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Creativity, Learning Attitude and Critical Reasoning as Predictors of Students' Soft Skills Evidence from an Indonesian Vocational High School

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Abstract

This study examines whether creativity, learning attitude and critical reasoning predict the soft skills of Grade X students at SMK Negeri 5 Pangkep, Indonesia. Design/methodology/approach: The research used a quantitative ex post facto design. From a population of 120 Grade X students, 60 respondents were selected through purposive random sampling, with each class represented by ten students. Data were collected using a structured questionnaire and analysed with validity testing, reliability testing, classical assumption testing and multiple linear regression using SPSS 26. Findings: The results indicate that creativity, learning attitude and critical reasoning each have a positive and statistically significant relationship with students' soft skills. The simultaneous regression model was significant ($F = 47.761$; $p < 0.001$), with $R = 0.848$ and $R^2 = 0.719$, indicating that 71.9% of the variance in soft skills was explained by the three predictors. Critical reasoning was the strongest predictor ($B = 0.526$; $\beta = 0.630$; $p < 0.001$). Originality/value: The study offers empirical evidence that soft-skill development in vocational education should be designed around cognitive, attitudinal and creative learning processes rather than treated as a separate non-academic outcome.

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Keywords: vocational education; soft skills; creativity; learning attitude; critical reasoning

INTRODUCTION

Vocational education has moved beyond the narrow objective of producing technically competent graduates. In the context of digital transformation, labour-market volatility and increasingly collaborative workplaces, vocational high schools are expected to prepare learners who can communicate clearly, organise work, exercise initiative, collaborate with others and solve problems responsibly. These capabilities are commonly discussed as soft skills and are increasingly positioned as a strategic component of graduate employability. In Indonesian vocational schools, however, soft-skill formation often remains less visible than hard-skill development, even though both forms of competence are required for students to enter industry, entrepreneurship and further education with confidence.

The soft-skill agenda is particularly relevant for SMK Negeri 5 Pangkep, a vocational high school that has attempted to align learning with industry needs and the demands of Industry 4.0. The thesis on which this article is based reports that Grade X students still require systematic support in developing creativity, learning attitude and critical reasoning as part of their broader soft-skill formation. This concern reflects a larger issue in vocational education: curriculum alignment with industry is not sufficient when students' learning dispositions, reasoning habits and creative confidence are not deliberately cultivated through classroom practice, school culture and formative assessment.

Previous studies in the Indonesian vocational-school context have emphasised public speaking, active learning, scientific approaches, online learning and practicum-based experiences as ways of strengthening students' soft and hard skills (Rizki et al., 2019; Setiani & Rasto, 2016; Ulum & Arsana, 2018; Widarto et al., 2012). These studies are valuable, but many interventions still treat soft skills as supplementary competencies rather than outcomes that can be predicted by students' cognitive and affective learning characteristics. The present study therefore focuses on three learner-level predictors: creativity, learning attitude and critical reasoning. These variables are theoretically connected to soft skills because they represent how students generate ideas, respond to learning tasks and evaluate information or problems.

Creativity is important in vocational settings because students frequently face practical tasks requiring new ideas, alternative procedures and adaptive responses. Learning attitude matters because students' willingness to engage with teachers, materials, assignments and peer interactions shapes the intensity and quality of learning. Critical reasoning is equally important

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because vocational students need to interpret information, evaluate evidence, make decisions and interact productively in problem-solving situations. When these three attributes are developed together, soft skills become a measurable educational outcome rather than a vague character label.

This article converts the original master's thesis into an international journal-style manuscript. It refines the argument, clarifies the statistical interpretation and presents the findings in a format comparable with Springer or Emerald empirical articles. The study addresses the following research question: To what extent do creativity, learning attitude and critical reasoning, individually and simultaneously, predict the soft skills of Grade X students at SMK Negeri 5 Pangkep?

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Soft skills in vocational education

Soft skills refer to interpersonal, self-management and problem-solving capacities that enable students to apply technical knowledge effectively in social and occupational contexts. In vocational education, these skills include communication, responsibility, collaboration, leadership, logical thinking and persistence. They are not merely personality traits; they are learnable competencies that emerge through repeated participation in structured learning, peer interaction and authentic tasks. Widarto et al. (2012) argue that vocational education should integrate soft and hard skills because workplace performance depends not only on technical mastery but also on how graduates adapt, communicate and collaborate. Suryanto (2013) also highlights the relevance of soft skills required by industry compared with those explicitly taught in vocational schools.

The development of soft skills becomes more urgent under Industry 4.0, where digital tools, flexible production processes and networked work practices require graduates to learn continuously. Maryati and Apriana (2019) indicate that vocational students need competencies that support readiness for technological change. Therefore, the school's role is not only to transmit procedural knowledge but also to design learning conditions that build students' confidence, reasoning and social participation.

Creativity and students' soft skills

Creativity describes the ability to produce new ideas, develop new concepts, discover alternatives and generate useful outputs. In learning, creativity is reflected in curiosity, flexibility,

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originality and willingness to propose ideas. Munandar (2009) associates creativity with the development of gifted potential, while Wulandari and Madlazim (2019) show that creative thinking can be strengthened through inquiry-oriented and STEM-based learning. In vocational classrooms, creativity supports students in interpreting tasks, designing solutions, improving work processes and expressing ideas in group settings.

Creativity is expected to support soft skills because creative students tend to be more willing to communicate ideas, solve problems and adjust to uncertain situations. Students who can generate alternatives are more likely to demonstrate initiative and resilience during learning. Thus, creativity is not an isolated cognitive skill; it is a foundation for collaborative and adaptive behaviour.

H1. Creativity has a positive and significant relationship with students' soft skills.

Learning attitude and students' soft skills

Learning attitude refers to students' favourable or unfavourable responses toward teachers, learning objectives, materials, tasks and school requirements. It is shaped by cognitive, affective and conative components and can be expressed through interest, consistency, acceptance of learning goals and willingness to participate. Djaali (2020) discusses interest as a tendency to prefer and engage in an activity, whereas Khodijah (2014) explains that positive attitudes can increase the intensity of learning activity. Dachmiati (2015) further links attitudes and learning habits with educational guidance, suggesting that attitudes can be developed rather than assumed to be fixed.

A positive learning attitude should enhance soft skills because students who respond constructively to learning are more likely to practise communication, discipline, responsibility and cooperation. In contrast, students with weak learning attitudes may avoid interaction and show limited persistence. Learning attitude therefore functions as an affective bridge between academic engagement and observable soft-skill behaviour.

H2. Learning attitude has a positive and significant relationship with students' soft skills.

Critical reasoning and students' soft skills

Critical reasoning is the capacity to formulate problems, analyse arguments, ask and answer questions, evaluate sources, make deductions and inductions, identify assumptions and decide on appropriate actions. Florea and Hurjui (2015) emphasise that critical thinking should be cultivated from early schooling because it supports students in processing information and making

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reasoned judgments. In vocational contexts, critical reasoning helps learners connect theory with practice, evaluate the quality of work and communicate decisions based on evidence rather than impulse.

Critical reasoning is also closely related to soft skills because workplace-oriented soft skills require sound judgement. Communication without reasoning can become superficial, and collaboration without evaluation may fail to produce effective solutions. Students who reason critically are better positioned to manage interpersonal tasks, solve problems, lead group discussions and respond to feedback. For these reasons, critical reasoning is expected to be a strong predictor of soft skills.

H3. Critical reasoning has a positive and significant relationship with students' soft skills.

H4. Creativity, learning attitude and critical reasoning simultaneously predict students' soft skills.

METHODOLOGY

Research design, site and sample

The study employed a quantitative ex post facto design. This design was appropriate because the research examined existing variations in creativity, learning attitude, critical reasoning and soft skills without manipulating treatment conditions. Ex post facto research is commonly used when the researcher seeks to identify factors associated with a phenomenon that has already occurred (Widarto, 2013). The research was conducted at SMK Negeri 5 Pangkep, Indonesia.

The population consisted of 120 Grade X students distributed across six classes: Automotive Engineering, Computer and Network Engineering class 1, Computer and Network Engineering class 2, Office Management and Business Services class 1, Office Management and Business Services class 2, and Building Modelling and Information Design. The study selected 60 students through purposive random sampling, with ten students randomly selected from each class. This sampling strategy ensured representation across Grade X classes while maintaining a manageable respondent size for questionnaire-based analysis.

Measures and data collection

Data were collected using a structured Likert-scale questionnaire. The independent variables were creativity (X1), learning attitude (X2) and critical reasoning (X3), while the dependent variable was students' soft skills (Y). Creativity was operationalised through indicators

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related to new ideas, new concepts, discovery of new things and production of something new. Learning attitude captured students' responses toward learning activities, including acceptance, consistency and positive engagement. Critical reasoning represented students' ability to formulate problems, analyse arguments, evaluate information, draw conclusions and interact in decision-making processes. Soft skills were measured through indicators related to communication, organisation, leadership, logic, effort and group skills.

Before hypothesis testing, instrument quality was examined through item validity and reliability testing. The questionnaire items for all variables exceeded the critical r-table value of 0.252, indicating that all retained items were valid. Reliability was assessed using Cronbach's alpha. The alpha values were 0.790 for creativity, 0.792 for learning attitude, 0.917 for critical reasoning and 0.769 for soft skills. These values indicate acceptable to excellent internal consistency, supporting the use of the scales in regression analysis (Ghozali, 2019; Priyatno, 2011).

Data analysis

The data were analysed using SPSS 26. The analytical procedure included descriptive statistics, item validity testing, Cronbach's alpha reliability testing, normality testing, multicollinearity testing and multiple linear regression. The regression model estimated students' soft skills as a function of creativity, learning attitude and critical reasoning. Statistical significance was evaluated at the 0.05 level. The following model guided the analysis:

$$Y = a + b1X1 + b2X2 + b3X3 + e$$

where Y represents students' soft skills, X1 represents creativity, X2 represents learning attitude, X3 represents critical reasoning, a is the constant, b1–b3 are regression coefficients and e is the error term.

Table 1. Measurement constructs and reliability

Construct	Operational focus	Items	Cronbach's alpha	Interpretation
Creativity (X1)	New ideas, new concepts, discovery and production of new outputs	4	0.790	Reliable
Learning attitude (X2)	Positive learning response, consistency and acceptance of learning tasks	5	0.792	Reliable

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Construct	Operational focus	Items	Cronbach's alpha	Interpretation
Critical reasoning (X3)	Problem formulation, argument analysis, evaluation and decision making	7	0.917	Highly reliable
Soft skills (Y)	Communication, organisation, leadership, logic, effort and group skills	7	0.769	Reliable

RESULTS

Descriptive statistics and assumption testing

The descriptive statistics show that the mean scores were 13.367 for creativity, 16.567 for learning attitude, 23.300 for critical reasoning and 22.300 for soft skills. The Kolmogorov-Smirnov normality test produced asymptotic significance values of 0.050 for creativity and 0.200 for learning attitude, critical reasoning and soft skills. These results indicate that the variables met the normality requirement for regression analysis. Multicollinearity was also not a concern because the tolerance values were above 0.10 and the variance inflation factor (VIF) values were below 10 for all predictors.

Table 2. Descriptive statistics and normality test

Variable	N	Mean	Std. deviation	K-S statistic	Asymp. Sig.
Creativity (X1)	60	13.367	3.053	0.114	0.050
Learning attitude (X2)	60	16.567	3.275	0.097	0.200
Critical reasoning (X3)	60	23.300	5.484	0.100	0.200
Soft skills (Y)	60	22.300	4.578	0.095	0.200

Multiple regression analysis

The regression results support all proposed hypotheses. Creativity had a positive and significant coefficient (B = 0.261; t = 2.299; p = 0.025), indicating that students with stronger creative characteristics tended to report higher soft skills. Learning attitude was also positive and significant (B = 0.315; t = 2.705; p = 0.009), showing that constructive attitudes toward learning are associated with better soft-skill outcomes. Critical reasoning produced the largest coefficient and standardized beta (B = 0.526; β = 0.630; t = 7.275; p < 0.001), indicating that it was the

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strongest predictor in the model.

The estimated regression equation is: Soft skills = 1.355 + 0.261(Creativity) + 0.315(Learning attitude) + 0.526(Critical reasoning). The simultaneous model was significant ($F = 47.761$; $p < 0.001$). The model summary produced $R = 0.848$, $R^2 = 0.719$ and adjusted $R^2 = 0.704$. Thus, 71.9% of the variance in students' soft skills was explained by creativity, learning attitude and critical reasoning together. The remaining 28.1% may be explained by other factors such as family support, teacher pedagogy, peer climate, work-based learning exposure, school culture or socio-economic background.

Table 3. Regression coefficients and multicollinearity diagnostics

Predictor	B	Std. error	β	t	p-value	Tolerance	VIF
Constant	1.355	2.018	-	0.671	0.505	-	-
Creativity (X1)	0.261	0.113	0.174	2.299	0.025	0.878	1.139
Learning attitude (X2)	0.315	0.116	0.225	2.705	0.009	0.724	1.381
Critical reasoning (X3)	0.526	0.072	0.630	7.275	<0.001	0.670	1.493

Table 4. Simultaneous model fit

Statistic	Value
F statistic	47.761
Sig. F	<0.001
R	0.848
R Square	0.719
Adjusted R Square	0.704
Std. error of estimate	2.491
Durbin-Watson	1.514

DISCUSSION

The findings show that creativity is a significant positive predictor of vocational students' soft skills. This result is theoretically consistent with the view that creative learning encourages students to generate alternatives, express ideas and respond flexibly to practical problems. In

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vocational classrooms, these behaviours can appear as initiative during project work, willingness to offer solutions and confidence in presenting ideas. The statistical coefficient suggests that, when learning attitude and critical reasoning are held constant, increases in creativity are associated with increases in soft-skill scores. Although the standardized beta for creativity was smaller than those of learning attitude and critical reasoning, its significance confirms that creativity remains a meaningful component of soft-skill development.

Learning attitude also demonstrated a significant positive relationship with soft skills. This finding supports the argument that students' affective orientation toward learning influences how they participate in academic and social activities. A positive attitude toward teachers, tasks and learning goals may increase attendance, attention, task completion and interaction with peers. These behaviours are directly related to the performance of soft skills such as discipline, cooperation and communication. The result is consistent with educational psychology perspectives that regard attitude and interest as drivers of learning intensity (Djaali, 2020; Khodijah, 2014).

Critical reasoning emerged as the dominant predictor. Its unstandardized coefficient was 0.526 and its standardized beta was 0.630, substantially higher than the coefficients for creativity and learning attitude. This result indicates that soft skills in vocational education are not only interpersonal but also cognitive. Students who can formulate problems, evaluate arguments and make decisions are more capable of communicating purposefully, solving conflicts, organising tasks and contributing to group activities. The finding is important because soft skills are sometimes reduced to friendliness or communication style. The present evidence suggests that reasoning quality is central to students' observable soft-skill behaviour.

The simultaneous model explained 71.9% of the variance in soft skills. This is a strong model for educational survey research and indicates that creativity, learning attitude and critical reasoning together provide a meaningful explanatory framework. However, the ex post facto design means that the results should be interpreted as predictive associations rather than experimental proof of causality. The findings indicate where intervention may be useful, but future research should use longitudinal, quasi-experimental or mixed-method designs to test whether deliberate improvement in these three variables directly increases soft-skill outcomes.

From a practical standpoint, the results suggest that soft skills should be embedded in everyday learning rather than treated as an extracurricular add-on. Teachers can strengthen creativity through project-based tasks, brainstorming, design challenges and opportunities for students to generate multiple solutions. Learning attitude can be supported through formative

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feedback, clear task relevance, supportive classroom climate and consistent expectations. Critical reasoning can be developed through problem-based learning, argument analysis, reflective questioning, evidence evaluation and decision-making tasks. These strategies are aligned with the needs of vocational students who must integrate technical competence with workplace-ready behaviour.

CONCLUSION

This study found that creativity, learning attitude and critical reasoning are positive and significant predictors of the soft skills of Grade X students at SMK Negeri 5 Pangkep. The three predictors jointly formed a significant regression model, explaining 71.9% of the variance in students' soft-skill scores. Among the predictors, critical reasoning was the most dominant, followed by learning attitude and creativity. These findings confirm that soft-skill development in vocational education is linked to students' cognitive, affective and creative learning capacities.

The study contributes to vocational-education scholarship by demonstrating that soft skills can be empirically modelled through measurable learner attributes. For schools, the implication is clear: programmes to improve soft skills should integrate reasoning development, positive learning attitudes and creative learning experiences. For teachers, the findings highlight the need to design learning tasks that require students not only to know technical content but also to analyse, communicate, collaborate and generate solutions. For students, the findings suggest that developing soft skills requires active participation in thinking, learning and creative problem-solving processes.

LIMITATIONS AND FUTURE RESEARCH

The study has several limitations. First, it relied on self-reported questionnaire data, which may be influenced by students' perceptions and response tendencies. Second, the sample was limited to Grade X students in one vocational high school, so the results should be generalized cautiously. Third, the ex post facto design does not allow strong causal inference. Future research should include larger multi-school samples, teacher assessments, classroom observations and longitudinal or intervention designs. Further studies may also examine additional predictors, such as teacher support, peer collaboration, family background, school culture, work-based learning experience and digital literacy.

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DECLARATION OF COMPETING INTEREST

The author declares no competing interest related to the publication of this manuscript.

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