaya et al., 2019). Students acquire the practical skills necessary to create project solutions and work in teams, organize and distribute various types of project activities. Project activity is the work of completing certain tasks, including agreed methods, action methods (Aleksieienko L. L. V., 2019; Deveci, 2018; Vaganova et al., 2019). A well-designed project-based learning approach should teach students important content standards, concepts, and in-depth understanding (Crosling et al., 2015; Dias & Brantley-Dias, 2017). Apart from this, project based learning can also focus on successful skills such as critical thinking, self-regulation, and collaboration. Opinions also came from (Crosling et al., 2015; Parker et al., 2013). According to (Kolb, 2015) experiential learning is an active pedagogy that emphasizes concrete experience and abstract conceptualization that places life experience as a center and needs to be part of the learning process, where knowledge is created through the transformation of experience. Project-based learning refers to inquiry-based instructional methods that engage students in knowledge construction by asking them to complete meaningful projects and develop real-world products (Brundiers & Wiek, 2013; Dias & Brantley-Dias, 2017). This creation process requires students to work together to find authentic problem solutions in the

process of integrating knowledge, applications, and construction (Miller & Hadwin, 2015; Mitchell & Rogers, 2020), so that project based learning can be implemented in experiential learning models.

Based on some of the previous studies, a research gap was found which will then be filled in in this study. Where previously no comprehensive research had been conducted on the experiences of students and teachers in the project based learning process, especially with regard to participant experiences and personal insights about events, situations, and phenomena (Tsybulsky & Muchnik-Rozanov, 2019). so this research is present to study this in the framework of experiential learning. Basically, this study aims to analyze the model of experiential learning implementation in developing collaboration skills in vocational students through practicum project based learning, thus the experiential learning that will be studied in this study is based on a formal education perspective. To create an environment that stimulates learning and enhances outcomes, students must become fully engaged in the process and become discoverers and creators of knowledge.

## 2. METHOD

This research is a research that uses a mixed approach between qualitative and quantitative (mixed methods) (Almeida, 2020; Creswell, 2013). A qualitative approach is used to analyze the results of interviews with teachers phenomenologically, while a quantitative approach is used to analyze students collaboration abilities. The stages of implementation that were observed and studied in this study were the implementation of experiential learning in developing collaboration skills through project based learning. In the project based learning method, the teacher designs direct and real learning for students. Students usually work in groups on an activity project for a certain period of time, for example from one week to one semester. To be able to answer questions and produce quality work, students need to do things that are far from just memorizing information. Students need to use higher order thinking skills and learn to work in teams.

This research was conducted at SMKN 2 Pangkep, South Sulawesi Class XI Hospitality Department 2. Then the informants and respondents in this study were teachers and students at SMKN 2 Pangkep. Where, in determining the informants, the researchers set certain criteria as a condition for determining informants, namely, among other things, for teacher informants, the criteria used were teachers who had implemented an experience based learning process through project based learning. While the respondent criteria determined by the researcher are students who have learning experience through project-based learning practicums and apply collaboration skills. Based on these criteria, there were 3 teacher informants and 22 students as respondents.

There are two data collection techniques used in this study, namely interviews and questionnaires. Interviews were conducted to find out and collect data from informants regarding the experiential based learning process applied to students to develop collaboration skills through project-based learning practicum. The indicators of collaboration skills is show in Table 1.

**Table 1.** Collaboration Skills Indicators

| No. | Indicator | Description |
|---|---|---|
| 1. | Positive Interdependence | Each member of the group is involved with each other to work together in achieving common goals. |
| 2. | Individual Responsibility | All members of the collaborators in the group hold responsibility for doing the work of their own part. |
| 3. | Positive Interaction | Although each member of the group does their part individually, most of the tasks must be done interactively with other members by providing reasoning, input, and conclusions related to the material being studied and more importantly being able to teach and support one another. |
| 4. | Application Of Collaboration Skills | Students or collaborators are encouraged and assisted to develop trust, leadership, decision-making, communication, and skills in managing conflict. |

The response questionnaire for student collaboration skills is the quantitative data instrument used in this study. This survey is adjusted to four indicators, namely positive interdependence, individual responsibility, positive interaction, and the application of collaboration skills arranged in a Likert Scale. The grid for the student collaboration skills test as show in Table 2.

**Table 2.** Student Collaboration Skills Questionnaire Grid

| Collaboration Skills Indicator | Item Number | | Amount |
|---|---|---|---|
| | Positive | Negative | |
| Positive interdependence | 1, 2, 3, 4, 5 | 6, 7, 8, 9, 10 | 10 |
| Individual responsibility | 11, 12, 13, 14, 15 | 16, 17, 18, 19, 20 | 10 |
| Positive interaction | 21, 22, 23, 24, 25 | 26, 27, 28, 29, 30 | 10 |
| Application of collaboration skills | 31, 32, 33, 34, 35 | 36, 37, 38, 39, 40 | 10 |

The data analysis design in this study used a sequential exploratory design (Creswell, 2013). Sequential exploratory design is data collection that begins with the collection of qualitative data and then continues with the collection of quantitative data. The purpose of collecting qualitative data in the first stage is to explore existing phenomena first, then the second stage is collecting quantitative data to explain the symptoms of the variables found in the qualitative data. The process as show in Figure 1.

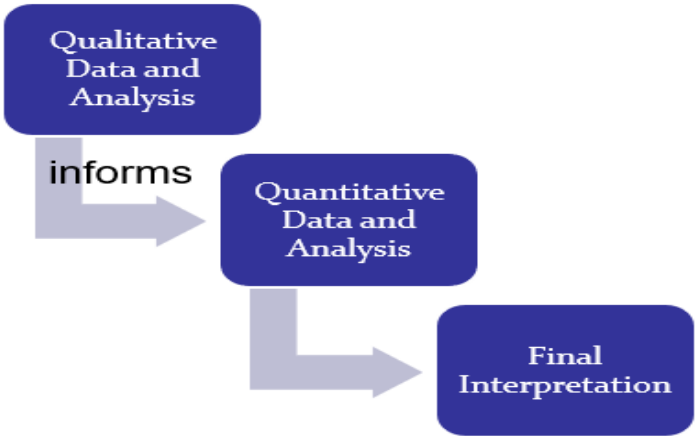


**Figure 1.** Sequential Exploratory Design

(Creswell, 2013)

The design of data analysis to explore the implementation of the experiential learning model in developing collaboration skills of vocational high school students through project-based learning practicums was adapted from the sequential exploratory design (Creswell, 2013). In this study, sequential exploratory design is characterized by the collection and analysis of qualitative data followed by the collection and analysis of quantitative data. In this study, priority was given to the quantitative elements and the main purpose of the qualitative elements was to assist in the triangulation of survey results. The analysis of the three stages is integrated at the results interpretation and discussion stage, as shown Figure 2.

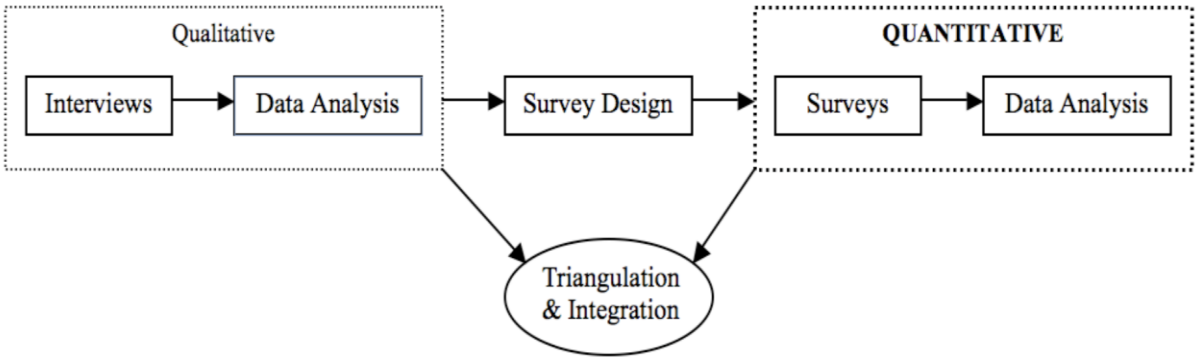


**Figure 2.** Development of Sequential Exploratory Design

## 3. RESULT AND DISCUSSION

### Result

This research focuses on the implementation of the experiential learning model to develop students' collaboration skills through project-based learning practicum. Thus, referring to the focus of the research, the instruments in this study seek to find out and collect answers from related informants (1) whether you have applied the experiential learning model to students through project-based learning practicums; (2) what are examples of projects that have been given to students and what is the impact of the experiential learning model on the development of students' collaboration skills, and whether this learning model can be implemented in everyday life or in the world of work in the future; (3) is there coercion on students to take part in learning with the experiential learning model. The results of the answers from informants can be seen in Table 3.

**Table 3.** Results of Informants (Teachers) Answers

| Question | Answer |
|---|---|
| 1. Have you implemented experiential-based learning for students through project-based practicum? | "Incidentally, I have implemented an experience-based learning model for students with the aim of making students more active in learning in the real world. With project-based learning, students gain knowledge and skills by working on a project within a certain period of time which can develop students' knowledge in depth, think critically, and collaborate". (Informant AR, interview results on 18 December 2022) |
| 2. What are examples of projects that have been given to students and what is the impact of the experiential learning model on the development of student collaboration skills which are carried out on a project-based learning basis, and can this learning model be implemented in everyday life or in the world of work in the future? | ”Student collaboration has a positive effect because students can share tasks with others on how to accurately record and process all room reservations while promoting hotel products and creating and maintaining a good hotel image through providing maximum service. Regarding its implementation in everyday life or the world of work in the future it depends on students how they implement this learning model, but this learning model can and is very influential implemented in the world of work. Actually project-based learning has many benefits, such as students can interact with adults and can develop careers according to their interests, and students gain skills that are useful for the world of work and for life, such as how to take initiative, team collaboration, and communicate ideas". (Informant HS, interview results on 18 December 2022) |
| 3. Is there compulsion for students to apply this experiential learning in learning? | "We here never force students to apply this experience-based learning in everyday life, we give freedom to students how they can use the knowledge they get from here in their daily lives, such as to continue their education. requires majoring in hospitality also in the world of lectures later". (Informant MJ, interview results on 18 December 2022) |

Furthermore, data from 22 respondents related to collaboration skills in Class XI Hospitality 2 SMKN 2 Pangkep were then analyzed based on indicator items, each consisting of 4 indicators and 10 statement items. The data obtained were analyzed using descriptive statistical analysis. If the indicators of positive interdependence are divided into three groups based on the calculation results of descriptive statistical analysis obtained at high, medium and low indicators, the results is show in Table 4.

**Table 4.** Distribution of Positive Interdependence Indicator Score Categorization

| Range | Frequency | Percentage | Category |
|---|---|---|---|
| $X < 25$ | 4 | 18% | Low |
| $25 \leq X < 31$ | 15 | 69% | Moderate |
| $X \geq 31$ | 3 | 13% | High |
| **Total** | **22** | **100%** | |

Base on Table 4, the results of the categorization of positive interdependence indicator scores show that the average value of student collaboration skills for positive interdependence indicators is 27.00, it can be seen that these skills are included in the medium category, with an average value obtained between 26 and 30 with a percentage of 69%, or 15 of 22 students. Furthermore, for the individual responsibility indicator, it is also divided into three groups on this indicator, namely high, medium, and low, so the following information is obtained as show in Table 5.

**Table 5.** Distribution of Score Categorization of Individual Responsibility Indicators

| Range | Frequency | Percentage | Category |
|---|---|---|---|
| X < 25 | 3 | 13% | Low |
| 25 ≤ X < 31 | 17 | 80% | Moderate |
| X ≥ 31 | 2 | 7% | High |
| **Total** | **22** | **100%** | |

Base on Table 5 the results of the categorization of individual responsibility indicator scores were 25,17 which indicated that individual responsibility was included in the moderate category, with an average score obtained between 23 and 28 with a percentage of 80%, or 17 out of 22 students. Furthermore, the positive interaction indicators are divided into three groups based on the results of the analysis obtained on this indicator, namely high, medium, and low, the following information is obtained as show in Table 6.

**Table 6.** Distribution of Score Categorization of Positive Interaction Indicators

| Range | Frequency | Percentage | Category |
|---|---|---|---|
| X < 25 | 5 | 22% | Low |
| 25 ≤ X < 31 | 13 | 60% | Moderate |
| X ≥ 31 | 4 | 18% | High |
| **Total** | **22** | **100%** | |

Base on Table 6, the results of the categorization of positive interaction indicator scores mean the average value is 24,11, which is in the medium category. The average value obtained ranges from 23-27 with a percentage of 60% or 13 of 22 students. For indicators of student collaboration skills divided into three groups based on the results of descriptive analysis calculations obtained on this indicator, namely high, medium, and low, the following information is obtained as show in Table 7.

**Table 7.** Distribution of Collaboration Skills Indicator Score Distribution

| Range | Frequency | Percentage | Category |
|---|---|---|---|
| X < 25 | 1 | 3% | Low |
| 25 ≤ X < 31 | 19 | 90% | Moderate |
| X ≥ 31 | 2 | 7% | High |
| **Total** | **22** | **100%** | |

Base on Table 7 the results of the categorization of the indicator score for the application of student collaboration skills is 25,61, indicating the moderate category of this indicator. The average value obtained ranges from 24-28 with a percentage of 90% or 19 of 22 students. Each of the 22 Class XI Hospitality 2 students at SMKN 2 Pangkep received an average score of 27,00; 25,17; 24,11; and 25,61. Based on the research findings, it shows that students' cooperation skills on the four indicators are in the medium category, with a percentage of 69% or 15 students, on the first indicator 80%, or 17 students, 60%, or 13 students, on the third indicator, and 90% or 19 students on the fourth indicator. The results of this study indicate that project based learning has a positive impact on students, this can be seen in the results of the descriptive statistical analysis in Table 8.

Base on Table 8, the results of this study also indicate the challenges faced by teachers. Where, when it was the first time trying the project-based learning method, the most difficult challenge for teachers was the need to give trust to students and reduce teacher control over students. In project based learning, the teacher is more often than not in front of the class, but this does not mean that the teacher does not teach in class. Traditional teaching practices still exist, but are packaged in a project context.

**Table 8.** The Positive Impact of Project Based Learning on Students

| | | |
|---|---|---|
| **Academic Achievement** | | |
| a. | Students in project based learning understand more deeply and remember it longer. | 70% |
| b. | In several subjects, such as Mathematics, Economics, Languages, Science, and other subjects, project based learning is more effective than traditional learning methods. | 75% |
| c. | In the HOTS-based exam, students in project-based learning are equal to and even superior to students who are taught traditionally. | 60% |
| **21st Century Skills** | | |
| a. | Students demonstrate superior problem solving and can apply it to solve everyday life problems. | 75% |
| b. | Students demonstrate better critical thinking. | 50% |
| c. | Students in project based learning are better able to collaborate and resolve conflicts. | 80% |
| d. | Opportunity to collaborate with other students of different levels, different majors, and different achievements. | 85% |
| **Equity** | | |
| a. | Project based learning can minimize gaps by involving slow learners. | 70% |
| b. | Project based learning can be a model for overall school reform. | 70% |
| c. | Project based learning can be applied in various types of schools and for various characteristics of students. | 65% |
| **Motivation** | | |
| In project based learning classes, students are more motivated to be actively involved in the learning process. | | 75% |
| **Teacher Satisfaction** | | |
| Teachers need time and professional development to understand project based learning, but teachers who have successfully implemented project based learning say that their job satisfaction has increased. | | 85% |

**Discussion**

This research basically focuses on the level of education, especially formal education, because basically, this project-based learning method is mostly applied in formal education for all levels of education. As a study conducted noted that the project-based learning method has been explored at various levels of education starting from basic education to higher education, however, this research pays attention to one level of formal education, namely vocational secondary education, because this level of vocational secondary education will be the starting point for introducing the professional world or the world of work (Kokotsaki et al., 2016).

Project based learning does not have a single precise definition, proponents generally agree on certain basic characteristics of the approach. The definition of project based learning as experiential activities that involve things such as open-ended questions, questions or problems, authentic application of content and skills, student directed learning, and student creation of products, presentations, or performances to answer prompting questions or problems (Dharma, 2019; Rambe, 2018) However, when teachers choose to use project based learning in their classrooms, they may face certain challenges. Among these challenges are taking a constructivist approach, adopting new learning strategies, curriculum and topic selection, project based learning management and design, assessing project based learning, and the nature of collaboration (Dharma, 2019; Rambe, 2018)

In this study, the results were obtained that the experiential learning model through project-based practicum which was implemented at SMKN 2 Pangkep had a positive impact on the development of students' collaboration skills. The results of this study are in line with previous research conducted which found results that the use of experiential learning models has a positive and significant impact on teachers and students (Girvan et al., 2016). This study also found that there were many benefits to students in learning by applying the experiential learning model through team-based project practicum, namely teaching students how to work together and build effective collaboration in doing something or solving a problem. The results of this study are also in line with research conducted which explains that project-based learning has an influence on student collaboration (ibrahim & Rashid, 2022). So according to other study from the results of the research they have conducted, collaboration can be implemented and even cultivated in among students by using this project-based learning method (Ibrahim & Rashid, 2022).

However, this is in fact inversely proportional to the research conducted by based on the research conducted, where the research attempted to provide a comparison between problem-based learning and

project-based learning, the results of which the comparison was made to find out how effect on students' communication and collaboration skills, the results of the study then showed that there was no significant effect between the two, in the sense that both problem-based learning and project-based learning the results on students' communication and collaboration skills were the same, namely not so influential. Apart from that, this research also shows that project-based learning can help students succeed in this complex and rapidly changing world, by developing a set of knowledge and skills as well as academic achievements. In line with the results of this study argued that project-based learning helps students in terms of academic achievement and the results from implementing project-based learning are somewhat better than traditional learning processes (Hussein, 2021).

Based on the results of this study, the researchers tried to examine more deeply regarding the novelty of this study when compared to previous research, it was found that the results of this study provided novelty in terms of research findings due to differences in terms of research subjects, where previous research did not examine to students of SMKN 2 Pangkep so that no one has provided a description regarding the application of the experiential learning model through project based learning practicums for students of SMKN 2 Pangkep. Apart from that, previously there was no comprehensive research conducted on the experiences of students and teachers in the process of project-based learning, especially with regard to participant experiences and personal insights about events, situations and phenomena, so this research is here to examine this within the framework of experiential learning. Then, the results of this study also have a particularly positive impact on research subjects, where with this research, teachers can specifically reflect and evaluate the learning process that has been carried out so far and can continue to apply the experiential learning model through project-based practicum based learning because it can have an impact positive for students especially in terms of student collaboration skills.

## 4. CONCLUSION

This study found that the experiential learning model has a positive impact on students in the learning process and can be implemented in the world of work later. The implementation of the experiential learning model through project based learning teaches students how to work together and build effective collaboration in doing something or solving a problem. According to indicators of collaboration skills, students are more active in working on their projects interactively with other members by providing reasoning, input, and conclusions related to the material being studied and more importantly being able to teach and support each other, and in project work each group member is involved with each other to working together in achieving common goals still needs to be improved in the learning process.

## 5. REFERENCES

Akhigbe, J. N., & Adeyemi, A. E. (2020). Using Gender Responsive Collaborative Learning Strategy to Improve Students' Achievement and Attitude towards Learning Science in Virtual and Hands-on Laboratory Environment. *Journal of Pedagogical Research*, *4*(3), 241–261. https://doi.org/10.33902/JPR.2021063948.

Aleksieienko L. L. V. (2019). The activity approach as a basis for preschool teachers'methodological activities. *Humanitarian Balkan Research*, *3*(6), 10–14. https://cyberleninka.ru/article.

Almeida, F. (2020). Strategies To Perform A Mixed Method Study. *European Journal of Education Studies*, *7*(1), 326–337. https://doi.org/10.5281/zenodo.1406214.

Braßler, M. (2016). Interdisciplinary problem-based learning—Student-centred pedagogy for teaching social sustainable development in higher education. *Teaching Education for Sustainable Development at University Level*, 245–257. https://doi.org/10.1007/978-3-319-32928-4_17.

Brundiers, K., & Wiek, A. (2013). Do we teach what we preach? International comparison of project and problem-based learning courses in sustainability. *Sustainability*, *5*(4), 1725–1746. https://doi.org/10.3390/su5041725.

Buchs, C., Filippou, D., Pulfrey, C., & Volpé, Y. (2017). Challenges for cooperative learning implementation: reports from elementary school teachers. *Journal of Education for Teaching*, *43*(3), 296–306. https://doi.org/10.1080/02607476.2017.1321673.

Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 4th Edition*. Sage Publications, Incorporated.

Crosling, G., Nair, M., & Vaithilingam, S. (2015). Creative learning ecosystems, educational quality and innovative capacity: A perspective from higher education. *Higher Education Studies*, *40*(7), 1147–1163. https://doi.org/10.1080/03075079.2014.881342.

Deveci, T. (2018). Student Perceptions on Collaborative Writing in a Project-Based Course. *Universal Journal*

*of Educational Research*, *6*(4), 721–732. https://eric.ed.gov/?id=EJ1175391.
Dharma, I. M. A. (2019). Pengembangan Buku Cerita Anak Bergambar Dengan Insersi Budaya Lokal Bali Terhadap Minat Baca Dan Sikap Siswa Kelas V Sd Kurikulum 2013. *Journal for Lesson and Learning Studies*, *2*(1), 53–63. https://doi.org/10.23887/jlls.v2i1.17321.
Dias, M., & Brantley-Dias, L. (2017). Setting the Standard for Project Based Learning: a proven approach to rigorous classroom instruction. *Interdisciplinary Journal of Problem-Based Learning*, *11*(2). https://scholarworks.iu.edu/journals/index.php/ijpbl/article/view/28157.
Girvan, C., Conneely, C., & Tangney, B. (2016). Extending experiential learning in teacher professional development. *Teaching and Teacher Education*, *58*(1), 129–139.
Grossman, P., Dean, C. G., Kavanagh, S. S., & Herrmann, Z. (2019). Preparing teachers for project-based teaching. *Phi Delta Kappan*, *100*(7), 43–48. https://doi.org/10.1177/0031721719841338.
Han, S., Yalvac, B., Capraro, M., & Capraro, R. (2015). Implementation of teachers in office and understanding of STEM project-based learning. *Journal of Mathematics Education, Science and Eurasian Technology*, *11*(1), 63–76. https://doi.org/10.12973/eurasia.2015.1306a.
Hussein, B. (2021). Addressing Collaboration Challenges in Project-Based Learning: The Student's Perspective. *Education Sciences*, *434*(11), 8. https://doi.org/10.3390/educsci11080434.
Ibrahim, D. S., & Rashid, A. M. (2022). Effect of Project-Based Learning Towards Collaboration among Students in the Design and Technology Subject. *World Journal of Education*, *12*(3). https://doi.org/10.5430/wje.v12n3p1.
Imam, I., Ayubi, A., & Bernard, M. (2018). Pengaruh Pembelajaran Berbasis Masalah Terhadap Kemampuan Pemecahan Masalah Matematis Siswa SMA. *JPMI:Jurnal Pembelajaran Matematika Inovatif*, *1*(3), 355–360. https://doi.org/10.22460/jpmi.v1i3.355-360.
Kavanagh, S. S., & Rainey, E. (2017). Learning to support youth literacy:The pedagogy of teacher educators and novice teachers takes the preparation of art teachers intermediate English. *American Journal of Educational Research*, *54*(5), 904–937.
Kennedy, M. (2016). Break down teaching practice. *Journal of Teacher Education*, *67*(1), 6–17. https://doi.org/10.1177/0022487115614617.
Kokotsaki, D., Menzies, V., & Wiggins, A. (2016). Project-based learning: A review of the literature. *Improving Schools*, *19*(3), 267–277. https://doi.org/10.1177/1365480216659733.
Kolb, D. A. (2015). *Experiential learning: Experience as a source of learning and development.* Upper Saddle River.
Lely, P., Prabawati, S., Ngurah, G., & Agustika, S. (2020). Project-Based Learning Based On Stem (Science, Technology, Engineering, And Mathematics) Enhancing Students Science Knowledge Competence. *Jurnal Ilmiah Sekolah Dasar*, *4*(4), 621–629. https://doi.org/10.23887/jisd.v4i4.26670.
Magta, M., Ujianti, P. R., & Permatasari, E. D. (2019). Pengaruh Metode Proyek Terhadap Kemampuan Kerjasama Anak Kelompok a. *Mimbar Ilmu*, *24*(2), 212. https://doi.org/10.23887/mi.v24i2.21261.
Miller, M., & Hadwin, A. (2015). Scripting and awareness tools for regulating collaborative learning: Changing the landscape of support in CSCL. *Computers in Human Behavior*, *52*(1), 573–588. https://doi.org/10.1016/j.chb.2015.01.050.
Mitchell, J. E., & Rogers, L. (2020). Staff perceptions of implementing project-based learning in engineering education. *European Journal of Engineering Education*, *45*(3), 349–362. https://doi.org/10.1080/03043797.2019.1641471.
Myalkina, E. . (2019). Diagnostics of the education quality in the higher educational institution. *Vestnik of Minin University*, *7*(3), 4. https://vestnik.mininuniver.ru/jour/article/view/1006/736?locale=en_US.
Parker, W., Lo, J., Yeo, A. J., Valencia, S., Nguyen, D., Abbott, R., & Vye, M. (2013). Beyond breadth-speed-test: Toward deeper knowing and engagement in an advanced placement course. *American Educational Research Journal*, *50*(6), 1424–1459. https://doi.org/10.3102/0002831213504237.
Ralph, R. A. (2015). Post-secondary project-based learning in science, technology, engineering, and mathematics. *Journal of Technology and Science Education*, *6*(1), 26–35. https://www.redalyc.org/pdf/3311/331144428004.pdf.
Rambe, R. N. K. (2018). Penerapan Strategi Index Card Match Untuk Meningkatkan Hasil Belajar Siswa Pada Mata Pelajaran Bahasa Indonesia. *Jurnal Tarbiyah : Jurnal Ilmiah Kependidikan*, *25*(1), 93–124. https://doi.org/10.30829/tar.v25i1.237.
Reisman, A., Kavanagh, S. S., Monte-Sano, C., Fogo, B., Simmons, E., & Cipparone, P. (2018). Facilitate whole-class discussion on history:A framework for preparing prospective teachers. *Journal of Teacher Education*, *69*(3), 278–293. https://doi.org/10.1177/0022487117707463.
Saito, E., Takahashi, R., Wintachai, J., & Anunthavorasakul, A. (2021). Issues in Introducing Collaborative Learning in South East Asia: A Critical Discussion. *Management in Education*, *35*(4), 167–173.

https://doi.org/10.1177/0892020620932367.
Scardamalia, M., & Bereiter, C. (2014). *Building knowledge and creation edge of knowledge: Theory, pedagogy, and technology*. Cambridge UniversityPress.
Schutz, K., Danielson, K., & Cohen, J. (2019). Approximate in language art English: Scaffolding of teaching practices. *Teacher Teaching and Education*, *81*(1), 100– 111. https://doi.org/10.1016/j.tate.2019.01.004.
Soleimanof, S., Morris, M. H., & Jang, Y. (2021). Following the footsteps that inspire: Parental passion, family communication, and children's entrepreneurial attitudes. *Journal of Business Research2*, *128*(1), 450–461. https://doi.org/10.1016/j.jbusres.2021.02.018.
Sukmawijaya, Y., Suhendar, & Juhanda, A. (2019). Pengaruh Model Pembelajaran Stem-Pjbl Terhadap Kemampuan Berpikir Kreatif Siswa Pada Materi Pencemaran Lingkungan. *BioEdUIN*, *9*(9), 28–43. https://doi.org/10.15575/bioeduin.v9i2.5893.
Tika, I. N., & Agustiana, I. G. A. T. (2021). The Effect of a Blended Learning Project Based Learning Model on Scientific Attitudes and Science Learning Outcomes. *Jurnal Ilmiah Sekolah Dasar*, *5*(4), 557. https://doi.org/10.23887/jisd.v5i4.39869.
Toma, R. B., & Greca, I. M. (2018). The effect of integrative STEM instruction on elementary students' attitudes toward science. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(4), 1383–1395. https://doi.org/10.29333/ejmste/83676.
Tsybulsky, D., & Muchnik-Rozanov, Y. (2019). Identity development professional student-teacher current science class teaching team using project-based learning approach: Multi-level analysis. *Teacher Teaching and Education*, *79*(1), 48–59. https://doi.org/10.1016/j.tate.2018.12.006.
Vaganova, O. ., Ilyashenko, L. ., Smirnova, Z. H. V, Bystrova, N. ., & Kaznacheeva, S. . (2019). Students' creative abilities development in higher educational institution. *Amazonia Investiga*, *8*(22), 701–710. https://amazoniainvestiga.info/index.php/amazonia/article/view/822.
Van Ryzin, M. J., & Roseth, C. J. (2018). Cooperative Learning in Middle School: A Means to Improve Peer Relations and Reduce Victimization, Bullying, and Related Outcomes. *Journal of Educational Psychology*, *110*(8), 1192–1201. https://doi.org/10.1037/edu0000265.
Von Esch, K., & Kavanagh, S. S. (2018). Preparing primary class teachers of English learning (EL) students: Basis of design practice-based for teacher learning in theory development skill. *Journal of Teacher Education*, *69*(3), 239–251. https://doi.org/10.1177/0022487117717467.
Xia, X. (2022). Application Technology on Collaborative Training of Interactive Learning Activities and Tendency Preference Diversion. *SAGE Open*, *12*(2). https://doi.org/10.1177/21582440221093368.