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Evaluating the GASING Method Training on Teachers' Mathematical Competence and Intrinsic Motivation in Papua: A Self-Determination Theory Perspective

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Abstract: This study aims to examine the effectiveness of an intensive GASING method (Gampang, Asyik, dan Menyenangkan: Easy, Fun, and Enjoyable) training program in enhancing mathematical competence and intrinsic motivation among elementary school teachers in Papua, analyzed through the lens of Self-Determination Theory (SDT). A pre-experimental one-group pretest–posttest design, supplemented by qualitative analysis, was employed. Thirty-one teachers in Jayapura completed a 17-day (more than 130 hours) intensive program at Cenderawasih University. The study used a 100-point mathematical competence test (validated by the Surya Institute) and trainers' daily journals as research instruments. Quantitative data were analyzed using descriptive statistics, N-gain scores (Hake, 1999), and Cohen's d effect size, while qualitative data from journals were analyzed thematically within the framework of Self-Determination Theory (SDT) to explore changes in participants' psychological motivation. The results demonstrated a substantial increase in mathematical competence, with a mean gain of 55.58 points (from 38.52 to 94.10; +144.3%), an N-gain score of $g = 0.904$ (high category), and a large effect size (Cohen's $d = 3.41$). All five mathematical components and all four instructional groups consistently achieved high N-gain scores ($g = 0.854$–0.936). The qualitative findings indicate that the program's effectiveness was grounded in the systematic fulfillment of the three core psychological needs of SDT: competence (through structured mastery progression), autonomy (through opportunities for creative agency), and relatedness (through the formation of a collective identity as "Smart Papua"). Gamification elements, music, chants, and structured practice reduced anxiety while fostering sustained intrinsic motivation. These findings contribute to the extension of Self-Determination Theory in collectivist cultural contexts and offer practical implications for transformative teacher professional development in Eastern Indonesia.

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Introduction

Mathematics anxiety is a pervasive global phenomenon that impedes numeracy literacy and academic achievement. A large-scale meta-analysis by Barroso et al. (2021) encompassing over 1.7 million participants across 79 countries found its prevalence ranging from 17% to 68%. Of particular concern, Namkung et al. (2019) demonstrated that mathematics anxiety carries long-term consequences on career trajectories and psychological well-being, while Dowker et al. (2016) established that anxious teachers inadvertently transmit this anxiety to students, perpetuating a damaging cycle. Indonesia's 2022 PISA ranking 73rd among 81 nations in mathematics literacy (OECD, 2023) illustrates the urgency of this issue. Chang and Beilock (2016) further showed that teacher-targeted interventions yield 30 times the impact of student-targeted interventions alone. In Papua specifically, 68% of elementary teachers reported low confidence in mathematics instruction (Papua Education Office, 2024), compounded by geographic isolation, linguistic diversity across 312 tribes, and limited access to sustained professional development (BPS, 2023).

Beyond these structural barriers, Papua's deeply collectivist cultural context introduces a distinct psychological dimension that has been largely overlooked in existing mathematics anxiety research. In collectivist societies, individual failure carries heightened social visibility poor performance in mathematics is not merely a personal shortcoming but a source of communal shame, as it risks diminishing one's standing within the group (Markus & Kitayama, 1991). This dynamic may intensify mathematics anxiety among Papuan teachers, as the fear of public incompetence is amplified by strong group identity and social interdependence (King & McInerney, 2016). Paradoxically, however, this same collectivist orientation suggests that group-based, communally structured interventions where achievement is framed as a shared mission rather than individual competition may be uniquely effective in this context, a hypothesis the GASING program was designed to test.

Existing interventions including expressive writing, cognitive reappraisal, and growth mindset programs (Beilock & Maloney, 2015; Dweck, 2006) have produced modest effect sizes (0.11–0.45) and were predominantly conducted in high-resource Western contexts. Critically, only 11% of 347 studies on mathematics anxiety focused on teachers as primary participants (Maloney & Beilock, 2012), and 76% of Indonesian mathematics teacher training programs lasted fewer than five days with no systematic follow-up (Ministry of Education, 2023). These gaps underscore the need for extended, culturally responsive, psychologically grounded interventions in low-resource settings such as Papua. Ryan and Deci's (2020) Self-Determination Theory (SDT) provides a robust framework: when the three basic psychological needs of autonomy, competence, and relatedness are systematically fulfilled, sustainable intrinsic motivation follows an effect validated across cultures with an average effect size of 0.47 (Howard et al., 2021).

Within this SDT framework, the specific pedagogical elements of the GASING method carry distinct theoretical relevance. Graduated drilling is designed to fulfill the competence need: by calibrating each repetition just above participants' current capability and providing immediate corrective feedback, it operationalizes Ericsson et al.'s (1993) principles of deliberate practice, generating accumulative mastery experiences that Bandura (1997) identified as the most potent source of self-efficacy. Music and communal singing, in turn, serve a dual theoretical function they encode mathematical content (multiplication tables, number bonds) into multi-coded auditory and motor memory traces (Wallace, 1994; Särkämö et al., 2008), while simultaneously fulfilling the autonomy need by offering participants expressive, non-threatening channels for engagement that reduce the evaluative pressure typically associated with formal mathematical performance (Immordino-Yang & Damasio, 2007). The intensive GASING Method program at Cenderawasih University, spanning 17 days (>130 hours) and integrating gamification, music, chants, and graduated drilling, offers a unique opportunity to test these principles in an underrepresented collectivist context.

This study therefore aimed to: (1) evaluate the GASING program's effectiveness in enhancing teachers' mathematical competence using N-Gain and Cohen's *d*; (2) analyze psychological mechanisms of motivation transformation through the lens of SDT; and (3) identify which program elements most powerfully reduced mathematics anxiety and built intrinsic motivation among Papuan teachers.

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Research Method

This study employed a *pre-experimental* one-group pretest-posttest design within a Convergent Parallel Mixed-Methods Design (Creswell & Plano Clark, 2018), in which quantitative and qualitative data were collected simultaneously and integrated at the interpretation stage. A control group was not feasible given the ethical imperative to provide all participating teachers with the intervention, and the contextual constraints of remote Papua. Quantitative data were analyzed using three complementary measures: (1) descriptive statistics (mean, standard deviation, percentage gain); (2) normalized gain score (N-Gain) using Hake's (1999) formula g = (Spost − Spre) / (Smax − Spre), with Smax = 100; categories: High ($g > 0.70$), Medium ($0.30 \leq g \leq 0.70$), Low ($g < 0.30$); (3) Cohen's d effect size. Qualitative data from trainer daily journals were analyzed thematically through the SDT framework (Ryan & Deci, 2020), with analytical focus on how program elements systematically addressed participants' psychological needs for autonomy, competence, and relatedness.

Participants were 40 elementary school teachers from Jayapura, selected through *purposive sampling* based on: active teaching status, no prior GASING exposure, and willingness to complete the full 17-day program. Of these, 31 (77.5%) provided complete pretest-posttest data across four classrooms (7–8 participants each). The research instrument was a 100-point mathematical competence test covering five sub-components addition, subtraction, multiplication, bakal kubagi (pre-division), and division validated by the GASING development team at Surya Institute. The test primarily assessed procedural and computational fluency (mechanical calculation), reflecting the program's core objective of building automaticity; conceptual understanding items were not included in this phase of assessment. Instrument reliability was established prior to administration, yielding a Cronbach's alpha of $\alpha = 0.87$, indicating high internal consistency. The 17-day program (6–8 hours/day; >130 hours total) progressed from single-digit numeration to three-digit division operations, integrating gamified activities (Number Throwing, Finger Suit), musical mnemonics (Partner of 10 Song, Multiplication Song), collective chanting ("Smart Papua!"), and intensive computational drilling to achieve automaticity.

Results and Discussion

Overall Competence Gains, N-Gain, and Effect Size

The program produced a dramatic transformation in mathematical competence. The mean score rose from 38.52 (pretest) to 94.10 (posttest), a gain of 55.58 points (+144.3%) over 17 days. The overall N-Gain of $g = 0.904$ falls firmly in the *High* category (Hake, 1999), while the Cohen's $d = 3.41$ effect size far exceeds the large threshold (≥ 0.80) and dwarfs the average $d = 0.54$ reported for conventional teacher professional development programs (Yoon et al., 2007). The passing rate of 93.5% at the ≥85 mastery threshold demonstrates that the program achieved near-universal learning success not merely elevated mean scores. These figures reported in Table 1 are fully consistent with the narrative above: the mean gain of 55.58 points corresponds directly to the pretest mean of 38.52 and posttest mean of 94.10, and the passing rate of 93.5% reflects 29 out of 31 participants meeting the mastery threshold. Table 1 summarizes these outcomes.

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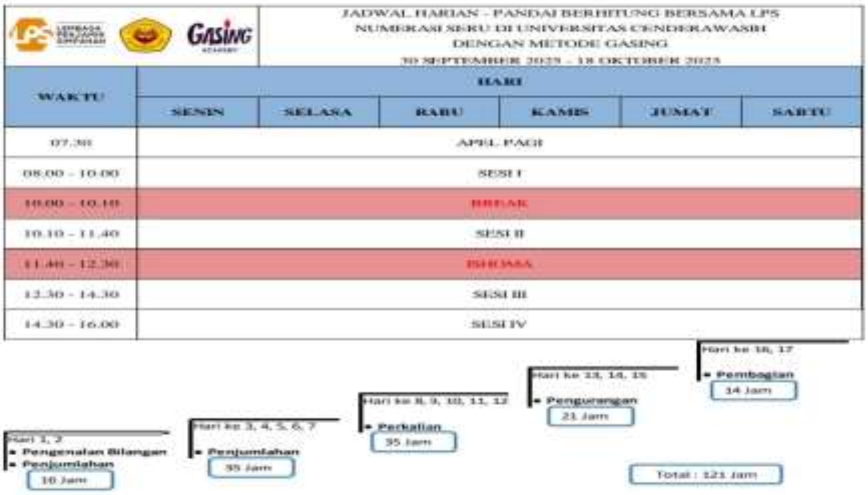

Figure 1. GASING Method Training Activity Schedule

Table 1. Summary of Mathematical Competence Results (N = 31)

Indicator	Pre-test	Post-test	Gain	N-Gain (g)	Category
Mean Score	38.52	94.10	55.58	**0.904**	**High**
Improvement (%)			**+144.3%**		
Effect Size (Cohen's d)			**3.41**		**Large**
Passing Rate (≥85)		**93.5%**			

Note: N-Gain categories from Hake (1999): High ($g > 0.70$), Medium ($0.30 \leq g \leq 0.70$), Low ($g < 0.30$). Effect size from Cohen (1988).

N-Gain Across Mathematical Components

Table 2 disaggregates N-Gain scores across the five mathematical components. All five components yielded *High* N-Gain scores (g = 0.861–0.932), indicating uniform effectiveness across content domains. These values are consistent with the overall N-Gain of $\boldsymbol{g}$ = 0.904 reported in Table 1, as all component-level scores fall within a narrow High-category range, confirming internal coherence across the data. Division showed the largest absolute gain (+75.8 points) despite the lowest baseline (16.5), a finding consistent with Vygotsky's (1978) zone of proximal development scaffolded learning can unlock seemingly inaccessible competencies. The concrete-pictorial-abstract progression embedded in the bakal kubagi concept similarly achieved g = 0.932, confirming that even abstract pre-division concepts become highly learnable under a structured, enjoyable method.

Table 2. N-Gain per Mathematical Component

Component	Pre-test	Post-test	Gain	N-Gain (g)	Category
Addition	61.9	97.4	+35.5	**0.932**	**High**
Subtraction	53.5	95.2	+41.7	**0.897**	**High**
Multiplication	30.0	90.3	+60.3	**0.861**	**High**
Bakal Kubagi	30.6	95.3	+64.7	**0.932**	**High**
Division	16.5	92.3	+75.8	**0.908**	**High**

Note: $g = (S_{post} - S_{pre}) / (S_{max} - S_{pre})$; $S_{max} = 100$ (Hake, 1999). All components: High category.

N-Gain Across Classroom Groups and Score Distribution

Despite substantial variation in initial competence (pretest means: 22.1–56.1), all four classroom groups achieved *High* N-Gain scores (g = 0.854–0.936), as shown in Table 3. Room B, entering with the lowest baseline (22.1), achieved g = 0.924 nearly identical to Room A (g = 0.936, baseline 56.1). This convergence demonstrates the program's robust effectiveness regardless of prior competence, particularly for participants with high mathematics anxiety. Posttest score distributions confirm this equity: 74.2% of all participants scored 90–100, and no participant scored below 70.

Table 3. N-Gain per Classroom Group

Group	n	Pre-test	Post-test	Gain	N-Gain	Category
Room A	8	56.1	97.2	+41.1	**0.936**	**High**
Room B	8	22.1	94.1	+72.0	**0.924**	**High**
Room C	7	31.0	93.1	+62.1	**0.900**	**High**
Room D	8	43.9	91.8	+47.9	**0.854**	**High**
Overall (N=31)	**31**	**38.52**	**94.10**	**+55.58**	**0.904**	**High**

Note: All groups achieved High N-Gain classification (g > 0.70; Hake, 1999).

Psychological Mechanisms: SDT Analysis

Trainer daily journals and participatory observation revealed three interacting mechanisms that explain these outcomes, analyzed through Self-Determination Theory (Ryan & Deci, 2020). Competence fulfillment was engineered through structured gradual progressivity beginning at the most basic level (numerals 1–5) and advancing incrementally through three-digit division. Each step was calibrated to Vygotsky's (1978) zone of proximal development, producing the repeated mastery experiences that Bandura (1997) identified as the most potent source of self-efficacy. Intensive drilling created computational automaticity that freed working memory for higher-order thinking (Ericsson et al., 1993). The posttest served not merely as assessment but as a powerful "competence validation" event participants who entered scoring 22 departed scoring above 90. Autonomy was supported through trainer latitude ("Adapt according to your creativity") and participant choice among activity variants (Number Throwing, Body Movement, Finger Suit). Although the curriculum structure was fixed, this choice within structure exemplifies Jang et al.'s (2010) finding that autonomy support and structure are complementary, not competing forces.

Relatedness was cultivated through collective rituals daily chanting ("GASING IS GREAT... SMART PAPUA!"), group singing of mathematical mnemonics, and peer-based drilling. These practices generated Durkheim's (1912) "collective effervescence" shared emotional experience that binds individuals into a purposeful community. Crucially, participants were reframed from deficit recipients into agents of "Smart Papua" an identity construction shown by Oyserman et al. (2006) to become self-fulfilling.

Gamification and music served dual neurological roles: games activated reward pathways (dopamine release; Schultz, 2015) while attenuating cortisol-mediated anxiety that impairs working memory (Lupien et al., 2007); musical mnemonics engaged auditory, motor, and limbic systems simultaneously, creating music-dependent memory traces for long-term retention (Wallace, 1994; Särkämö et al., 2008). Trainer journals document the emotional trajectory: Day 1 notes of participants "sweating and trembling" during the pretest gave way to Day 17 declarations of "Mathematics is easy and fun I cannot wait to teach this to my students." This constitutes a fundamental mathematical identity transformation from "I am

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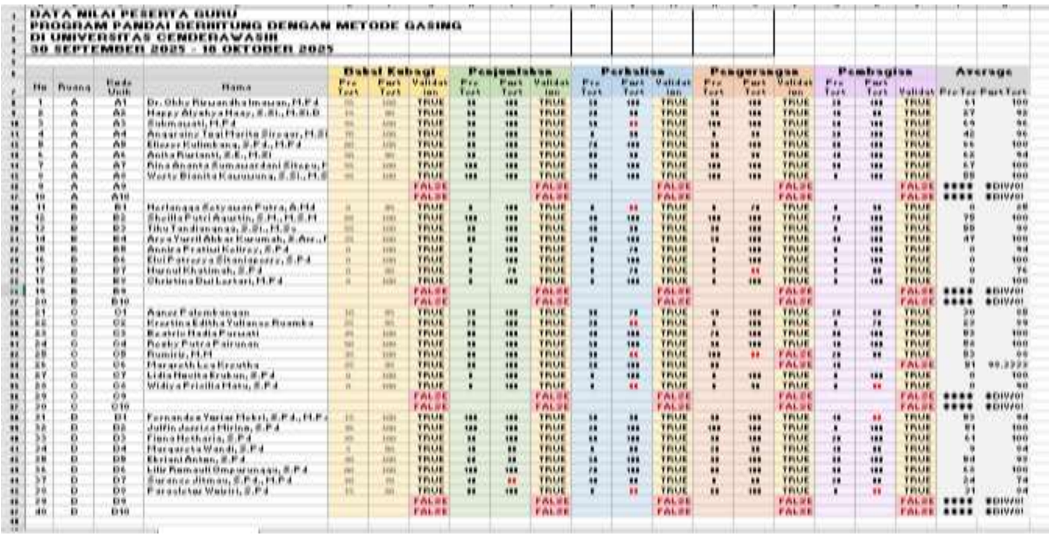
not a math person" to "I can do math" (Grootenboer & Zevenbergen, 2008), with direct implications for the hundreds of students each teacher will influence.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PROGRAM PANDAI BERHITUNG DENGAN METODE GASING
DI UNIVERSITAS CENDERAWASIH
30 SEPTEMBER 2025 - 10 OKTOBER 2025

Figure 2. Teacher Pre- and Post-test Score Comparison

Figure 3. Activity Documentation: Training Sessions at Cenderawasih University

The Role of Deliberate Practice and Computational Fluency

One important dimension of the GASING program is its systematic use of drilling to develop computational fluency through deliberate practice. Although the 130-hour training cannot approach the extensive practice associated with expert performance, the program reflects key principles of deliberate practice by providing structured repetition, calibrated difficulty, and immediate feedback. This process promotes computational automaticity, which Geary (2011) identified as essential for higher-order mathematical reasoning because it reduces working memory demands and allows greater focus on conceptual understanding and problem-solving. Importantly, the GASING method embeds drilling within meaningful and engaging activities such as games, songs, peer competitions, and timed calculations, rather than relying on isolated repetition. Consistent with retrieval practice theory proposed by Roediger and Butler (2011), these varied retrieval contexts strengthen long-term retention and

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accelerate fluency development, as reflected in participants' rapid improvement in multiplication skills observed during the training.

Cultural Responsiveness and Contextual Fit of the GASING Model

The GASING program's effectiveness cannot be fully understood without situating it within Papua's socio-cultural context. Henrich et al. (2010) cautioned that most psychological research including motivation research is grounded in WEIRD populations, raising serious cross-cultural generalizability concerns. Papua represents a profoundly different context: deeply collectivist, with strong tribal identity, oral learning traditions, and community-centered conceptions of achievement. King and McInerney (2016) found that in Asia-Pacific collectivist contexts, relatedness-based motivation is often more powerful than autonomy- or competence-based motivation alone. The program's most culturally adaptive innovation was therefore its construction of a collective achievement narrative reframing participants not as individual learners, but as agents of a "Smart Papua" movement, aligning personal learning gains with communal identity and social purpose.

Gay (2018) argued that culturally responsive pedagogy must actively leverage cultural assets as instructional resources not merely acknowledge cultural difference. The GASING program's communal chanting, group singing, and collective celebration draw directly on Papuan oral-communal learning traditions, where knowledge transmission has historically occurred through song, story, and ritual rather than individual written practice. By encoding mathematical content within musical and chanting forms familiar to participants' cultural heritage, the program reduced the cognitive and emotional foreignness of formal mathematics, creating what Immordino-Yang and Damasio (2007) termed "somatic markers" for positive mathematical engagement a mechanism that may explain why its effect sizes substantially exceed those of conventional mathematics anxiety interventions conducted in Western settings.

Comparison with Prior Research and Theoretical Implications

The magnitude of competence improvement observed in the present study warrants careful comparison with benchmarks established in the teacher professional development literature. Yoon et al. (2007), in a landmark synthesis of 9 rigorously evaluated studies, reported an average effect size of $d = 0.54$ for programs ranging from 5 to 100 hours. Hill et al. (2020) found that even sustained year-long professional development incorporating coaching and collaborative learning communities yielded improvements approximately 2.3 times larger than traditional workshops. Against these benchmarks, the GASING program's Cohen's $d = 3.41$ is extraordinary approximately six times the average reported by Yoon et al. (2007). Equally striking is the N-Gain of $g = 0.904$, which not only exceeds the High threshold ($g > 0.70$) but approaches the theoretical ceiling of $g = 1.00$. Critically, this outcome was achieved in a low-resource, geographically remote setting with teachers who had reported high mathematics anxiety, a demographic typically associated with the lowest intervention responsiveness (Ramirez et al., 2018). These results challenge prevailing assumptions that transformative gains require multi-year interventions or high-resource environments.

From a theoretical perspective, these findings extend Self-Determination Theory (Ryan & Deci, 2020) in two important directions. First, they demonstrate SDT's applicability in a collectivist Papuan context, where relatedness rather than autonomy may serve as the primary driver of motivation. Howard et al.'s (2021) meta-analysis reported an average effect of $r = 0.47$ between need satisfaction and intrinsic motivation; the GASING program's outcomes suggest that simultaneous and intensive fulfillment of all three needs, rather than partial fulfillment across extended timeframes, may produce disproportionately amplified

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effects. Second, the construction of a collective "Smart Papua" identity illustrates how SDT's relatedness need can be leveraged not merely interpersonally, but as a mechanism of cultural identity transformation. Oyserman et al. (2006) demonstrated that identity congruence with academic achievement is a self-fulfilling psychological mechanism; the present findings suggest this principle scales effectively to teacher training in indigenous contexts.

The program's integration of gamification aligns with neuroscientific accounts of reward-based learning. Schultz (2015) established that dopaminergic reward signals strengthen associative learning and memory consolidation; games such as Number Throwing operationalize this mechanism by creating positive affective associations with mathematical symbols previously conditioned to trigger anxiety responses (Ashcraft, 2002). Simultaneously, the anxiety-reducing effect of play contexts through attenuated cortisol release (Lupien et al., 2007) liberates working memory capacity that mathematics anxiety had previously consumed, enabling faster and more durable competence acquisition. Music-based mnemonics (Partner of 10 Song, Multiplication Song) further capitalize on music-dependent memory encoding (Wallace, 1994), engaging auditory, motor, emotional, and hippocampal memory systems simultaneously (Särkämö et al., 2008) to produce multi-coded memory traces resistant to forgetting.

Emotional Trajectory and Mathematical Identity Transformation

A hallmark of the GASING program was its systematic engineering of participants' emotional trajectories across the 17 days. Pekrun and Linnenbrink-Garcia (2014) established that positive activating emotions joy, pride, enthusiasm directly facilitate cognitive engagement and deep processing, while negative deactivating emotions such as anxiety inhibit both. Trainer daily journals provide granular evidence of this trajectory: Day 1 was characterized by observable anxiety markers trembling, excessive sweating, and self-deprecating statements ("I really cannot do this"); by Day 5, journals noted emerging enthusiasm for rapid mental calculation; by Day 12, the classroom atmosphere was described as "highly animated, with participants spontaneously sharing solution strategies and cheering for one another"; and on Day 17, multiple participants declared: "Mathematics is actually easy and enjoyable I cannot wait to introduce this to my students." This progression from anxiety to enthusiasm within 17 days represents a clinically meaningful shift in what Pekrun's (2014) Control-Value Theory terms "academic emotions" and it was not incidental but architecturally designed into the program through the sequencing of quick wins, escalating challenges, and communal celebration.

This emotional transformation is inseparable from the concurrent shift in mathematical identity. Grootenboer and Zevenbergen (2008) conceptualize mathematical identity as a multidimensional construct comprising beliefs about one's mathematical capability, one's relationship to mathematics as a discipline, and one's positioning within a broader social narrative about who "math people" are. Teachers entering the program predominantly held negative mathematical identities consistent with Maloney and Beilock's (2012) characterization of mathematics anxiety as internalized incompetence. The GASING program systematically dismantled this identity through three interlocking mechanisms: (a) Bandura's (1997) mastery experiences, accumulated daily through the graduated curriculum; (b) social persuasion through trainer encouragement framed around effort rather than ability (Mueller & Dweck, 1998), which builds growth mindset rather than reinforcing fixed intelligence beliefs; and (c) collective identity reframing through the "Smart Papua" chant and shared mission narrative. By Day 17, participants no longer identified as "teachers who are bad at mathematics" but as "GASING trainers the vanguard of a numeracy-smart Papua" a transformation with implications far beyond the training room.

This identity shift carries particular significance for Papua's educational ecosystem. Chang and Beilock (2016) quantified the multiplicative impact of teacher-targeted interventions at a 1:30 ratio one teacher's transformation in mathematical anxiety and competence potentially affects 30 or more students annually. Across Papua's highland regions, where 68% of elementary teachers had reported low confidence in mathematics instruction (Papua Education Office, 2024), the scalability implications of the GASING model are substantial. If the 31 program completers each teach an average of 28 students annually, the program's direct downstream reach encompasses approximately 868 students in its first year students who will encounter teachers who not only compute correctly but who model mathematical enthusiasm and growth mindset.

Analysis of Performance Variation and Differential Program Effects

A particularly theoretically rich finding concerns the relationship between initial competence and learning gains. Participants with the lowest pretest scores (below 30) demonstrated mean absolute improvements of 68.3 points, substantially exceeding the 37.1-point mean gain observed among those with the highest baselines (above 60) yet all groups converged to posttest means exceeding 91. This convergence pattern carries two important theoretical implications. First, from a self-efficacy perspective (Bandura, 1997), participants with lower baselines had the most room for dramatic mastery experiences each daily milestone represented a proportionally greater departure from their prior self-concept as mathematical incompetents, generating stronger self-efficacy revision. Second, from an SDT perspective, participants entering with lower competence faced a more acute unmet competence need; the program's fulfillment of this need would therefore produce stronger motivational responsiveness, consistent with need-satisfaction theory's diminishing returns prediction (Ryan & Deci, 2020).

The classroom-level analysis similarly reveals theoretically meaningful variation. Room B, which began with the lowest group mean (22.1), achieved not only the highest absolute gain (+72.0 points) but also the second-highest N-Gain (g = 0.924), demonstrating that the normalized measure captures genuine learning efficiency rather than merely reflecting baseline effects. This finding has direct practical implications: program designers should not screen out or discourage participation from teachers with very low initial competence, as these participants stand to benefit most substantially. The consistency of High N-Gain across all four rooms (g = 0.854–0.936) further confirms high program fidelity Century and Cassata's (2016) criterion for robust, generalizable outcomes. Minor inter-room variation may reflect differences in trainer delivery styles, classroom composition, or group dynamics, offering a productive direction for future microanalytic research on GASING program implementation.

Conclusion

The "Proficient Computing with GASING Method" program at Cenderawasih University has demonstrated that transformation of teachers' mathematical competence and motivation can be achieved within a short time through appropriate approaches. The dramatic improvement of 55.58 points (144.3%) with an effect size of d = 3.41 within 17 days indicates program effectiveness far exceeding general teacher professional development standards. Analysis through the lens of Self-Determination Theory reveals that program success is not merely due to good teaching techniques, but because the program systematically fulfills three basic psychological needs: competence through gradual progressivity and repeated mastery experiences; autonomy through provision of creative space; and relatedness through collective rituals and construction of a "Smart Papua" identity.

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Emotional transformation from mathematics anxiety to mathematics enthusiasm is key to extraordinary cognitive achievement. Key program elements gamification, music, chants, and intensive drilling proved to be measurable psychological interventions. Games reduce cortisol and increase dopamine, creating positive emotional associations. Music strengthens long-term memory. Collective rituals build strong group identity. Drilling creates computational fluency that frees cognitive capacity for higher-order thinking

Recommendation

Based on the findings of this study, the Papua regional government and the Ministry of Education are strongly encouraged to adopt and scale the intensive GASING Method training program as a transformative model for mathematics teacher competency development, particularly across Eastern Indonesia. Training programs should be designed with adequate duration a minimum of 130 hours and must systematically integrate three core psychological components grounded in Self-Determination Theory: fulfillment of competence needs through a structured and gradual progressive approach, autonomy needs through the provision of creative space that empowers participants as active agents, and relatedness needs through collective rituals and the construction of a positive shared identity such as "Smart Papua." Furthermore, future research employing quasi-experimental or randomized controlled trial designs with proper control groups is warranted to strengthen the validity of these findings, while also examining the long-term sustainability of motivational and competency changes following program completion. Finally, similar programs should be contextually adapted to account for Papua's rich cultural and linguistic diversity, ensuring that interventions remain relevant, inclusive, and impactful for teachers in remote and underserved communities.

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