

The effect of project-based learning models and digital-based learning media on students' work skills in accounting subjects in SMK negeri 1 gorontalo city, Indonesia

ABSTRACT

Project Based Learning (PJBL) is a learning model that uses projects/activities as a means of learning to achieve attitude, knowledge and skill competencies. PJBL learning with the use of digital-based learning media is considered very important in improving student skills, especially in the digitalisation 4.0 era. This study aims to analyse the effect of using project-based learning models and digital-based learning media on student work skills in accounting subjects at SMK Negeri 1 Gorontalo City. This research uses a quantitative approach with causality. The type of data in this study is primary data through distributing questionnaires to students who are research samples to assess the effectiveness of learning using project-based learning models and digital-based learning media. The number of samples in this study were 156 students. The data analysis technique used is Multiple Regression with the help of SPSS version 21. The results of this study indicate that (1) the Project Based Learning (PjBL) learning model has a positive and significant effect on the work skills of students majoring in Accounting in Vocational High School (SMK) Negeri 1 Gorontalo City. (2) Digital-based learning media has a positive and significant effect on the employability skills of students majoring in Accounting in Gorontalo City. Based on these results, it can be a recommendation that the project-based learning model and digital-based learning media can be combined in order to increase student creativity in learning activities.

Keywords: {Learning_Model, PjBL, Digital_Learning_Media, Employability_Skills, Accounting_Major}

1. INTRODUCTION

[The existence of technology in today's era has dominated in various layers of society, especially in the current digital industry era or era 4.0. Many people have utilised technology in their daily activities [1]. "This increasingly advanced utilisation, encourages students to be able to develop computer-based learning media. This is an adjustment as a student in welcoming this sophisticated era. Able or unable educators must do this. New standards are needed so that students will have the competencies needed in an age dominated by digital technology. Schools are challenged to find ways to enable students to succeed in work and life through mastery of creative thinking skills, flexible problem solving, collaboration and innovation" [2].

"In classroom learning, each teacher has his own methods that are considered appropriate and in accordance with the condition of students and the achievements expected by the teacher. There are several learning models currently used in school teaching in the independent curriculum, namely the Project Based Learning Model (PJBL) which is a learning model that uses projects / activities as a means of learning to achieve attitude, knowledge and skills competencies. One of the main advantages of this strategy is a meaningful learning experience for students. By facing real challenges and completing

projects that have an impact in the context of their lives, students can see the direct relevance of learning in the real world" [1,2]. The use of PJBL is very effective in implementing learning and makes it easier for teachers to deliver learning materials [4]. In developing student skills, of course, it requires the right learning model that aims to improve student skills. In the explanation above that the right model in developing student skills is a Project-based learning model (PJBL), so researchers chose the Project Based Learning Model as the subject in this study.

"In this Project Based Learning model, the use of media is certainly needed in teaching and familiarising students in working on any project, especially the use of digital media which is currently needed in developing skills to prepare for the future of each student. Learning media is one component that cannot be replaced in the learning process. Through learning media, educators can achieve learning objectives as desired. Learning media can affect cognitive learning outcomes, so that students are able to improve their cognitive skills" [5].

Based on preliminary observations at SMK Negeri 1 Gorontalo, that the use of digital media in the implementation of the Project Based Learning learning model is only used in a few subjects such as one of them is in computer accounting subjects in Class X and accounting cycle learning in class XI and Class XII which is the focus of the subject in this study, in this subject the PJBL learning model is implemented using the MYOB (Manage Your Own Business) application and also Microsoft Excel where students are taught how to compile financial reports using these two applications. The research object focuses on Class X, Class XI and Class XII at SMK Negeri 1 Gorontalo. Based on the facts obtained in the field, it can be seen that in this day and age, everything depends on technological developments, encouraging teachers to use computer-based technology in terms of learning, especially if it is related to finance such as accounting subjects, so that students are also required to be able to master technology, especially computers, to be able to follow the learning flow.

In the independent learning curriculum, the learning process is centred on developing skills, building character or morals and non-technical abilities in students, so that at SMK Negeri 1 Gorontalo students are more focused on practical learning and project work that mostly uses digital technology. Especially in accounting subjects in class X students are more directed in project work using Microsoft Excel applications on computers and in class XI and class XII students are directed to use MYOB Accounting (Mind Your Own Business Accounting) applications. However, practice-based learning will not be successful if students cannot understand the theories related to accounting so that the level of student understanding in using the accounting theory taught by the teacher will greatly affect the development of student work skills.

The use of Project Based Learning Model in today's learning process is very helpful in developing students' skills, in facing the current digital era. This learning model not only develops students' skills but can also help develop a better character or attitude in students [4,6]. Nowadays, cooperation and collaboration are considered important in the ethics of the world of work, because in the world of work not only individual skills.

The present study aimed to determine the effect of project-based learning models and digital-based learning media on students' work skills in accounting subjects in SMK negeri 1 gorontalo city, Indonesia.

2. METHODS

[A. Time and Place

This research took place at SMK Negeri 1 Gorontalo which is located at Jalan Ternate, Tapa Village, Sibatana District, Gorontalo City. with research time conducted for 3 months from April 2023 to June 2023.

B. Research Approach, Method and Research Design

This research uses a quantitative approach that aims to measure data and usually applies some form of statistical analysis. The study used multiple regression analysis to determine whether or not there was an influence between the three variables to be studied. In this study there are two independent variables, namely the Project Based Learning Model (X1) and the Digital Based Learning Media variable (X2) as variables that affect the Student Work Skills variable (Y) as the dependent variable.

This research uses a survey method conducted on a number of individuals so that facts or information are found factually about the symptoms of a group or individual behaviour and the results can be used as material for planning or decision making. The research design describes the procedure in testing the research hypothesis through the independent variable and the dependent variable.

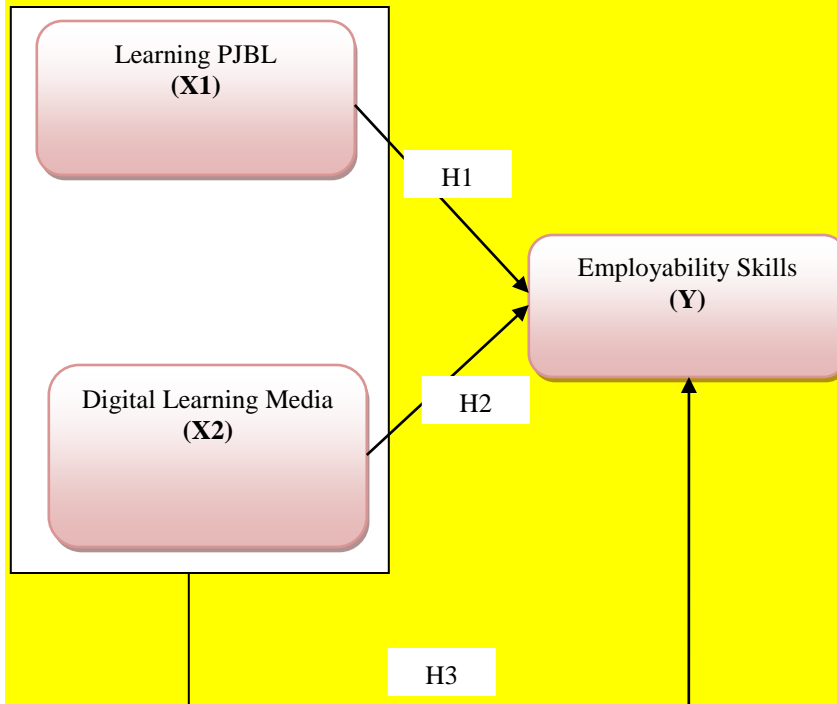


Figure 1: Research Design

C. Research population and sample

Population is a study is the whole subject of research. Objects / subjects that have certain qualities and characteristics set by researchers to study and then draw conclusions [7]. The population in this study were all students in classes X, XI and XII majoring in accounting at SMK Negeri 1 Gorontalo City with a total of 280 students.

This study will use a sample that will be taken from the population to be studied. The sample is part or representative of the population to be studied. In this study, sampling was carried out using the Simple Random Sampling technique. The sample withdrawal in this research uses the Slovin formula [7], which is presented below:

$$n = \frac{N}{1 + N \cdot e^2}$$

Description:

n: sample size

N : population size

e: percent leeway, inaccuracy due to sampling errors that can still be tolerated or desired 10%

D. Data Collection Technique

Data collection carried out in researchers is using questionnaires distributed to samples. Questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents to answer [7]. The statements presented in the questionnaire will be accompanied by alternative answers chosen by the respondent and measured using a Likert scale.

E. Data Analysis Technique

Data analysis is grouping data based on variables and types of respondents, tabulating data based on variables from all respondents, presenting data for each variable studied, performing calculations to answer problem formulations, and performing calculations to test hypotheses that have been proposed [7]. In quantitative research, data analysis techniques use statistical calculations. The data analysis technique used is Multiple Regression with the help of SPSS version 21.]

3. RESULTS

[A. Descriptive Analysis Of Research

The results of descriptive analysis of each variable in this research are presented as follows:
Table 1. Descriptive Results of Variables

Research Variable	Number of Items	Theoretical Score		Skor data empirik		Mean	Standard deviation	Score	Criteria
		Min	Max	Min	Max				
Project Based Learning (PjBL) learning model	12	12	60	30.00	60.00	50.19	6.03	83.64%	Good
Digital-based learning media	10	10	50	22.00	50.00	40.15	5.77	80.29%	Good
Student work skills	16	16	80	38.00	80.00	64.65	8.10	80.81%	Good

Looking at Table 1. above, the impact of each score can be described as follows:

a. Project Based Learning Model (PjBL) Variable

Based on the results in Table 1. it can be seen that the percentage of the achievement score of the model Project Based Learning (PjBL) learning model variable is 83.64% which is in the 'good enough' category. This shows that students majoring in Accounting at Vocational High School (SMK) Negeri 1 Gorontalo city feel that model PjBL learning is quite mixed in having a positive impact on student learning, especially in terms of increasing students' critical thinking skills, collaboration, and creativity in projects that are relevant to the real world, such as simulating company bookkeeping, analysing financial statements, or making business plans.

b. Digital-based Learning Media Variables

Based on Table 1, it can be seen that in general the level of achievement score of computer-based learning media variables is 80.29% which is included in the 'very good' classification. This shows that students majoring in Accounting at Vocational High School (SMK) Negeri 1 Gorontalo city feel that digital media allows for more interactive and interesting learning methods because animations, graphics, and videos help students understand accounting concepts better.

c. Student work skills variable

Based on Table 1, it can be seen that the overall percentage of the achievement score for the student work skills variable is 80.81% which is in the 'good enough' category. This shows that students majoring in accounting at Vocational High School (SMK) Negeri 1 Gorontalo city have developed adequate skills, although there is still room for improvement where

students are quite capable of doing bookkeeping, compiling financial reports, operating accounting software, and conducting fraud analysis.

B. Data Normality (Variable Normality)

The results of the One Sample Kolmogorov Smirnov test for the normality of the research variable data can be described as follows:

Table 2. Data Normality Test Results (SPSS 21 Data Processing, 2024)

		PjBL Learning Model	Digital-based Learning Media	Student Employability Skills
	N	156	156	156
Normal	Meran	42.3839	36.0627	54.9715
Parameterrsa,b	Std. Dervation	6.76036	6.31470	9.21406
Most Erxtremer	Absoluter	.049	.086	.068
Differrencers	Positiver	.046	.086	.068
	Nergativer	-.049	-.059	-.054
	Kolmogorov-Smirnov Z	.617	1.073	.846
	Asymptotic significancer (2-tailerd)	.841	.200	.471

From the table above, it can be clearly seen that the data normality test (Kolomogorov Smirnov) found that the research variables have a Kolomogorov Smirnov (KS) value that is smaller than the Z taberl value of 1.96 (standard Z). As well as a probability greater than 0.05 so that the data in this study fulfils the Normality test (Normally distributed data).

C. Multiple Regression Analysis Results

1. Multiple Regression Equation

The results of multiple regression analysis with the help of the SPSS programme are shown in Table 2 as follows:

Table 3. Regression Analysis Results (SPSS 21 Data Processing, 2024)

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
		(Constant)	6.396	3.027		
1	PjBL Learning Model	.524	.085	.385	6.197	.000
	Digital-based Learning Media	.731	.091	.501	8.069	.000

Based on the results of the analysis, the modern multiple linear regression equation is:

$$\hat{Y} = 6,396 + 0,524X_1 + 0,731X_2 + \epsilon$$

2. Simultaneous Test Results (F Test)

The results of simultaneous testing with the help of the SPSS 21 programme are shown in table 2. below:

Table 4 Simultaneous Test Results (SPSS 21 Data Processing, 2024)

	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	8401.146	2	4200.573	135.070	.000 ^b
	Residual	4758.174	153	31.099		
	Total	13159.320	155			

Based on the table above, the value obtained F count for this study is 135.070 with a significant value or probability of 0.000. While at the 5% significance level, the F table value is 3.055 with df1 of k = 2 and df2 of N-k-1 = 156-2-1 = 153. The calculated F value obtained is much higher than the F table when these two F values are compared. Then, the probability value obtained from the test is smaller than the alpha value of 0.05. Therefore, the Project Based Learning (PjBL) learning model and

digital-based learning media together have a significant effect on the work skills of students majoring in Accounting at Vocational High School (SMK) Negeri 1 Gorontalo City.

3. Partial Test Results (t Test)

The partial test results are shown in Table 5. as follows:

Table 5. Partial Test Results

No	Variabel	t _{hitung}	P-Value	t _{tabel}	Description
0	(Constant)	2.113	0.036		
1	PjBL Learning Model	6.197	0.000	1,976	Signifikan
2	Digital-based Learning Media	8.069	0.000	1,976	Signifikan

^{ns} Not Signifikan

*Significant at the 0.1 level (2-tailed)

** Significant at the 0.05 level (2-tailed)

***Significant at the 0.01 level (2-tailed)

Based on the results of the analysis above, the partial test results of this study can be explained:

1) Partial Test Interpretation of Project Based Learning Model (PjBL) Variables

Based on the analysis, the t-test value for the Project Based Learning (PjBL) learning model variable is obtained at 6.197 while the t-table value is 1.976. The calculated t value still exceeds the t table value when the two t values are compared ($6.197 > 1.976$). The significance value of the Project Based Learning (PjBL) learning model is smaller than the probability value of 0.05, or the value ($0.000 < 0.05$), then at that point H_{a1} is recognised / accepted. So that the Project Based Learning (PjBL) learning model has a positive and significant effect on the work skills of students majoring in Accounting in Vocational High School (SMK) Negeri 1 Gorontalo City.

2) Interpretation of Partial Test of Digital-based Learning Media Variables

Based on the analysis, the t-count value for the Project Based Learning (PjBL) learning model variable is obtained at 8.069 while the t-table value is 1.976. The calculated t value still exceeds the t table value ($8.069 > 1.976$) when the two t values are compared. The importance value of t on the computerised learning media variable is 0.000. Because the value of ($0.000 < 0.05$) the significance value of digital-based learning media is smaller than the probability value of 0.05, H_{a2} is accepted. Therefore, digital-based learning media has a positive and significant effect on the work skills of students majoring in Accounting in Vocational High School (SMK) Negeri 1 Gorontalo City.

D. Classical Assumption Testing

1. Residual Normality

The Normal Probability Plot results for the normality test are presented in Figure 1 below :

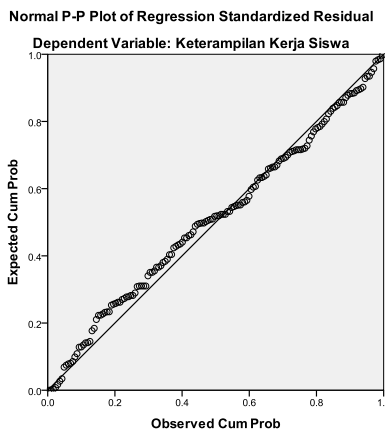


Figure 2. Graph of Normal Probability Plot Testing Results

The data (points) are scattered around the diagonal line and move in that direction, as shown in this figure. So the information in this regression model fulfils the Assumption of Data Normality. Meanwhile, the result of the One Sample Kolmogorov Smirnov test can be described as follows:

Table 6. Residual Normality Test Results

		Unstandardized Residual
	N	156
Normal Paramerters ^{a,b}	Meran	.0000000
	Std. Dervation	5.54056837
Most Erxtremer Diferrencers	Absoluter	.074
	Positiver	.048
	Nergativer	-.074
	Kolmogorov-Smirnov Z	.925
	Asymp. Sig. (2-tailed)	.360

From the table above, it can be seen that the data normality test (Kolomogorov Smirnov) found that the residual value has a Kolomogorov Smirnov (KS) value of 0.925 which is smaller than the Z table value of 1.96 (standard Z). As well as a probability of 0.360 which is greater than 0.05 so that the data in this study fulfils the Normality test (Normally distributed data).

2. Multicollinearity Testing

The results of testing the classic assumptions of multicollinearity using SPSS 21 are presented as follows:

Table 7. Multicollinearity Testing

	Model	Collinearity Statistics	
		Tolerance	VIF
	(Constant)		
1	PjBL Learning Model	.613	1.630
	Digital-based Learning Media	.613	1.630

Based on the results in the table above, it can be seen that the Project Based Learning (PjBL) learning model variable has a VIF value of 1.630. Then the value of digital-based learning media is 1.630. The VIF value is not right at the standard number 10. So in this review there are no symptoms of murtikolnearity or the multicollinearity test of exploratory information is fulfilled.

3. Heteroscedasticity Test

Heteroscedasticity test is a test that expects to test whether in a regression there are differences in Variance with Residual Data that exist today. The following are the results of the heteroscedasticity test:

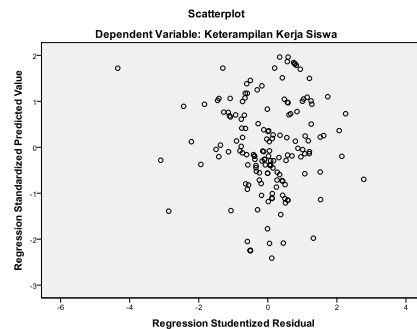


Figure 3. Heteroscedasticity Testing Results

Based on the picture above, it can be seen that the points spread randomly and spread both above and below zero on the Y axis. Therefore, it can be concluded that the regression model does not occur heteroscedasticity.

DISCUSSION

1. The effect of the Project Based Learning (PjBL) learning model on student work skills

The results obtained from descriptive testing obtained the level of achievement score on the Project Based Learning (PjBL) learning model variable is 83.64% which is in the 'good enough' category. This shows that students majoring in Accounting at Vocational High School (SMK) Negeri 1 Kota Gorontalo feel that the PjBL learning model is quite mixed in having a positive impact on student learning, especially in terms of improving students' critical thinking skills, collaboration and creativity in projects that are relevant to the real world, such as simulating company bookkeeping, analysing financial statements, or making business plans. The use of PjBL model learning is able to increase the creativity of students, where this model emphasises more on students in solving the problems faced so as to encourage students to think creatively. Compared to the usual learning model that only makes students only listen to the material delivered without real action from the students themselves [7]. However, to be able to support and improve the PjBL learning model, it needs to be supported by adequate facilities and resources.

The results of testing the first hypothesis with multiple regression analysis found that the Project Based Learning (PjBL) learning model has a positive and significant effect on the work skills of students majoring in Accounting in Vocational High School (SMK) Negeri 1 Gorontalo City with a partial determination coefficient of 26.80%. The better and more effective the use of the Project Based Learning (PjBL) learning model in learning activities, the better the work skills of students majoring in Accounting at State Vocational High School 1 Gorontalo City. This is because PjBL offers a challenging and contextualised learning approach, which is directly relevant to the world of work.

"Based on the results obtained, it is known that the PjBL learning model is able to stimulate problem solving in students. Project Based Learning (PjBL) is a learning model that emphasises the exploration of real problems and practical solutions through projects undertaken by students collaboratively" [2,4]. This model has been shown to have a significant impact on students' employability skills. One of the main influences is the improvement of critical thinking skills. In PjBL, students are invited to identify problems, design solutions, and implement projects that are relevant to the real world. This process

requires students to analyse information, evaluate alternative solutions, and make decisions based on data and logic. The Project Based Learning (PjBL) learning model contributes significantly to the development of students' employability skills through the enhancement of critical thinking, collaboration, time management, organisation, and learning motivation. Thus, PjBL becomes one of the effective learning approaches in preparing students for the challenges in the modern world of work.

2.The effect of digital-based learning media on student work skills

The results obtained from descriptive testing obtained that the level of achievement scores on computer-based learning media variables is 80.29% which is in the 'good enough' category. This shows that students majoring in Accounting at Vocational High School (SMK) Negeri 1 Kota Gorontalo feel that digital media allows for more interactive and interesting learning methods because animations, graphics, and videos help students understand accounting concepts better. "Platforms such as Googler Classroom, Moodle, or Edmodo are used to manage learning materials, assignments, and communication between teachers and students. Then students are taught to use accounting software such as MYOB, Zahir, or Accurater. MYOB, Zahir, or Accurater is an accounting software that is very important in helping to accelerate the completion of inputting and processing transaction data and in terms of reporting. Processing transaction data with this computer-based accounting software can also reduce errors that occur" [8]. "The use of this software allows students to understand the process of financial measurement and reporting in a more practical and efficient way. So that digital-based accounting simulations provide practical experience to students in carrying out accounting tasks, such as making financial reports or analysing financial data" [7].

The results of testing the second hypothesis with multiple regression analysis found that digital-based learning media has a positive and significant effect on the work skills of students majoring in Accounting at Vocational High School (SMK) Negeri 1 Gorontalo City with a coefficient of determination of 37.10%. The more adequate and qualified the digital-based learning media, the better or better students' work skills at SMK Negeri 1 Gorontalo City will be in completing and understanding various materials related to accounting. Digital-based learning media offers a variety of benefits that directly affect students' ability to understand and master subject matter. The utilisation of information and communication technology in the learning process has several benefits, namely: (1) increasing the quality of learning activities; (2) increasing access to learning and education; (3) developing the depiction of abstract ideas; (4) making it easier to understand the learning material that is being explored; (5) making the appearance of learning material more interesting; and (6) being a link between material and learning [9].

The use of learning media can affect cognitive learning outcomes, so that students can improve their cognitive skills. Digital-based learning media has become an important tool in modern education, offering a variety of significant benefits to students' work skills [8,10]. The use of digital media also facilitates adaptive and personalised learning, allowing students to receive immediate feedback and customisation of materials according to student needs. This not only enhances teaching effectiveness but also prepares students to face various situations in the workplace with high flexibility and adaptability. Digital learning media contributes significantly to the development of students' employability skills through the enhancement of technology, communication, self-management, analysis and adaptation skills. By utilising digital technology, students are better prepared to face challenges in the ever-evolving world of work.

3.Effect of Project Based Learning (PjBL) learning model and digital-based learning media on student work skills

The results of descriptive testing found that the percentage of achievement scores for the student work skills variable was 80.81% which was in the 'good enough' category. This

shows that students majoring in Accounting at Vocational High School (SMK) Negeri 1 Gorontalo City have developed adequate skills, although there is still room for improvement where students are quite capable of doing bookkeeping, compiling financial reports, operating accounting software, and conducting financial analysis. Technical skills are very important because they reflect students' ability to apply accounting knowledge practically. It also means that the school has been quite successful in equipping students with the basic skills needed in the world of work. To achieve better results, there needs to be continuous efforts in improving access to resources, teacher training, real work experience, and student motivation and discipline. Thus, it is expected that students can be better prepared and competent to face the challenges in the world of work and achieve success in careers related to the field of accounting.

The results of using multiple regression analysis to test the third hypothesis found that the Project Based Learning (PjBL) learning model and digital-based learning media together have a significant effect on the work skills of students majoring in Accounting at Vocational High School (SMK) Negeri 1 Gorontalo City. Based on these results, it can be concluded that the use of Project Based Learning combined with the utilisation of digital media can improve students' work skills. As much as 63.40% of the variability of work skills of students majoring in Accounting in Vocational High School (SMK) Negeri 1 Gorontalo City can be explained by the Project Based Learning (PjBL) learning model and digital-based learning media, while the remaining 36.60% can be explained by other variables not examined in this study such as student motivation, interest in learning, learning strategies, teacher classroom management, peer tutors, and learning environment.

Project learning models and digitalisation in learning have a significant effect on student development [10]. Learning by utilising digital technology is very helpful in the student learning process, thus supporting success in student learning [12]. The combination of PjBL and digital media encourages innovation and creativity. Digital media provides a variety of tools for visualisation and simulation that can assist students in designing and testing student ideas. With PjBL, students are encouraged to think creatively and come up with innovative solutions to problems encountered in student projects. In the world of work, people are constantly looking for better and newer ways of doing things, and these skills are highly valued. So the integration of the Project Based Learning (PjBL) learning mode with the digital-based learning mode has a significant impact on students' employability skills. This combination not only improves technical and managerial skills, but also develops communication, collaboration, creativity, and motivation skills that are essential for learners in today's and tomorrow's workplace.

4. CONCLUSION

[Based on the results of the research and discussion, it can be concluded that:

1. The use of the Project Based Learning (PjBL) learning mode in the accounting subject has a positive impact on improving the work skills of students in the accounting course of SMK Negeri 1 Gorontalo City.
2. The use of digital-based learning tools in accounting courses has a positive impact on improving the work skills of students in the accounting course of SMK Negeri 1 Gorontalo City.
3. Collaboration between the use of Project Based Learning (PjBL) learning mode and digital-based learning mode in Accounting subject has a significant effect on the working skills of students of SMK Negeri 1 Gorontalo City.]

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Details of the AI usage are given below:

1. SPSS 21

2.

3

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