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THE EFFECT OF DIGITAL LITERACY AND COLLABORATION SKILLS ON TEAM PROBLEM SOLVING ABILITY WITH CREATIVITY AS AN INTERVENING VARIABLE (A STUDY ON STUDENTS OF THE FACULTY OF ECONOMICS AND BUSINESS, JAKARTA STATE UNIVERSITY)

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Abstract:

This study aims to determine the effect of digital literacy and collaboration skills on team problem-solving abilities with creativity as an intervening variable in students. This study is a quantitative study with an explanatory approach. The population in this study were undergraduate students at the Faculty of Economics and Business, Jakarta State University, class of 2021, totaling 677 students with a sample of 251 students. The data in this study were processed and analyzed using Structural Equation Modeling (SEM) assisted by the SmartPLS 3.0 program. The results of the study indicate that (1) There is a significant effect between digital literacy and team problem-solving abilities in students (2) There is a significant effect between collaboration skills and team problem-solving abilities (3) There is a significant effect between creativity and team problem-solving abilities (4) There is a significant effect between digital literacy and creativity (5) There is a significant effect between collaboration skills and creativity (6) There is an indirect effect between digital literacy and team problem-solving abilities through creativity (7) There is an indirect effect between collaboration skills and team problem-solving abilities through creativity.

Keywords: ***Digital Literacy, Collaboration Skills, Team Problem Solving Ability, Creativity***

BACKGROUND

The rapid development of information and communication technology (ICT) in the era of the industrial revolution 4.0 has changed various aspects of life, including in the field of education (Tri, 2021). Curriculum change is one form of reform of the education system in Indonesia. The Independent Curriculum is one form of implementation of education reform in Indonesia. According to the National Education Agency (BNSP), the demands of the independent curriculum are in line with the concept of 21st century skills, namely emphasizing critical thinking skills, cooperation, communication, creativity, and problem solving.

However, although the independent curriculum is designed to encourage flexibility and development of student potential, the reality on the ground shows that is implementation still faces various challenges. Problem-solving skills in Indonesia are still relatively low due to problems in the field. This is evidenced by the results of the 2018 PISA study released by the

OECD (Siswanto, 2024). The results show that Indonesia obtained a low average score in reading with a score of 371 with an average OECD score of 487, mathematics with a score of 379 with an average OECD score of 487, and science with a score of 389 with an average OECD score of 489. In addition, out of 79 participating countries, Indonesia is ranked 73rd, which means it is in the bottom 10 countries. Based on these results, the PISA results have clearly descreased compared to 2015 (OECD, 2019)

Meanwhile, the PISA 2022 results published in December 2023 showed that Indonesia was ranked low with a score of 359 for reading, 366 for mathematics, and 383 for science, compared to the OECD average score of 476 for reading and science, and 472 for mathematics. The lack of problem-solving skills in Indonesia according to (Prima Riyani, 2023)is one of the causes of the low PISA results because the PISA test is designed to measure students' abilities in critical thinking, problem solving, and application of knowledge to real situations.

In the context of 21st century skills, the ability to work collaboratively to solve problems is one of the main pillars needed to face future challenges. The use of digital literacy will be more optimal if accompanied by adequate collaboration skills, so that problems can be solved effectively through synergistic teamwork. This process includes joint identification of root causes, brainstorming creative ideas, strategy development, and consensus-based decision making.

Research conducted by (Aulia Nur Hidayah, 2023) revealed that digital literacy influences critical thinking skills and problem-solving abilities of students. The study stated that high digital literacy shows better ability to analyze information, make logistical decisions, and solve complex problems. Meanwhile, other research conducted by (Anggelita, 2020) shows that collaboration skills also have an influence on problem-solving abilities. In line with 21st century learning, research by (Lestari, 2019) explains that creativity influences problem-solving abilities.

This research was conducted at the Faculty of Economics and Business, Jakarta State University because the results of the pre-survey showed that they had sufficient theoretical knowledge, but had difficulty applying it when facing a problem. This can be seen from several statements that reflect obstacles such as difficulty in identifying the root of the problem, more often focusing on symptoms than the main cause, confusion in developing a solution strategy, and hesitation in making decisions and implementing solutions. Researchers are motivated to fill this gap by exploring the influence of digital literacy and collaboration skills on team problem-solving abilities with creativity as an intervening variable.

THEORETICAL FRAMEWORK

The constructivism theory developed by Lev Vygotsky, a Russian psychologist, focuses on the social role in the learning process and cognitive development of individuals. Vygotsky emphasized that knowledge is not only constructed individually, but is also influenced by social and cultural interactions. It can be said that social interaction is at the core of this theory, so collaboration skills are a very important element. Vygotsky emphasized the importance of social interaction and the use of mediators such as technology in supporting learning and skill development.

Vygotsky believed that individual skills develop through support from others, either through peer collaboration or through tools such as technology. According to (Amahorseya, 2023), with the presence of Vygotsky's constructivism theory, many educational observers have developed cooperative learning models, peer interaction learning models, group learning models, and problem-posing learning models. Some elements of constructivism theory

according to (Masgumelar, 2021) include, 1) critical thinking, 2) collaboration, 3) authentic and situational, 4) solving problems, and 5) explaining phenomena.

METHOD

Data collection in this study was by distributing questionnaires online through a digital survey platform, namely Google Forms. This study was conducted in semester 122 of the 2024/2025 academic year. The population in this study were undergraduate students at the Faculty of Economics and Business, Jakarta State University, class of 2021, totaling 677 students. To determine the number of samples in this study, the cluster sampling technique was used so that each group in the population was represented proportionally. Determination of the number of student samples by calculation using the Slovin formula, as follows:

Table 1 Number of Research Samples

Study program	Number of Students	Calculation	Number of Samples
S-1 Economic Education	136	(136/677)*251	50
S-1 Accounting	116	(116/677)*251	43
S-1 Business Education	82	(82/677)*251	30
S-1 Office Administration Education	84	(84/677)*251	31
S-1 Management	153	(153/677)*251	57
S-1 Digital Business	106	(106/677)*251	39
Amount	**677**		**251**

This study uses a quantitative research design with an explanatory research approach. In (Sari, 2023) explains that the explanatory approach aims to identify, ensure the causal relationship between variables in relation to other variables. This study aims to analyze the relationship between digital literacy, collaboration skills and team problem-solving abilities with creativity as an intervening variable. The data in this study were processed and analyzed using Structural Equation Modeling (SEM) assisted by the SmartPLS 3.0 program.

RESULT

Descriptive Statistics

The characteristics of the research respondents are based on gender and study program origin. The explanation of the characteristics of the research respondents is as follows:

Table 2 Respondent Profile

Respondent Identity Variable	Category	Amount	Percentage (%)
Gender	Man	84 People	33,47
	Woman	167 People	66,53
Study program	S-1 Economics Education	50 People	19,92
	S-1 Accounting	43 People	17,13
	S-1 Business Education	30 People	11,95
	S-1 Office Administration Education	31 People	12,35
	S-1 Management	57 People	22,7
	S-1 Digital Business	39 People	15,53

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SEM Analysis

Model Fit Analysis

Table 4.3 Model Fit Test Results

	Saturated Model	***Estimated Model***
SRMR	0.031	0.031
d_ULS	0.518	0.518
d_G	0.483	0.483
Chi-Square	671.898	671.898
NFI	0.931	0.931

Based on the results, the figures obtained were <0.10 for the SRMR, d_ULS, d_G, and NFI indicators, it can be concluded that this research model meets the overall model feasibility criteria.

Hypothesis Testing

Direct Effect Significance Test

Hypothesis testing uses an alpha value of 5% (0.05), if the t-statistic value is > 1.96, then H_0 is rejected and H_a is accepted, which means the relationship between variables is significant. While if the p-value < 0.05, then H_a is accepted, indicating that the relationship between variables.

Table 4.4 Hypothesis Testing Based on Path Coefficient LD on KPMT

Variable	***Original Sample* (O)**	***Sample Mean* (M)**	***Standard Deviation* (STDEV)**	***T Statistics* (|O/STDEV|)**	***P Values***
LD → KPMT	0.306	0.302	0.080	3.816	0.000

The results show that digital literacy has a direct effect on team problem-solving abilities (t = 3.816, p = 0.000).

Table 4.5 Hypothesis Testing Based on Path Coefficient KK on KPMT

Variable	***Original Sample* (O)**	***Sample Mean* (M)**	***Standard Deviation* (STDEV)**	***T Statistics* (|O/STDEV|)**	***P Values***
KK →KPMT	0.217	0.214	0.086	2.527	0.012

The results show that the t value = 2.527 and p = 0.012 indicate that collaboration skills also have a direct and significant influence on the ability to solve problems as a team.

Table 4.6 Hypothesis Testing Based on Path Coefficient K on KPMT

Variable	***Original Sample* (O)**	***Sample Mean* (M)**	***Standard Deviation* (STDEV)**	***T Statistics* (|O/STDEV|)**	***P Values***
K → KPMT	0.352	0.355	0.099	3.562	0.000

The results show that creativity has a direct and significant influence on team problem solving ability (t = 3.562, p = 0.000).

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Table 4.7 Hypothesis Testing Based on Path Coefficient LD on K

Variable	*Original Sample* (O)	*Sample Mean* (M)	*Standard Deviation* (STDEV)	*T Statistics* (|O/STDEV|)	*P Values*
LD → K	0.347	0.334	0.106	3.265	0.001

The results show that digital literacy has a positive and significant influence on student creativity with a value of t = 3.265 and p = 0.001 (< 0.05).

Table 4.8 Hypothesis Testing Based on Path Coefficient KK on K

Variable	*Original Sample* (O)	*Sample Mean* (M)	*Standard Deviation* (STDEV)	*T Statistics* (|O/STDEV|)	*P Values*
KK → K	0.501	0.509	0.085	5.918	0.000

The results show that collaboration skills (KK) have an effect on creativity (K). The results obtained were t = 5.918 and p = 0.000, which means that collaboration skills have a positive and significant effect on creativity.

Indirect Effect Test

Table 4.9 Indirect Effect and Total Effect Test

Variable	*Original Sample* (O)	*Sample Mean* (M)	*Standard Deviation* (STDEV)	*T Statistics* (|O/STDEV|)	*P Values*
LD → K → KPMT	0.122	0.118	0.050	2.450	0.015

Digital literacy (LD) affects creativity (K) through team problem solving ability (KPMT). The results show a value of p = 0.015 and t = 2.450 > 1.96, so the indirect effect is significant.

Table 4.10 Indirect Effect and Total Effect Test

Variabel	*Original Sample* (O)	*Sample Mean* (M)	*Standard Deviation* (STDEV)	*T Statistics* (|O/STDEV|)	*P Values*
KK → K → KPMT	0.176	0.183	0.065	2.697	0.007

Collaboration skills (KK) have an effect on creativity (K) through team problem solving skills (KPMT). With a value of p = 0.007 and t = 2.697, this indirect relationship is also significant.

DISCUSSION

1. The effect of digital literacy on team problem-solving skills
   Based on the results of processing and testing the research data that has been carried out, it can be concluded that there is an effect between digital literacy and team problem-solving skills. The results of data processing show t count> t table (t = 3.816> 1.96) and p value <0.05 (0.000 <0.05), meaning that Ho is rejected while Ha is accepted. Research by (Kim, 2023) also supports this finding, where his research aims to investigate the level of digital literacy and verify the impact of digital literacy and academic self-efficacy on problem solving in nursing students. The results showed that digital literacy of nursing students (β = .311, p = .001), followed by academic self-efficacy (β = .184, p = .048), had a significant impact on problem-solving skills (F = 12.237, p < .001), which explained 16.1% of the variation.

2. The effect of collaboration skills on team problem-solving abilities
   Referring to the test results and research data processing, the results obtained were t count> t table (t = 2.527> 1.96) and p value <0.05 (p = 0.012 <0.05) meaning Ha is accepted. These results indicate that as students' collaboration skills increase, the team's problem-solving abilities also increase. Research by (Anggelita, 2020) aims to describe the effect of collaboration skills on students' problem-solving abilities. The results of the analysis test concluded that there is a significant influence between collaboration skills and problem-solving abilities.
3. The effect of creativity on team problem-solving ability
   From the results of data processing of creativity variables on team problem-solving ability, the results obtained were t count> t table (t = 3.562> 1.96) and p value 0.05 (p = 0.000 <0.05) indicating Ha is accepted. This positive relationship shows that if students have high creativity, it will encourage the discovery of innovative solutions in team problem-solving abilities. This finding is also reinforced by (Nurlaela, 2024) research which aims to determine the effect of creativity on the problem-solving abilities of mechanical engineering students. The results of the study found a positive and significant relationship between creativity and problem-solving abilities.
4. The effect of digital literacy on creativity
   From the results of data processing on the digital literacy variable on creativity, the results obtained were t count> t table (t = 3.265> 1.96) and p value <0.05 (p = 0.001 <0.05) meaning Ha is accepted. This positive relationship indicates that the higher the digital literacy, the higher the creativity of students. Another study by (Selegi, 2022) aims to determine the creativity of digital literacy of PGSD students. The results of the study show that through creative ideas, students can become digital literacy as well as works in increasing creativity and having a positive impact on society.
5. The effect of collaboration skills on creativity
   From the results of data processing on the collaboration skills variable on creativity, the results obtained were t count> t table (t = 5.918> 1.96) and p value <0.05 (p = 0.000 <0.05), meaning Ha is accepted. This positive relationship means that the more effective teamwork and communication are, the more creative ideas will develop. Another finding in (Nisa, 2023) study aims to assess the impact of a collaborative approach in improving students' creativity and critical thinking skills. Through the ANOVA test, it can be concluded that there is an effect of implementing collaborative learning in improving students' creativity and critical thinking in the independent curriculum.
6. The effect of digital literacy on team problem-solving ability is mediated by creativity
   Referring to the results of data processing of the digital literacy variable research on team problem-solving ability with creativity as an intervening variable, based on the Indirect effect test, a p value of <0.05 was obtained (p = 0.015 <0.05), so it can be concluded that creativity plays a role as a mediating variable in strengthening the relationship between digital literacy and team problem-solving ability. Although there have not been many previous studies that specifically examine creativity as a mediator between digital literacy and team problem-solving ability, this finding is logically and theoretically relevant. Vygotsky's constructivism theory in (Sulikasmi, 2024) states that cultural tools (including digital technology) have an important role in the development of high-level cognitive functions, including creativity and problem solving.
7. The effect of collaboration skills on team problem-solving ability is mediated by creativity

The results of the Indirect effect test data analysis show that the p-value for the indirect effect between collaboration skills on team problem-solving ability through creativity is 0.007, smaller than 0.05. This finding indicates that creativity significantly mediates the effect of collaboration skills on team problem-solving ability. In line with the Social Interdependence Theory by (Johnson, 2008) which states that learning outcomes and group performance are influenced by the way individuals interact and depend on each other in achieving common goals. In a positive collaborative environment, creative thinking processes emerge naturally as a result of supportive team dynamics, so that solutions to problems can be formed through the integration of ideas from each member.

CONCLUSION

Based on theoretical studies, data processing results, analysis and description of research results that have been conducted on students of the Faculty of Economics and Business, Jakarta State University Class of 2021 regarding the influence of digital literacy and collaboration skills on team problem-solving abilities mediated by creativity. All models were tested using the Structural Equation Model (SEM) technique using the Partial Least Square (PLS) 3.0 program and the results are in accordance with previous theories or research. The conclusions from the results of the hypothesis test are as follows: (1) There is a significant influence between digital literacy and team problem solving skills in students (2) There is a significant influence between collaboration skills and team problem solving skills in students (3) There is a significant influence between creativity and team problem solving skills in students (4) There is a significant influence between digital literacy and creativity in students (5) There is a significant influence between collaboration skills and creativity in students (6) There is an indirect influence between digital literacy and team problem solving skills through creativity in students (7) There is an indirect influence between collaboration skills and team problem solving skills through creativity in students.

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