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Phenomenology Of Silent Knowledge: An Analysis Of Students' Academic Self-Concept And Psychological Barriers In Mathematics Learning (A Case Study At Rantepao Christian High School

Tiku Lembang Bato^{1*}, Yusem Ba'ru², Suri Toding Lembang³

^{1, 2, 3} Master of Mathematics Education Program, Indonesian Christian University Toraja Jl.Jenderal Sudirman Number 9 Makale 91811, Tana Toraja

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*Corresponding author: Tiku Lembang Bato

Abstract

Mathematics learning often encounters a paradoxical phenomenon where students possess adequate cognitive understanding yet choose to remain verbally passive in class. This phenomenon, conceptualized in this study as "Silent Knowledge," becomes more complex in private educational institutions where students often perceive themselves as entering a "second-choice school." This article, conducted as a literature review, aims to establish a theoretical framework regarding the relationship between Silent Knowledge, academic self-concept, and psychological barriers within the context of mathematics learning at Rantepao Christian High School. Through literature synthesis and theoretical analysis, this study reveals that student silence is not merely an indicator of cognitive incompetence, but rather a self-defense mechanism stemming from math anxiety, a culturally rooted sense of shame (*siri'*), and a vulnerable academic self-concept. This study provides a conceptual foundation for educators to address the underlying psychological dimensions of student passivity in mathematics classrooms.

Keywords: Silent Knowledge, Academic Self-Concept, Psychological Barriers, Mathematics Learning, Literature Review.

INTRODUCTION

Ideal mathematics education should not only focus on students' ability to solve written problems, but also emphasize their mathematical communication skills (NCTM, 2000; OECD, 2019). However, empirical observations in classrooms, particularly at Rantepao Christian High School, indicate a noticeable gap between cognitive competence and active verbal participation. Teachers frequently observe a phenomenon where students demonstrate

conceptual understanding when directly prompted or during written assessments, yet choose silence when offered opportunities to voluntarily participate or express their mathematical reasoning (Sfard, 2008; Keaten & Kelly, 2000). This pattern indicates the presence of Silent Knowledge—knowledge that is cognitively processed but remains unarticulated (Polanyi, 1966). This situation presents a structural challenge to student-centered learning, which relies heavily on active student engagement facilitated by

instructional design (Freeman et al., 2014). Furthermore, this issue is compounded by a pattern where students demonstrate comprehension under teacher guidance in class but experience a sharp decline in understanding at home due to a lack of independent review and self-regulated learning strategies (Zimmerman, 2002; Lave & Wenger, 1991). The demographic profile of students at Rantepao Christian High School—many of whom enrolled after not securing admission to public schools and come from middle-to-low socioeconomic backgrounds—may contribute to a fragile academic self-concept (Marsh & Martin, 2011; Sirin, 2005). Enrolling in private institutions under such conditions often leads students to perceive themselves as attending a "second-choice school," which further degrades their academic confidence (Pinxten et al., 2014). This article examines this phenomenon through a literature review, synthesizing theories from educational psychology, sociology, and mathematics education to explain the mechanisms behind why capable students choose silence.

METHODS

This study employs a Literature Review methodology. The author collected, evaluated, and synthesized relevant literature, including educational psychology textbooks, peer-reviewed national and international journal articles, and previous research focusing on Silent Knowledge, academic self-concept, math anxiety, and socio-cultural learning factors. The analytical process involved synthesizing theoretical framework—such as Polanyi's Tacit Knowledge Theory, Shavelson's Self-Concept Theory, and Ashcraft's Math Anxiety Theory—with the specific context of secondary education in North Toraja to construct a comprehensive conceptual framework.

RESULTS AND DISCUSSION

Conceptualization of Silent Knowledge in Mathematics

The term *Silent Knowledge* in this study is adapted from Michael Polanyi's (1966) concept of *Tacit Knowledge*, encapsulated by the assertion that "we know more than we can tell." In the mathematics classroom, Silent Knowledge manifests as a cognitive-behavioral dissonance: students process mathematical concepts correctly at a cognitive level, yet exhibit behavioral passivity. Literature indicates that this silence does not reflect an absence of knowledge, but rather a breakdown in knowledge translation—specifically, the difficulty or apprehension involved in converting internal mental representations into external verbal mathematical discourse. Keaten and Kelly (2000) classify this as *Academic Reticence*, where quiet students may engage in deep cognitive processing but are constrained by perceived social risks.

Academic Self-Concept and the "Second-Choice School" Stigma

Academic self-concept is defined by Marsh and Martin (2011) as an individual's self-perception regarding their academic capabilities within specific domains. This construct is largely shaped through social comparison mechanisms (Shavelson et al., 1976). In the context of Rantepao Christian High School students, rather than displaying the typical Big-Fish-Little-Pond Effect (BFLPE), students often experience stigma internalization. Enrolling in a private school after not gaining admission to public alternatives can lead students to start their academic journey with a self-perception of being "second-tier" learners. Literature suggests that

a negative or fragile self-concept strongly correlates with avoidance strategies. Students may view silence as a protective mechanism (self-worth protection) against potential public failure. By remaining silent, their perceived inadequacy remains unproven; conversely, speaking up and making a mistake risks confirming the "less capable" label.

Psychological Barriers and the Toraja Cultural Context

The literature highlights two primary psychological barriers relevant to this context:

1. **Math Anxiety:** Ashcraft (2002) demonstrates that math anxiety impairs working memory capacity. When questioned by a teacher, a student's cognitive resources can be consumed by anxiety management, leading to temporary cognitive paralysis. This helps explain why students may complete written tasks independently in low-pressure settings, yet freeze during real-time classroom interactions (Himmi, 2023; Marweli et al., 2022).
2. **The Culture of *Siri'* (Shame/Honor):** Within the local cultural framework of Toraja and South Sulawesi, the concept of *Siri'* plays a dual role. While it preserves honor and self-respect, it can also inhibit classroom participation. Students may experience *masiri'* (shame or embarrassment) if they appear overly conspicuous among peers (fearing accusations of arrogance), or if they give an incorrect answer publicly. This collectivistic orientation can reinforce a norm of silence within the classroom.

Context-Bound Learning: Understanding in Class, Forgetting at Home

The phenomenon where students understand concepts during instruction but struggle to retain them at home can be analyzed through Situated Learning Theory (Lave & Wenger, 1991). Student learning can become heavily context-bound, where their understanding relies on the immediate presence of the teacher as an instructional scaffold. When returning home, the learning environment changes. Given middle-to-low socioeconomic factors, students may lack dedicated learning spaces or need to prioritize domestic and family responsibilities. Without teacher scaffolding or a sufficiently developed capacity for self-regulated learning, the concepts acquired during class may not be effectively consolidated.

CONCLUSION

Based on the literature synthesis, the phenomenon of *Silent Knowledge* at Rantepao Christian High School represents a multidimensional interaction of cognitive, psychological, and socio-cultural factors. Student passivity in the mathematics classroom is not necessarily an indicator of low cognitive ability, but can be driven by psychological barriers, including a vulnerable academic self-concept, math anxiety, and cultural norms surrounding *siri'*. These findings suggest the value of expanding instructional approaches. Beyond content delivery (*transfer of knowledge*), mathematics instruction can incorporate strategies that address affective factors and support students' academic confidence. Further empirical field studies are recommended to evaluate and build upon this theoretical framework in classroom settings.

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