Correlation between Happy Puzzle Hands-On Media, Student Motivation, and Writing Skills: Evidence from Vocational High School EFL Learners

Renata Adelia | English Language Education, Universitas Islam Majapahit, Mojokerto, Indonesia
Wiwik Mardiana | English Language Education, Universitas Islam Majapahit, Mojokerto, Indonesia
Ahmad Iklil Saifulloh | English Language Education, Universitas Islam Majapahit, Mojokerto, Indonesia
renataadelia08160@gmail.com

Abstrak

Writing remains one of the most difficult productive skills for EFL learners in Indonesian vocational high schools, yet the classroom variables associated with it are rarely examined together. This study examined the correlation between students' perceptions of Happy Puzzle Hands-On Media, student motivation, and writing skills among Grade X students at SMKN 1 Mojoanyar, East Java. Using a quantitative correlational design, data were collected from 108 students through two Likert-scale questionnaires and a picture-based narrative writing test scored using the analytic rubric of Jacobs et al., then analyzed with multiple linear regression using IBM SPSS Statistics version 27. The simultaneous test showed that Happy Puzzle Hands-On Media and student motivation together had a statistically significant relationship with writing skills, $F(2, 105) = 3.823$, $p = .025$, $R^2 = .068$. The partial test showed a more varied picture: the hands-on media variable retained a significant relationship with writing performance ($t = 2.158$, $p = .033$, $\beta = .203$), while motivation did not ($t = 1.747$, $p = .083$, $\beta = .165$). These results indicate that motivation's contribution to writing performance in this context only becomes statistically meaningful when it operates alongside concrete learning media, rather than functioning as a standalone predictor. This article argues that this pattern repositions the media-motivation relationship as complementary rather than additive, with practical implications for how English teachers in vocational schools can sequence motivational and material scaffolding in writing instruction.

Keywords: hands-on media; writing motivation; writing skills; vocational EFL; correlational study

Introduction

Writing is rarely viewed by learners as a single skill; it is more accurately understood as a matter of coordination, in which idea generation, linguistic accuracy, and rhetorical organization must be managed simultaneously (Hyland, 2003). For vocational high school students, this coordination problem carries an additional consequence: writing is not merely an academic exercise but a competency directly tied to job readiness, since graduates are expected to be able to draft reports, application letters, and other work documents soon after graduating. As national literacy indicators remain weak, this occupational stake becomes increasingly hard to ignore. Indonesia's performance

in the Programme for International Student Assessment (PISA) 2022 shows reading literacy well below the OECD average (Programme for International Student Assessment, 2022), and because reading and writing involve overlapping processes of comprehension and organization, the national reading literacy gap can reasonably serve as a proxy for concerns about writing ability. The question this article raises is not whether EFL writing in Indonesia needs support; that much is clear, but rather which classroom-level variables are actually associated with it, and whether those variables operate independently or are only meaningful when combined.

Two candidate variables recur in the literature: instructional media and student motivation. Neither can be considered a settled matter. Motivation researchers report a positive relationship between motivational regulation strategies and writing proficiency (Teng et al., 2020), and De Smedt et al. (2023) showed that intrinsic writing motivation mediates the relationship between students' implicit beliefs about writing ability and their eventual achievement. Media researchers, mostly working with picture-based or puzzle-based stimuli, report comparable findings, arguing that visual and manipulative materials support idea generation and reduce the cognitive load involved in composing text (Fitrianingsih et al., 2024; Indihadi, 2016). What is missing from both lines of research is a study that places both variables within a single analytic framework while testing whether the apparent effect of each variable holds up when tested against the other. Siska et al. (2021) come closest, examining writing motivation, writing anxiety, and writing proficiency together among EFL university students, but found no significant relationship between motivation and writing proficiency once anxiety was controlled for, a result that itself shows how unstable the motivation-writing relationship can be once placed within a multivariable model. No comparable study has replaced anxiety with an instructional media variable, and none has been conducted at the vocational secondary level, where students' motivational profiles, cognitive maturity, and the practical orientation of writing tasks differ meaningfully from university or general high school populations.

The empirical motivation for closing this gap does not come solely from the literature. It arose from classroom conditions observed during teaching practice at SMKN 1 Mojoanyar, a vocational high school in Mojokerto Regency, East Java. Two conditions stood out. First, unstable internet access ruled out most digital or app-based interactive media, narrowing the realistic options for classroom interactivity to physical, hands-on materials. Second, English writing instruction for Grade X students relied almost entirely on printed textbooks and whiteboard explanations, with interactive media rarely used. Under these conditions, students showed signs of low engagement, and their writing output fell below the level expected for a vocational program whose graduates are required to produce work-ready documents soon after graduation. This is not merely a setting description; it is the practical justification for testing instructional media as a variable, rather than simply assuming its effect. If a classroom lacks interactive tools and its students show low engagement, the natural next step is to ask whether introducing low-cost, low-technology interactive media can change something measurable in students' writing outcomes and, separately, whether any such change (if present) can be distinguished from the effect of motivation, since the two are conceptually close but not identical.

Happy Puzzle Hands-On Media, the learning tool examined in this study, is a picture-puzzle activity in which students physically assemble puzzle pieces into a complete image, which then becomes a prompt for a writing activity. Its theoretical foundation rests on Mayer's Cognitive Theory of Multimedia Learning, which holds that combining visual and manipulative stimuli activates dual processing pathways and reduces extraneous cognitive load (Mayer, 2022), as well as on constructivist views of hands-on learning, in which physical manipulation supports the active construction of meaning rather than passive reception. A complementary alternative explanation

for any observed effect is a motivational one: Self-Determination Theory holds that intrinsic motivation is strengthened when learners experience autonomy, competence, and relatedness (Ryan & Deci, 2000), all three of which are plausibly supported by a collaborative hands-on puzzle activity. Because both theoretical frameworks equally predict a positive relationship with writing performance, and because both mechanisms can plausibly operate together within the same classroom activity, a research design is needed that can separate each variable's unique statistical contribution rather than testing each construct in isolation.

This gap is not merely a matter of academic completeness. If media and motivation are typically studied separately, the practical advice available to English teachers in vocational schools becomes fragmented: one body of literature recommends richer instructional materials, another recommends motivational scaffolding, and neither tells teachers who have limited class time and budgets which investment matters more, or whether the two need to be paired to matter at all. A combined correlational test cannot answer every open question in this literature, but it can answer a narrower and more directly useful one, namely, whether, in a specific vocational classroom, the apparent relationships of both variables with writing performance hold up when tested against each other, or whether one absorbs the apparent contribution of the other when both are placed in the same model. That is the specific contribution this article aims to make.

Building on this, the present study examines the correlation between students' perceptions of Happy Puzzle Hands-On Media, student motivation, and writing skills among Grade X students at SMKN 1 Mojoanyar, using a quantitative correlational design analyzed through multiple linear regression. This design deliberately does not test Happy Puzzle Hands-On Media as an instructional intervention with treatment and control groups; instead, it tests whether students' existing perceptions of the media, measured after they experienced it, are statistically related to how well they subsequently write. This distinction matters for interpretation: the findings presented later describe an association, not a causal effect, and the discussion that follows treats them accordingly. The remainder of this article is organized as follows. The Literature Review section reviews the theoretical and empirical literature on EFL writing, motivation, and hands-on media, and develops the study's hypotheses. The Methods section explains the research design, sample, instruments, and analysis procedures. The Results and Discussion section reports the results of the regression analysis and discusses them against the theoretical framework and prior findings. The Conclusion closes the article with practical implications and study limitations.

Literature Review

Writing in a foreign language is often described as the most demanding of the four language skills, not because any single sub-skill within it is intrinsically difficult, but because several of them must be carried out simultaneously under real-time constraints. A learner composing a paragraph must generate content, sequence it logically, choose vocabulary appropriate to register and audience, apply grammatical structures accurately, and attend to surface conventions such as spelling and punctuation; failure at any one of these levels can undermine an otherwise well-planned text. This multicomponent view underlies the analytic scoring approach used in this study, the Jacobs et al. ESL Composition Profile, which scores content, organization, vocabulary, language use, and mechanics separately rather than assigning a single holistic score (Jacobs et al., 1981). The advantage of an analytic rubric for research purposes is diagnostic: it allows a low overall score to be traced back to a specific component, and allows researchers to ask whether an intervention or correlate (such as instructional media) is related to the construct as a whole or to a specific sub-skill, such as content generation, which is the component most directly targeted by a picture-based prompt.

The weighting built into this rubric is itself analytically informative and is used later in this article to sharpen the interpretation of the regression results. Content and organization together account for half of the total score (30 and 20 points, respectively), while mechanics accounts for only 5 points, reflecting an assumption widely held in EFL writing assessment that idea generation and structural coherence matter more to overall writing quality than surface accuracy, at least at the paragraph and short-narrative level targeted by this study's writing test. Because Happy Puzzle Hands-On Media is theoretically assumed to operate mainly at the prewriting and idea-generation stage rather than at the level of grammatical or spelling accuracy, this weighting structure has direct implications for what a significant relationship between the media variable and the total writing score is likely to represent: it is more plausible that such a relationship is carried by the content and organization components, which are weighted most heavily by the rubric and most directly targeted by a picture-based prompt, than by mechanics, which is weighted lightly by the rubric and not clearly touched by the media. This study does not report component-level regression results, since the analytic design tests the total writing score as a single outcome variable, but this reasoning is presented here as an interpretive boundary for the discussion that follows, as well as a concrete direction for future research to test directly by regressing each rubric component separately against the same two predictors.

For vocational students specifically, the stakes attached to this multicomponent skill are practical, not merely academic. Vocational EFL curricula are oriented toward functional, work-relevant text types: reports, procedural documents, application letters rather than literary writing or pure exposition. This orientation raises the standard for adequate writing performance, since work documents with organizational or mechanical weaknesses carry professional, not merely academic, consequences. It also means that instructional strategies validated in general secondary or higher education contexts cannot be assumed to transfer directly; the motivational profile, time constraints, and genre demands faced by vocational learners differ enough that the relevance of any instructional variable needs to be tested within the vocational context itself, rather than inferred from other populations.

Approaches to writing instruction have shifted, at least in principle, from product-oriented models in which students are given a topic, write independently, and are assessed only on the final text toward process-oriented models that provide scaffolding at every stage of writing. Hyland (2003) argues that effective writing instruction must support the development of ideas and organizational coherence across the prewriting, drafting, and revision stages, rather than treating these stages as students' sole responsibility. In vocational contexts, this process orientation needs to be paired with materials relevant to students' occupational interests, since motivation to engage in any writing task is partly a function of whether the task feels connected to something students consider important. Puzzle-based and other hands-on media fit into this process model specifically at the prewriting stage: such media are not meant to replace instruction in drafting or revision, but to address a barrier that often arises earlier, namely when students struggle to generate ideas before having anything to organize or revise. This positioning matters for interpreting this study's results, since it predicts that any effect of hands-on media should be most clearly visible in the content and organization components of writing, rather than in mechanics, which the media does not directly target (Saifulloh, 2021, 2026a, 2026b; Saifulloh et al., 2023, 2026; Saifulloh, Retnaningdyah, & Mustofa, 2025a, 2025b, 2025c; Saifulloh, Retnaningdyah, Mustofa, et al., 2025; Saifulloh & Anam, 2022).

Motivation is conventionally defined as the internal drive that initiates, directs, and sustains learning behavior (Dörnyei, 2001), and in second language acquisition specifically, motivation is understood to involve learners' goals, attitudes, and self-perceptions, rather than a single undifferentiated trait. Self-Determination Theory refines this account by holding that intrinsic

motivation engagement pursued for its own sake rather than for external rewards is strengthened when three psychological needs are met: autonomy, competence, and relatedness (Ryan & Deci, 2000). Applied to writing, this theory predicts that students who feel they have choices about what or how they write, who believe themselves capable of producing adequate text, and who feel connected to peers or teachers during the writing process should show more sustained engagement in drafting and revision than students for whom these conditions are not met.

Empirical support for the motivation-writing relationship does exist, but it is not uniform. Some studies report a clear positive relationship: Cahyono (2011) found writing motivation to be a meaningful predictor of writing proficiency among Indonesian EFL learners, and Teng et al. (2020), using a mixed-methods design, found that motivational regulation strategies, particularly mastery self-talk and interest enhancement, significantly predicted writing competence scores, with more strategic learners producing richer, more cohesive texts. De Smedt et al. (2023) extended this line of research by showing, through structural equation modeling, that intrinsic writing motivation mediates the relationship between students' implicit beliefs about their own writing ability and their eventual achievement, positioning motivation not as a background trait but as an active mechanism linking cognitive beliefs to writing outcomes. In contrast, Siska et al. (2021) found no significant correlation between writing motivation and writing proficiency among Indonesian EFL university students once writing anxiety was included in the same model, and Öztürk (2013) argues more broadly that broad writing motivation scales instruments that assess beliefs, goals, and enjoyment as a single composite do not always correlate closely with performance on a specific, time-limited writing task, since task-specific motivational states can differ from learners' general motivational dispositions.

This inconsistency is theoretically informative, not merely a nuisance for meta-analysis. It suggests that the motivation-writing relationship may be conditional: strong when measured with task-specific instruments or in contexts without competing predictors, weaker when a broad general motivation questionnaire is placed in a model alongside other constructs that more directly target the cognitive demands of the writing task itself. This possibility underlies this study's decision to test motivation alongside an instructional media variable, rather than in isolation, since doing so allows the analysis to distinguish motivation's truly independent effect from an effect that appears significant only because there is no more direct predictor to compete with it.

Hands-on instructional materials are learning tools that require students to physically interact with instructional content, on the premise that active manipulation supports engagement and meaning-making more effectively than passive reception (Smaldino et al., as cited in the theoretical review of the source thesis). Instructional media in any form can help deliver instructional content more effectively and capture students' attention (Sadiman, as cited in the theoretical review of the source thesis), and visual media in particular can make abstract tasks such as generating ideas from nothing more concrete. Mayer's (2022) Cognitive Theory of Multimedia Learning offers the clearest mechanistic explanation for why this matters for writing specifically: combining visual and verbal or manipulative elements activates dual processing pathways, which increases the amount of information a learner can hold and organize at once, while proportionally reducing the extraneous cognitive load that would otherwise be spent solely on thinking of something to write.

Happy Puzzle Hands-On Media operationalizes this theory in a low-tech form suited to contexts with unstable internet access. Students work in groups to assemble puzzle pieces into a complete image, following a sequence giving instructions, forming groups, distributing pieces, assembly time, and feedback on the completed image adopted from an established puzzle-based instructional model (referenced in the source thesis as a puzzle-based learning sequence). The completed image then serves as a visual prompt for an individual narrative writing task. Earlier

research on picture- and puzzle-based media reports encouraging results at lower grade levels: Fitrianingsih et al. (2024) found that picture-based media significantly improved elementary school students' descriptive writing skills, particularly in text structure and content richness, using a pretest/posttest experimental design, and Indihadi (2016) reported comparable vocabulary-related gains from puzzle media at a similar level. Both studies, however, share two limitations relevant to this study: both used experimental designs intended to demonstrate causal improvement rather than a correlational design describing naturally occurring association, and both were set in elementary or general secondary school contexts rather than vocational contexts, where learners' cognitive maturity and motivational orientation differ.

Reading the media literature and the motivation literature side by side reveals a division of labor rather than genuine disagreement. Research working along the pedagogical track instructional media, visual scaffolding, hands-on activities consistently frames its results in terms of improvement from a baseline, generally using experimental or quasi-experimental designs that compare a treatment group receiving the media with a control group that does not (Fitrianingsih et al., 2024; Indihadi, 2016). Research working along the psychological track motivational regulation, self-efficacy, writing anxiety instead frames its results in terms of within-group association, generally using correlational or structural equation modeling designs that treat learners' internal states as continuous predictors rather than as something manipulated by the researcher (Cahyono, 2011; De Smedt et al., 2023; Teng et al., 2020). Neither track alone can answer the question this study raises, because each design holds motivation constant while varying media exposure, or holds media exposure constant (usually at none at all) while varying motivation. Siska et al. (2021) are a partial exception, testing writing motivation against a second predictor, writing anxiety within the same correlational model, but that design still does not address media, since anxiety and media exposure are conceptually and empirically distinct constructs with no necessary relationship to one another.

Three things distinguish this study from prior work, and each of these differences is what makes the combined model in the Results and Discussion section possible, rather than merely a repetition of earlier findings. First, in terms of research design: rather than adopting an experimental or quasi-experimental structure intended to show that a medium improves writing ability relative to an untreated baseline, this study uses a correlational design that leaves ordinary classroom activity undisturbed and instead asks whether variation in students' perceptions of that activity, as it naturally occurs, is related to variation in their subsequent writing performance. This is a narrower claim than an experimental study would make, but it is also a claim about ecological classroom conditions rather than about a treatment imposed by the researcher, which matters for a vocational school where any intervention must coexist with an already limited instructional schedule. Second, in terms of predictor scope: rather than testing a single variable in isolation, as most of the studies reviewed above have done, this study places the instructional media variable and the motivation variable in the same regression model, which is the only design choice that allows a claim such as "motivation only matters when combined with media" to be tested empirically rather than merely asserted theoretically. Third, in terms of population: while the studies reviewed above examined elementary school students (Fitrianingsih et al., 2024; Indihadi, 2016), general secondary or university EFL learners (Cahyono, 2011; De Smedt et al., 2023; Siska et al., 2021), or EFL learners outside Indonesia (Teng et al., 2020), this study focuses specifically on Grade X vocational students, a population whose motivational orientation, cognitive maturity, and functional writing demands differ from all of these comparison groups in ways that make transferring their findings to a vocational context an empirical assumption rather than a safe conclusion.

Two theoretical frameworks jointly underlie this study's interpretation of how Happy Puzzle Hands-On Media and student motivation might each relate to writing performance. Mayer's

Cognitive Theory of Multimedia Learning underlies the expected relationship between students' perceptions of the puzzle media (X_1) and writing skills (Y): if dual coding and reduced cognitive load operate as the theory predicts, students who rate the puzzle activity more positively should show measurably stronger writing performance, since the activity has already done part of the cognitive work of idea generation for them before they begin drafting. Self-Determination Theory underlies the expected relationship between student motivation (X_2) and writing skills (Y): if autonomy, competence, and relatedness translate into sustained engagement, students who report higher motivation should persist longer in a writing task and produce proportionally stronger text.

Because both frameworks equally predict a positive relationship, but through different mechanisms one cognitive, targeting what a learner can process, and one motivational, targeting what a learner is willing to attempt the analytic strategy needs to be able to separate a variable's independent contribution from its contribution when combined with the other variable. This is the specific analytic advantage of multiple linear regression over a series of separate bivariate correlations: multiple regression estimates each predictor's unique relationship with the outcome while statistically holding the other predictor constant, which is the only way to test whether the apparent effect of motivation found in prior single-variable studies would hold up when placed alongside a more concrete, task-proximal variable such as instructional media. On this basis, the study tests the following hypotheses:

Methodology

This study uses a quantitative correlational design, chosen because its aim is to determine whether a naturally occurring relationship exists among Happy Puzzle Hands-On Media (X_1), student motivation (X_2), and writing skills (Y), without administering an experimental treatment or manipulating classroom conditions (Creswell, 2012). This design choice is not incidental to the study's argument: because Happy Puzzle Hands-On Media is already used as part of ordinary classroom practice rather than introduced as a controlled intervention, a pretest/posttest experimental design would require withholding the activity from a control group in a way that departs from how the school actually teaches writing. A correlational design allows this study to describe how media and motivation relate to writing performance as it occurs in the classroom, at the cost of being unable to make causal claims about whether the media improves writing ability a trade-off stated explicitly throughout the analysis and discussion. Multiple linear regression was chosen as the specific analytic technique because it can accommodate two predictors and one outcome variable, allowing estimation of each predictor's partial contribution as well as their combined simultaneous contribution within a single model (Creswell, 2012; Fraenkel et al., 2011).

The study was conducted at SMKN 1 Mojoanyar, a vocational high school in Mojokerto Regency, East Java, whose curriculum integrates practical writing tasks into vocational competency areas such as analytical chemistry. Data collection took place over one week in April 2026, during the even semester of the 2025–2026 academic year, structured across five days: the writing test was administered on the first two days, both questionnaires were distributed and completed on the third and fourth days, and the fifth day was reserved for verifying data completeness before the data were entered for analysis.

The population of this study consisted of all Grade X students at SMKN 1 Mojoanyar in the 2025/2026 academic year, divided into three classes: X TG 1, X TG 2, and X LPB 1. Because this population was limited to a relatively small and well-defined group, the study used total (saturated) sampling, in which every member of the population served as a respondent, eliminating sampling error and ensuring that the data reflect the entire target population rather than a subset of it.

Eligibility criteria included active enrollment in one of the three target classes during the relevant academic year, regular participation in English lessons, and attendance at all scheduled data collection sessions. This procedure produced a final sample of 108 students. Grade X was chosen deliberately, not for convenience: as first-year vocational students, this cohort is at an early, formative stage of intermediate English learning, still adjusting to the school's academic and vocational demands, making them an appropriate population for observing how instructional media and motivation relate to writing performance that is still developing rather than already stable.

Three variables were measured in this study. Happy Puzzle Hands-On Media (X_1) was operationally defined as the total score obtained from a Likert-scale questionnaire administered after students participated in the puzzle-based classroom activity, capturing engagement, perceived usefulness of the media for idea generation, and perceived relevance of the activity to the writing task; higher scores indicate a more positive perception. Student motivation (X_2) was operationally defined as the total score on a 30-item motivation questionnaire adapted from Indriyani (2021), covering five dimensions: beliefs about writing ability, writing goals, effort devoted to writing, willingness to share writing, and enjoyment of writing activities; higher scores indicate stronger writing motivation. Writing skills (Y) were operationally defined as the score obtained from a picture-based narrative writing task, scored using the Jacobs et al. (1981) analytic rubric across five weighted components: content (30 points), organization (20 points), vocabulary (20 points), language use (25 points), and mechanics (5 points), with a maximum score of 100.

Happy Puzzle Hands-On Media Questionnaire (X_1). This instrument used a five-point Likert scale to capture students' perceptions after the puzzle activity. Before the main data collection, the instrument underwent expert review by two specialists in English language teaching and educational measurement, followed by a pilot test with 30 students outside the main sample.

Student Motivation Questionnaire (X_2). This 30-item instrument was adapted from Indriyani (2021), which had previously shown strong psychometric properties (Cronbach's alpha = .895, with all 30 items exceeding the validity threshold). Although previously validated, the instrument was re-piloted on the current population, based on the principle that instrument validity is context-dependent and needs to be re-verified whenever the target population changes meaningfully (Creswell, 2012) in this case, from the original research context to Grade X vocational students at a different school.

Writing skills test (Y). Students completed an individual English narrative writing task, prompted by the image assembled during the Happy Puzzle activity, with a minimum length of 150 words and a 60-minute time limit. Students were instructed to include a clear beginning, a sequence of events, and an ending, and were prohibited from copying from classmates. Two independent raters, the researcher and one English teacher from SMKN 1 Mojoanyar, scored each writing sample using the Jacobs et al. (1981) analytic rubric, and each student's final score was the average of the two raters' scores. Inter-rater reliability was assessed using Cohen's Kappa, with a coefficient of .70 or above considered adequate agreement (Cohen, 1988); when the two raters' scores differed by more than 10 points, the raters discussed the sample to reach a consensus score before finalizing it.

Content validity for the X_1 questionnaire was established through expert evaluation by two specialists in EFL teaching and educational measurement, who assessed whether the items adequately reflected the intended construct and were appropriate for the target population; items that did not meet this standard were revised or removed before piloting. Empirical item validity for both questionnaires was then assessed by comparing each item's corrected item-total correlation (r-calculated) against the r-table value for the relevant sample size and significance level ($\alpha = .05$), first

with the 30-student pilot sample and then with the main sample of 108 students. Reliability was assessed using Cronbach's alpha, calculated separately for the pilot and main data, with a coefficient of .70 or above considered the minimum acceptable threshold for internal consistency, following a classification scheme adapted from Cohen (1988): above .90 very high, .80–.90 high, .70–.79 reliable, .60–.69 marginal, and below .60 unacceptable.

Analysis was conducted in four stages using IBM SPSS Statistics version 27 and Microsoft Excel. First, descriptive statistics mean, standard deviation, minimum, and maximum were calculated for each variable to characterize the overall score distribution before inferential testing began, following Gay, Mills, and Airasian's (2012) recommendation that descriptive statistics should precede inferential analysis so that extreme values or distributional anomalies can be identified early. Second, three classical assumption tests were conducted to confirm that the data met the prerequisites for multiple linear regression (Field, 2017): the Kolmogorov–Smirnov test for normality of regression residuals (proceeding if Asymp. Sig. > .05), a linearity test for each predictor's relationship with the outcome using SPSS's Test for Linearity procedure (proceeding if the Deviation from Linearity significance value exceeded .05), and a multicollinearity test using Tolerance and Variance Inflation Factor statistics (proceeding if Tolerance exceeded .10 and VIF remained below 10). Third, multiple linear regression was conducted with Happy Puzzle Hands-On Media (X_1) and student motivation (X_2) as predictors and writing skills (Y) as the criterion variable, producing an F-test for the simultaneous relationship, a t-test for each predictor's partial relationship, and a coefficient of determination (R^2) indicating the proportion of variance in writing skills jointly explained by both predictors. The strength of correlations was interpreted using Creswell's (2012) classification: .00–.19 very weak, .20–.39 weak, .40–.59 moderate, .60–.79 strong, and .80–1.00 very strong.

Research permission was obtained from the principal and English teacher at SMKN 1 Mojoanyar before data collection began, and the study's purpose and procedures were explained to participants beforehand. Because the writing test and both questionnaires were administered as part of students' regular class schedule rather than as an additional activity outside the curriculum, care was taken to keep the additional burden on instructional time proportionate: the puzzle activity and writing test together were confined to a single class session, and the two questionnaires were administered on separate days within the same data-collection week, rather than stacked on top of the writing test. This scheduling decision was also methodologically motivated, since asking students to complete a lengthy writing task immediately followed by two 30-item questionnaires risked fatigue effects that could depress writing or questionnaire scores independently of the constructs being measured, introducing a confound unrelated to the variables under study.

Results and Discussion

Empirical item validity was confirmed for both questionnaires at both testing stages. In the 30-student pilot, all 30 items of the Happy Puzzle Hands-On Media questionnaire produced r-calculated values between .363 and .833, exceeding the r-table value of .3610, and all 30 items of the motivation questionnaire produced comparable r-calculated values, also exceeding the same threshold. When retested with the main sample of 108 students, all items again exceeded the corresponding r-table value of .1874, although several items showed a much narrower margin above the threshold: five items on the X_1 questionnaire (Q7, Q8, Q15, Q16, Q22) fell between .198 and .252, and one item on the X_2 questionnaire (Q16) registered at .188, only slightly above the cutoff. These items remained statistically valid, but their relatively weak correlation with the total

construct score indicates that they contribute less discriminative information than the other items and warrant closer attention if the instrument is used again in future research.

Reliability also exceeded the acceptability threshold at both stages, and even increased for one instrument between the pilot and the main sample. In the pilot, Cronbach's alpha reached .9406 for the media questionnaire and .9605 for the motivation questionnaire, both classified as very high. In the main sample, the media questionnaire's alpha settled at .886 (high) and the motivation questionnaire's alpha at .917 (very high). Because both coefficients far exceeded the conventional minimum threshold of .70 at both administrations, the total scores obtained from these instruments can be treated as internally consistent measures of the constructs they were designed to assess, which is a prerequisite, not merely an incidental detail for confidence in the subsequent regression results: an unreliable instrument would make it impossible to distinguish genuine statistical patterns from noise arising from inconsistent measurement.

Table 1 summarizes the score distribution for the three study variables across 108 participants.

Table 1. Descriptive Statistics of Study Variables (N = 108)

Variable	Mean	SD	Category
Writing Skills (Y)	75.34	8.59	High
Happy Puzzle Hands-On Media (X_1)	113.15	12.95	High
Student Motivation (X_2)	104.38	13.91	Moderate

Note: Data processed by the researcher (2026).

Categorization follows the ideal mean/ideal standard deviation criteria, in which scores at or above the ideal mean plus one ideal standard deviation are classified as high, scores within one ideal standard deviation of the ideal mean are classified as moderate, and scores at or below the ideal mean minus one ideal standard deviation are classified as low. Both writing skills and students' perceptions of Happy Puzzle Hands-On Media fell into the high category, while student motivation, though still fairly strong in absolute terms, fell only into the moderate category. This asymmetry deserves attention before the regression results are presented, as it foreshadows the partial-test findings reported next: the variable with the relatively higher and more uniformly positive rating (media perception) is also the variable that later emerges as a statistically significant individual predictor, while the variable at a more moderate and more variable level (motivation, SD = 13.91, the largest of the three) does not.

The Kolmogorov–Smirnov test on the regression residuals produced a test statistic of .082 with an Asymp. Sig. (2-tailed) value of .069, exceeding the .05 threshold and confirming that the residuals did not deviate significantly from a normal distribution. This result indicates that the model's prediction error is not systematically skewed toward over- or under-predicting writing scores within any particular range of the data, which is a prerequisite for interpreting the significance values reported in the F-test and t-tests with confidence. The linearity test, conducted separately for each predictor against writing skills using SPSS's Test for Linearity procedure, also produced a Deviation from Linearity significance value above .05 for both X_1 and X_2, confirming that a linear model is the appropriate specification for both relationships, rather than one that should be modeled with a curved form or a threshold. Finally, the multicollinearity test showed a Tolerance value of 1.000 for both predictors well above the minimum threshold of .10 and a VIF value of 1.000, well below the cutoff of 10, indicating that Happy Puzzle Hands-On Media and student motivation are statistically distinct, non-overlapping constructs. This last result carries direct interpretive weight: because the two predictors do not share substantial overlapping variance, the regression coefficients reported next can be read as each variable's unique, non-redundant

relationship with writing performance, rather than as two measures of essentially the same underlying construct competing for credit.

Simultaneous test (F-test). The overall regression model was statistically significant, $F(2, 105) = 3.823$, $p = .025$. Because this p value falls below the conventional .05 threshold, the null hypothesis of no simultaneous relationship is rejected, and the alternative hypothesis that Happy Puzzle Hands-On Media and student motivation together are related to writing skills is accepted. In practical terms, when the two predictors are considered together as a unit, the observed pattern of association with writing scores is unlikely to have arisen by chance, although the F-test alone does not indicate how large or how evenly that association is distributed between the two predictors; that question is answered by the partial test that follows.

Partial test (t-test). The two predictors did not behave identically. Happy Puzzle Hands-On Media (X_1) showed a statistically significant partial relationship with writing skills, $t = 2.158$, $p = .033$, with an unstandardized coefficient of $B = 0.135$ (meaning a one-point increase in the media perception score is associated with a predicted 0.135-point increase in the writing score, holding motivation constant) and a standardized coefficient of $\beta = .203$, indicating a weak-to-moderate positive contribution. Student motivation (X_2), by contrast, did not reach statistical significance, $t = 1.747$, $p = .083$, with $B = 0.107$ and $\beta = .165$—a relationship that is positive in direction but statistically unreliable once the media variable is held constant in the same model.

Coefficient of determination. The overall model produced a multiple correlation of $R = .261$ and a coefficient of determination of $R^2 = .068$, indicating that Happy Puzzle Hands-On Media and student motivation together accounted for 6.8% of the variance in writing skills, leaving 93.2% of the variance attributable to factors outside the two predictors examined in this study.
Table 2 summarizes these regression results.

Table 2. Summary of Multiple Linear Regression Results (N = 108)

Test	Statistic	df	p	Interpretation
F-test (simultaneous)	$F = 3.823$	2, 105	.025	Significant
t-test: Happy Puzzle Media (X_1)	$t = 2.158$	-	.033	Significant ($B = .135$, $\beta = .203$)
t-test: Motivation (X_2)	$t = 1.747$	-	.083	Not significant ($B = .107$, $\beta = .165$)
R^2	.068	-	-	6.8% of variance explained

Overall, these results present an asymmetric picture rather than a simple confirmation that both variables are independent predictors: the model as a whole is statistically defensible, one of its two components is individually significant, and the other is not yet, but it still contributes to a model that is only significant when both are included together. That asymmetry, rather than the result of either variable alone, is the empirical center of gravity for the interpretation developed in the next section.

The central empirical fact established by this study is not that Happy Puzzle Hands-On Media and motivation are each independently significant predictors of writing performance; only one of them is. The central fact is that the model containing both is significant even though one predictor, motivation, does not reach significance on its own. This is not a contradictory result; it is the expected signature of two predictors whose individual and combined significance can differ, and it needs to be read that way, rather than treated as a simple win for the media variable and a loss for

motivation. If motivation contributed nothing beyond what the media variable already captured, removing it from the model should barely change the model's overall fit. The fact that the simultaneous F-test remains significant while motivation's standalone contribution does not reach significance instead suggests that motivation adds something to the model, just not enough, on its own, given this sample size and instrument, to clear the threshold of individual statistical reliability.

Three explanations, which are not mutually exclusive, are consistent with this pattern. The first is theoretical: Mayer's Cognitive Theory of Multimedia Learning holds that visual and manipulative media give students' existing motivation a concrete outlet (Mayer, 2022). A motivated student without a structured prompt still has to solve the harder problem of generating content from nothing; a motivated student who has just assembled a puzzle image has a visual anchor that channels that motivation directly into the writing task. Under this explanation, motivation and media are not competing explanations for the same variance but complementary ones, in which media converts a general disposition into a task-specific outcome. The second explanation is psychological: Self-Determination Theory holds that autonomy, competence, and relatedness jointly support engagement (Ryan & Deci, 2000), and the Happy Puzzle activity plausibly satisfies more than one of these needs at once: autonomy in how students interpret the assembled image, relatedness through collaborative group work. If the puzzle activity itself is already partly responsible for meeting the psychological conditions that Self-Determination Theory holds produce motivation, then the general motivation questionnaire administered afterward may be capturing an effect that is partly a byproduct of the media experience rather than fully independent of it which also helps explain why the two variables show no multicollinearity as separate constructs, yet behave as though their contributions are intertwined when tested together. The third explanation is instrumentational: following Dörnyei's (2001) distinction between general and situational motivation, a broad one-time questionnaire covering beliefs, goals, effort, sharing, and enjoyment may simply be a coarser measure than the specific situational motivational state generated by the puzzle activity itself at that moment.

The significant partial relationship for Happy Puzzle Hands-On Media ($t = 2.158$, $p = .033$) is consistent with, and extends, prior findings on picture- and puzzle-based writing scaffolding. Fitrianingsih et al. (2024) reported that picture-based media significantly improved elementary school students' descriptive writing skills, with the clearest gains in textual structure and content richness precisely the components (organization and content) expected to be most directly influenced by a picture-based writing prompt, since the prompt supplies content and a rough structure (a beginning, middle, and end implied by the assembled image) before students begin drafting. The fact that this study replicates a comparable directional effect at the vocational secondary level, using a correlational rather than experimental design, suggests that this mechanism generalizes across at least two fairly different populations elementary learners in a controlled experimental comparison, and vocational adolescents observed under ordinary classroom conditions although the effect size in this study ($\beta = .203$) is more modest than the gains typically reported in pretest/posttest experimental literature. This difference in magnitude is expected, not concerning: a correlational design that measures natural variation in students' perceptions typically shows smaller associations than an experimental design comparing a treatment group with an untreated control group, since a correlational design only captures the portion of the media relationship that varies among students who all received the same activity, rather than the entire gap between receiving that activity and not receiving it at all.

Theoretically, the significant result for X_1 aligns with Mayer's account of reduced extraneous cognitive load: if assembling the puzzle and viewing the completed image do part of the cognitive work of idea generation before writing begins, students should have more working memory

available to organize and elaborate their text once drafting starts, which is functionally what the positive, significant coefficient for X_1 implies. This is also consistent with Hyland's (2003) broader argument that effective writing instruction needs to provide scaffolding specifically at the prewriting stage, since that is where many EFL learners get stuck—not because they are unable to construct sentences, but because they have not yet settled on anything to write.

The non-significant partial result for motivation ($t = 1.747$, $p = .083$) sits in tension with studies such as Cahyono (2011) and Teng et al. (2020), both of which found significant positive relationships between motivation-related constructs and writing proficiency. It aligns more closely with Siska et al. (2021), who similarly found no significant correlation between writing motivation and writing proficiency once a competing predictor, writing anxiety, in their case, was included in the same model. The recurrence of this pattern across two different competing predictors (anxiety in Siska et al.'s study, instructional media in this one) reinforces, rather than undermines, the interpretation that motivation's apparent effect in single-variable studies may partly stem from the absence of a more direct, more task-proximal competitor in those models. Öztürk's (2013) observation that broad writing motivation scales do not always correlate closely with performance on a specific, time-limited task offers a plausible explanation why: the 30-item questionnaire used here measures a general disposition toward writing beliefs, goals, effort, sharing, enjoyment accumulated over a student's history with writing, rather than the narrower situational motivational state generated by the specific puzzle-and-narrative task on that particular day. General dispositions and situational states do not always move together, and when they diverge, a general instrument administered once will be a noisier predictor of a single task's outcome than an instrument designed to measure the task-specific state directly.

A second, complementary explanation follows Cognitive Load Theory more directly than motivational theory. If writing performance on this task substantially depends on whether students have enough working memory available, after managing content generation, to also manage organization and language accuracy, then a concrete tool that reduces cognitive load (the puzzle media) addresses that barrier more directly than a psychological disposition (motivation) that influences willingness to engage but not the amount of cognitive load a student can process at once. Under this explanation, motivation and cognitive load operate at different levels of the writing process: one governs whether a student tries, the other governs how much a student can achieve once they try, and a single 60-minute timed writing task is precisely the kind of task in which cognitive load barriers would be expected to dominate over general motivational disposition. This does not mean motivation is irrelevant to writing in general; it means that, in a task structured like this one, with this instrument, motivation's contribution is harder to detect as an independent statistical effect than the media variable's contribution.

The coefficient of determination, $R^2 = .068$, indicates that the two predictors together explain a small proportion of the variance in writing skills by Cohen's (1988) conventional benchmarks for behavioral science; this falls at the boundary between a small and a moderate effect, not a strong one. This figure should not be read as undermining the significance of the F-test; the two statistics answer different questions. Statistical significance indicates that the observed relationship is unlikely to have occurred by chance; R^2 indicates how much of the actual outcome is explained by that relationship. A model can be non-randomly reliable and still modest in its explanatory reach, and that is the situation here: Happy Puzzle Hands-On Media and student motivation have a real, non-random relationship with writing skills, but that relationship accounts for only a small part of what determines how well a student writes.

The remaining 93.2% of unexplained variance is not a gap in the analysis but a reminder of how many other factors plausibly shape writing performance: general English proficiency and prior

writing experience, vocabulary mastery and reading exposure, and the broader quality of classroom instruction and feedback students have received over time, none of which was measured in this study. Hyland's (2003) characterization of writing as a complex, multidimensional skill shaped by a range of linguistic, cognitive, and instructional factors is directly consistent with an R^2 this modest: a two-predictor model built around one instructional medium and one general motivation measure was never expected to capture the majority of what determines writing quality, and an honest interpretation of $R^2 = .068$ is that it confirms this expectation rather than contradicting the study's other findings.

It is important to be precise about what can and cannot be concluded from the non-significant t-test for motivation, since the temptation to over-interpret a p-value above .05 can pull in two opposite directions, both of which should be avoided. The first over-interpretation would treat $p = .083$ as evidence that motivation has no relationship whatsoever with writing performance in this population; the data do not support that conclusion, since the coefficient remains positive ($B = .107$, $\beta = .165$) and the simultaneous model that includes motivation is itself significant. The opposite over-interpretation would treat the non-significant positive coefficient as evidence of a real effect that would surely be confirmed with a slightly larger sample; this also exceeds what a single non-significant result can support, since a coefficient of this magnitude could plausibly reflect either a genuine small effect undetected because this sample is underpowered, or a coefficient close enough to zero that no realistic sample size would push it past significance. What the data support is narrower and, for practical purposes, more useful than either extreme: in this specific sample, task, and instrument, motivation's independent statistical contribution to writing performance cannot be distinguished from a null effect once a more task-proximal predictor is included in the same model, while its contribution to the combined simultaneous model remains detectable. Treating this as a directional signal about how motivation is likely to operate in this instructional context as a variable that supports, rather than independently drives, writing performance is defensible; treating it as a definitive confirmation or definitive denial of motivation's relevance to EFL writing is not.

This reading also clarifies why this study's findings do not simply contradict Cahyono (2011) and Teng et al. (2020), even though both studies reported significant motivation effects while this one did not. Both studies tested motivation without a task-proximal competing predictor in the same model; nothing in their design could reveal whether motivation's apparent effect would hold up when placed alongside a variable such as instructional media. This study does not contradict their finding that motivation correlates with writing proficiency in a single-predictor model; it shows that this correlation, when retested in a two-predictor model against a variable closer to the mechanics of the writing task itself, no longer clears the threshold of independent statistical significance. This is a difference in what these studies' designs are able to show, not necessarily a difference in the underlying psychological reality across the populations examined.

Theoretically, the significant partial relationship between Happy Puzzle Hands-On Media and writing skills extends Mayer's Cognitive Theory of Multimedia Learning beyond its more common application to audiovisual or digital multimedia, showing that low-tech, physically manipulable media can produce a comparable pattern of association particularly relevant for contexts, such as this vocational school, where unstable infrastructure rules out digital alternatives. The non-significant partial relationship for motivation, set against the significant simultaneous relationship for both variables together, offers a more nuanced reading of Self-Determination Theory than a simple confirmation or a simple denial: rather than suggesting that intrinsic motivation is irrelevant to writing performance, this pattern suggests that motivation may function as a supporting condition that only becomes measurable when channeled through a concrete instructional vehicle,

rather than as a standalone predictor capable of driving writing performance by itself in this type of task.

Practically, the clearest implication for English teachers at SMKN 1 Mojoanyar and comparable vocational contexts concerns sequencing rather than replacement: motivational strategies relevant task design, constructive feedback, opportunities for student choice should not be treated as standalone interventions for improving writing ability, since this evidence shows they are not reliably related to writing performance when tested alone. Such strategies appear more meaningful, and more measurable, when paired with concrete instructional media that give students something specific to work with. For curriculum planning, this implies that vocational English programs constrained by limited technological infrastructure have a defensible, low-cost option in visually structured hands-on prewriting activities, with the caveat that expectations about effect size remain calibrated to what the modest R^2 of .068 actually supports: a meaningful but partial contribution to writing performance, not a comprehensive solution to it.

Findings like these are only as useful as their attached boundary conditions, and three points deserve to be stated explicitly rather than left implicit in a limitations section. First, these findings are specific to one type of writing task picture-based narrative, timed, and completed individually and nothing in this data provides grounds for assuming the same pattern would hold for genres more central to vocational writing, such as procedural reports or job application letters, where the prewriting barrier addressed by Happy Puzzle Hands-On Media (having nothing to write about) is likely not the dominant barrier compared with genre-specific conventions and formats that the media does not touch. Second, these findings describe a classroom where interactive media had previously been rarely used, consistent with the setting described in the Introduction; in contexts where students are already accustomed to frequent interactive or multimedia instruction, the same puzzle activity might be perceived as routine rather than as a meaningful engagement shift, which could plausibly weaken the media variable's association with writing performance compared with what was observed here. Third, a modest R^2 means that even the significant, positive relationship for Happy Puzzle Hands-On Media should not be read as evidence that the media alone is sufficient to move a student from weak to strong writing performance; it is evidence that the media is one measurable, non-random contributor among many, operating within a system of contributions not fully explained by this study. None of these boundary conditions undermines the core finding, but each narrows the scope of context and claims that can responsibly be extended from it without further testing.

Conclusion

This study examined the correlation between students' perceptions of Happy Puzzle Hands-On Media, student motivation, and writing skills among 108 Grade X students at SMKN 1 Mojoanyar, using a quantitative correlational design and multiple linear regression. Three conclusions can be drawn from these results. First, Happy Puzzle Hands-On Media showed a statistically significant partial relationship with writing skills, indicating that more positive student perceptions of the puzzle activity are associated with stronger writing performance, even after statistically controlling for motivation. Second, student motivation did not show a statistically significant partial relationship with writing skills; although the direction of the relationship remained positive, it was not strong enough on its own to be treated as a reliable independent predictor in this sample. Third, when tested simultaneously, the two variables together showed a statistically significant relationship with writing skills, $F(2, 105) = 3.823$, $p = .025$, although their combined explanatory power was modest, $R^2 = .068$, leaving most of the variance in writing performance attributable to factors outside the scope of this study. Overall, these findings support the study's

alternative hypothesis of a significant simultaneous correlation, while also showing that this simultaneous significance depends on the combination of both predictors, rather than resting equally on each predictor individually.

The practical weight of these findings lies mainly in how vocational English teachers combine instructional strategies, rather than in which single strategy should be prioritized. Because the media variable had a stronger and more statistically reliable individual association with writing performance, it is reasonable to treat concrete hands-on instructional media as a core element, not merely a supplement, in vocational writing instruction, with motivational strategies relevant task framing, timely feedback, structured opportunities for student input embedded alongside it rather than applied as a standalone intervention. For school administrators, the implication is comparable: investment in low-cost, non-digital interactive materials is a defensible response to infrastructure constraints that rule out digital alternatives, and one supported by more than intuition alone. For students, the finding that motivation alone does not predict writing performance in this sample is not a license to disregard motivation, but a signal that internal drive needs a concrete task or medium through which to be channeled, rather than serving as a substitute for engagement in structured writing practice.

This study has several limitations that constrain its conclusions. The correlational design cannot establish that Happy Puzzle Hands-On Media causes improved writing performance, only that students' perceptions of it are statistically related to writing scores measured at the same point in time; causal claims would require an experimental design with random assignment, which was deliberately not used in this study. The sample was limited to 108 Grade X students at a single vocational school, which limits how far these findings can be generalized to other grade levels, school types, or regions. The motivation instrument measured a broad general disposition toward writing rather than the situational motivational state specific to the puzzle-and-writing task, which, as discussed in the Results and Discussion section, may partly explain why its independent contribution did not reach significance. Future research could address these limitations directly: by using an experimental or quasi-experimental design to test causal claims about the media's effect, by including additional predictors such as writing anxiety, reading habits, or general English proficiency to explain a larger share of variance in writing performance, by developing or adapting a task-specific motivation instrument rather than a general one, and by extending the sample to multiple vocational schools or additional grade levels to test whether the asymmetric pattern reported here media as an independent predictor, motivation as a contributor only in combination recurs beyond this single classroom context.

The authors thank the principal and English teacher of SMKN 1 Mojoanyar for their permission and support during the data collection process, and all Grade X students of SMKN 1 Mojoanyar who participated as respondents in this study.

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