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WOMEN'S LABOUR MIGRATION AND ECONOMIC EMPOWERMENT IN DURG DISTRICT OF CHHATTISGARH

Ila Singh*

SMP Negeri 1 Kendal, Department of Education and Culture of Kendal Regency, Central Java, Indonesia.

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***Corresponding Author:** Ila Singh
SMP Negeri 1 Kendal, Department of Education and Culture of Kendal Regency, Central Java, Indonesia.
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ABSTRACT

SMP Negeri 1 Kendal (State Junior Secondary School 1, Kendal), Indonesia, recorded a decline in higher-order numeracy reasoning (Level 3/L3) on the 2024 Education Report Card. This weakness was mirrored in Grade IX Informatics classes, where Algorithm and Programming instruction remained abstract, teacher-centered, and text-based, leaving most observed students passive and the majority of surveyed students (n = 32) reporting the material as unengaging. This paper reports a single-class best-practice intervention integrating the Scratch block-based programming environment with the school's existing Interactive Digital Panel (PID), operationalizing Unit IV (Adaptive Implementation Strategy) of KAPAS GULA Module 125. Over four weekly sessions in January 2026, 32 Grade IX A students used touch-screen, drag-and-drop manipulation of Scratch blocks to construct number-base conversion programs and function-based modules through a Project-Based Learning approach. Process-level results showed that all students completed a manual number-conversion task, over 85% built an error-free Scratch conversion program, and group presentations reached 'Competent' to 'Proficient' levels; the teacher's own Innovative Practice indicator on the Education Report Card rose from 62.65 to 76.87. Concurrent gains in broader, school-wide Report Card indicators were also documented, but as aggregate wholeschool figures they cannot be causally attributed to this single four-week unit. Remaining challenges included weak performance on abstract topics such as probability and exponents,International Journal Advanced Research Publication www.ijarp.com 2 and low independent-learning habits. Findings support Scratch-PID integration as a low-cost, replicable strategy for engaging students in computational and numeracy reasoning, pending confirmation through a controlled, class-level evaluation design. KEYWORDS: Scratch; interactive digital panel; numeracy literacy; adaptive learning; computational thinking.

INTRODUCTION

Twenty-first-century education demands a shift toward Higher Order Thinking Skills (HOTS). Under

Indonesia's Kurikulum Merdeka, strengthening numeracy literacy and school digitalization are stated national priorities. Numeracy literacy is understood not merely as basic arithmetic but as the capacity to reason logically using mathematical concepts, procedures, and computational tools to solve real-world quantitative problems. At SMP Negeri 1 Kendal, the 2024 Education Report Card showed the Numeracy Ability indicator (A.2) at a 'Good' level (63.95), with 81.82% of students meeting minimum competency. However, sub-indicator analysis revealed a decline in higher-order reasoning: the proportion of students 'above minimum competency' fell 3.49 percentage points (46.67% in 2023 to 43.18% in 2024), the Reasoning Competency/Level 3 (L3) sub-indicator (A.2.7) declined from 62.50 to 62.13, and the Data and Uncertainty domain (A.2.4) declined from 64.99 to 63.05. In Grade IX Informatics lessons on Algorithms and Programming, this manifested as three concrete classroom problems: students struggled to operate numeric variables and arithmetic expressions (computational thinking); students could not translate mathematical logic into conditional and looping structures; and students had difficulty analyzing the causal relationship between changes in input variables and program output. Root-cause analysis, triangulating classroom observation, in-depth interviews, and a preintervention questionnaire (n = 32 Grade IX A students), identified three interrelated causes: (1) conventional, teacher-centered instruction relying on syntax memorization from static text, inconsistent with constructivist accounts (Piaget; Vygotsky) holding that abstract concepts such as computational logic are best constructed through direct, hands-on manipulation of concrete or digital objects; (2) the absence of interactive, manipulable learning media, consistent with Resnick et al.'s (2009) argument that novice programming instruction requires a block-based environment supporting 'tinkering' — trying, detecting errors, and self-correcting; and (3) underused smart-classroom infrastructure, since the school's touch-screen Interactive Digital Panel (PID) had previously functioned only as a International Journal Advanced Research Publication www.ijarp.com 3 static projector, with 0% recorded student touch-screen interaction, despite evidence that interactive whiteboards raise numeracy reasoning only when used as a collaborative medium involving dynamic physical and visual student interaction (Higgins, Beauchamp, & Miller, 2007). To address these causes, the teacher implemented competencies from KAPAS GULA Module 125: Adaptive and AI-Integrated Use of ICT in Learning, specifically Unit IV (Adaptive Implementation Strategy), integrating the Scratch visual programming environment with the PID. This paper aims to: (1) describe the operational implementation of this Scratch-PID strategy in Grade IX Informatics learning; (2) examine how this integration visualizes abstract Algorithm and Programming concepts to strengthen student numeracy reasoning; and (3) evaluate how the strategy optimized use of existing smart-classroom assets to support active student engagement and collaboration.

MATERIALS AND METHODS

This paper reports a single-class, teacher-authored best-practice intervention rather than a controlled experiment; it draws on a participatory-action-research orientation in which the teacher acted as both practitioner and reflective evaluator. Three alternative solutions were considered before the strategy was selected: (1) text-based programming (Python/C++) with structured worksheets, rejected due to high syntax-error cognitive load that would divert attention from numeric reasoning; (2) unplugged computational-thinking activities (logic cards, board games, role-play), rejected because they provide no real-time feedback on complex numeric-variable execution and would not use the school's existing

digital assets; and (3) Scratch block-based coding operated on the PID touch-screen, selected because it eliminates syntax-error risk, converts individual coding at a small monitor into large-scale, touch-based collaborative exploration, and requires no new budget, using only existing school infrastructure and open-source software. The intervention involved 32 Grade IX A students, purposively selected because 2024 Education Report Card diagnostic data identified this class as having the weakest baseline L3 reasoning and theoretical coding comprehension among Grade IX classes. Sessions were held every Wednesday (7, 14, 21, and 28 January 2026) in the school's computer laboratory/smart classroom. Roles were divided among the principal (supervisory approval of the teaching module and ICT-facility oversight), the Informatics teacher (designing differentiated modules, facilitating Scratch coding guidance, preparing worksheets, and conducting formative and summative assessment), students (completing manual conversion tasks and International Journal Advanced Research Publication www.ijarp.com 4 constructing Scratch code individually, in pairs, and in small groups), and ICT support staff (maintaining computer units, network stability, and Scratch software installation). The four-week implementation followed a structured sequence: Week 1 covered binary and octal number-base concepts and manual conversion algorithms; Week 2 introduced basic Scratch visual programming, with students constructing variables and looping algorithms for automatic decimal-to-binary conversion; Week 3 provided scaffolded intervention for students struggling with coding logic and reinforced debugging skills; and Week 4 focused on program modularization linked to quadratic-function concepts, culminating in small-group projects and presentations. Monitoring combined weekly process checks (a daily teaching journal and a student performance-observation sheet) with peer-mentoring observation during the Week 4 group session, and outcome evaluation combining quantitative task-completion rates with qualitative rubric-based assessment of group presentations (Achievement Criteria/KKTP levels: Competent to Proficient). Supporting documentation included the teaching journal, assessment instruments and rubrics, a weekly progress log, code screenshots, and attendance records. Data were analyzed descriptively, comparing pre- and post-intervention observations and task-completion rates; no inferential statistical testing or comparison class was used, and the design does not permit isolating the effect of the Scratch-PID strategy from other concurrent factors.

RESULTS AND DISCUSSION

Results Weekly Implementation Progress Table 1 summarizes the four-week implementation and the physical evidence collected at each stage. Date Topic Output / Physical Evidence Wed, 7 Jan 2026 Binary and octal numbers (manual conversion) Worksheet results: decimal-to-binary/octal conversion Wed, 14 Jan 2026 Scratch programming module (numeric literacy) Scratch project file: decimal-to-binary conversion Wed, 21 Jan 2026 Scratch programming module (debugging) Debugged Scratch project files Wed, 28 Jan 2026 Program modularization (quadratic function) Group presentation slides/documents; quadratic-function module Source: teacher's daily teaching journal and classroom observation sheet, January 2026.