

Primary School Teacher Candidates' Experiences of Resistance to Learning Mathematics: A Phenomenological Study

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Abstract

Resistance to learning mathematics refers to individuals' active or passive opposition to learning processes and the development of motivational barriers. This phenomenon is particularly common among preservice primary school teachers, who often experienced such resistance during their own schooling and must address it during their professional development to avoid transferring it to their future students. Understanding this experience is critical, as they shape future pedagogical practices and approaches to student resistance. This study aimed to reveal the structural essence of preservice teachers' resistance to learning mathematics developed during their student years and its reflections on their future professional approaches. A phenomenological design was employed to explore the subjective meanings of lived experiences. The study group consisted of 15 fourth-year preservice primary school teachers enrolled in the Primary Education Department of a state university, selected through purposive sampling. Data were collected through semi-structured interviews and analyzed using content analysis following a reflective epoche process. Four core structural themes emerged. The findings indicate that resistance to learning mathematics is not merely a past academic issue but a significant affective legacy influencing future teaching practices.

Keywords: Resistance to learning, pre-service teacher, mathematics education, phenomenology, self-efficacy.

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1. INTRODUCTION

In the mathematics education literature, the affective domain plays a gatekeeping role that is decisive for the success of cognitive processes (Ata Baran, 2018). One of the most complex components of this affective domain resistance to learning is defined as the totality of cognitive, emotional, and behavioral defense mechanisms that individuals develop toward the object of learning, the instructional method, or the learning environment itself (Yüksel, 2004). In the context of pre-service primary school teachers, this resistance intersects critically with Lortie's (1975) concept of the apprenticeship of observation. When entering university, teacher candidates are not blank slates; rather, they carry an affective baggage filled with fears, beliefs of failure, and resistance patterns shaped by their prior experiences with mathematics.

From the perspective of Bandura's (1997) social cognitive theory, the mechanism underlying the formation of resistance can be aptly described as repeated past failures reinforcing the belief that the teacher candidate is incompetent in mathematics, which, when encountering new mathematical concepts, transforms into cognitive closure that is, resistance (Tatlıoğlu, 2021). Moreover, the pedagogical risk arising from this process is that such resistance may be reflected in the teacher candidate's future teaching practice (Toluk Uçar & Demirsoy, 2010).

A review of the literature indicates that mathematics anxiety experienced by teacher candidates leads them to develop negative attitudes toward mathematics and to transmit these attitudes to their students (Skemp, 1976; Bekdemir, 2010; Tatlıoğlu, 2021). This study conceptualizes resistance not merely as dislike or failure, but as an epistemological phenomenon that shapes instructional identity, determines teaching style preferences, and influences pedagogical decision-making.

1.1. Research Problem

How do pre-service primary school teachers' experiences of resistance to learning mathematics shape the teacher identities they construct and the pedagogical decisions they make?

1. Through which didactic and relational contexts within their own life-worlds do pre-service teachers make sense of the sources of their resistance to learning mathematics?
2. How do teacher candidates experience their cognitive and affective processes at moments of resistance?
3. In what ways do past experiences of resistance transform into a counter-reference point against teacher candidates' conceptions of the ideal mathematics teacher?
4. What role do mathematics teaching courses in undergraduate education play in enabling teacher candidates to confront their existing resistances and to reposition their perceptions of pedagogical competence?

1.2. Purpose and Significance of the Study

Mathematics education research has produced a rich account of what students feel, believe, and avoid in relation to mathematics. Far less attention has been paid to what happens

when those same individuals later become teachers and whether the affective residue of their own mathematical histories quietly reshapes the classrooms they build. This study examines that transitional moment: how pre-service primary school teachers reinterpret their mathematical pasts, not as closed chapters, but as active reference points that continue to shape their pedagogical choices.

More specifically, the study seeks to phenomenologically describe the structure of mathematics resistance as it was lived by pre-service primary school teachers during their own schooling, and to trace how that resistance surfaces transformed or intact in the professional identities and pedagogical orientations they are now constructing.

The existing mathematics education literature predominantly addresses the issue from a cross-sectional perspective, focusing either on primary school students' immediate resistance behaviors or on in-service teachers' current levels of mathematics anxiety. However, the critical transitional phase in which individuals move from the role of student to that of teacher during which pre-service teachers may instrumentalize their traumatic or resistance-laden mathematical pasts as pedagogical counterreactions or as unconscious avoidance strategies remains an underexplored problem area.

By focusing on the transitional space between being a resistant learner and becoming a mathematics teacher, the study opens a line of inquiry that has practical as well as theoretical stakes. For teacher education, the implication is direct: if past experiences of failure and resistance can be deliberately engaged rather than silently carried, they may become material for professional growth rather than vectors of transmission.

2. METHODOLOGY

2.1. Research Design

Resistance to learning mathematics, as conceptualized in this study, is an experience with interior structure: it has origins in specific encounters, characteristic emotional signatures, and consequences that extend forward in time into professional identity. To access this structure required a methodology oriented toward lived experience rather than measurable behavior. Phenomenology, as a qualitative research tradition, offers precisely this orientation.

According to Creswell (2009), phenomenology seeks to describe the essence and meaning structure of individuals' shared experiences related to a particular phenomenon or concept. Resistance to learning mathematics constitutes an internal experience that is deeply rooted in individuals' cognitive domains and self-perceptions and is far too complex to be explained solely through observable behaviors.

The primary epistemological rationale for selecting this design is to access the experiential essence of resistance, which cannot be adequately captured through standardized attitude scales, and to reveal how teacher candidates experience this resistance and how they make sense of it within the construction of their professional identities.

2.2. Study Group and Sampling Method

The study group consists of 15 pre-service teachers enrolled in the Primary School Teaching Program of the Faculty of Education at a public university.

2.2.1. Sampling method

In determining the participants, criterion sampling one of the purposive sampling strategies aimed at selecting individuals who experience the phenomenon under investigation most intensely was employed (Patton, 2015).

2.2.2. Sampling criteria

Two primary criteria were applied during the participant selection process:

- **Experience Criterion:** The participant must have experienced pronounced academic failure, high levels of anxiety, avoidance behaviors, or resistance toward mathematics at any stage of their prior educational life (primary school, middle school, or high school).
- **Pedagogical Competence Criterion:** The participant must have taken and successfully completed mathematics teaching courses within the undergraduate program. This criterion was deemed essential to ensure that participants could interrogate their past experiences not only from the perspective of a former student, but also as a pre-service teacher equipped with pedagogical content knowledge and could meaningfully discuss future pedagogical implications.

Since phenomenological research prioritizes depth of understanding over generalization, the sample size was determined based on the principle of data saturation (Guest et al., 2006). It was concluded that with 15 participants, the resistance phenomenon was captured at a sufficiently rich and comprehensive level.

2.3. Data Collection Instruments

A semi-structured interview form developed by the researchers was used as the data collection instrument to examine the origins of pre-service teachers' resistance experiences and their pedagogical reflections.

2.4. Development of the Interview Form

During the development process, interview questions were constructed by the researchers based on a comprehensive review of the relevant literature. The form included questions focusing on the initial emergence of resistance, cognitive blockages experienced during moments of resistance, and the impact of these experiences on participants' conceptions of the ideal mathematics teacher.

2.5. Expert Review and Pilot Study

The draft interview form was reviewed by three faculty members with expertise in mathematics education and educational psychology. Based on their feedback, the probes and question formulations were revised to ensure alignment with mathematical terminology and

clarity. Subsequently, pilot interviews were conducted with two pre-service teachers who were not included in the study group but demonstrated similar resistance characteristics, in order to test the functionality and coherence of the questions. Following these revisions, the interview form was finalized with five main questions. To support each main question and to elicit in-depth data, additional probing questions were also prepared.

2.6. Data Collection Process

The interviews were conducted face-to-face in environments where participants felt psychologically safe. Each interview lasted approximately 15–20 minutes and was audio-recorded with the participants' consent. In accordance with ethical principles, participants' identities were kept confidential and coded (e.g., S1, S2), and participants were assured that the data would be used solely for academic purposes.

2.7. Data Analysis

Following transcription of the audio recordings, the data were analyzed using content analysis, supported by a reflective epoché process (Creswell & Poth, 2018).

2.7.1. Reflective epoché process

At this stage, which is critical for the validity of the study, the researchers temporarily bracketed their own academic presuppositions, expectations, and expert knowledge regarding teacher candidates' mathematical misconceptions or pedagogical deficiencies. This process enabled the researchers to approach the data not as subject-matter experts, but as neutral observers seeking to understand the essence of the phenomenon, thereby allowing participants' subjective realities to emerge as they were experienced.

2.7.2. Stages of content analysis

- **Holistic Reading:** Transcripts were read repeatedly to gain a comprehensive understanding of the resistance experience as a whole.
- **Identification of Significant Statements:** Meaningful statements directly related to resistance to learning mathematics, anxiety, teacher-induced traumatic experiences, and pedagogical preferences were identified within the text.
- **Theme Construction:** Formulated meanings were derived from the significant statements, and these meanings were clustered based on similarities to construct structural themes.
- **Description of the Lived Essence:** The themes were synthesized and described in a manner that represents the shared structure of pre-service primary school teachers' experiences of resistance to learning mathematics.

2.8. Validity and Reliability

2.8.1. Internal validity

To verify whether the themes derived from the analysis accurately reflected participants' experiences, member checking was conducted.

2.8.2. Reliability

To ensure the reliability of the data analysis, 20% of the transcripts selected at random were independently coded by an educational researcher with expertise in qualitative research. The level of agreement between the researchers and the independent coder was calculated using Miles and Huberman's (1994) formula: $\text{Agreement} / (\text{Agreement} + \text{Disagreement}) \times 100$. The inter-coder reliability coefficient was calculated as 0.86, indicating an acceptable level of reliability.

3. FINDINGS

In this section, the findings obtained through phenomenological analysis (Colaizzi, 1978) are presented within the framework of four core phenomenological focal categories that reveal the structural essence of teacher candidates' resistance experiences and their reflections on professional identity:

1. The Construction of Resistance
2. Lived Essence
3. Professional Transformation
4. Pedagogical Tension

3.1. The Construction of Resistance

Pre-service teachers did not identify mathematical content as the source of their resistance. What they described instead was a series of didactic and relational violations encounters with teachers, classrooms, and assessment practices that made mathematics a site of humiliation, confusion, or meaningless compulsion. Analysis of their accounts yielded three core phenomenological themes constituting the building blocks of resistance: didactic violence, loss of meaning, and fear of making mistakes and being labeled. When Table 1 is examined, the distribution of participants across these three themes becomes apparent; Table 2 presents representative direct quotes from participants for each theme.

Table 1. *Distribution of participants by theme*

Theme	Participant
Didactic Violence	(S2, S5, S6, S8, S10)
Nonsense	(S3, S7, S9, S11, S14, S15)
Fear of Making Mistakes and Being Labeled	(S1, S4, S12, S13)

Table 2. *Direct quotes from the participants*

Theme	Participant Quote
Didactic Violence	"My elementary school teacher made me stand on one leg in front of the class because I couldn't memorize the multiplication table. The shame I felt at that moment planted the seed of my hatred for numbers. For me, mathematics was not numbers, it was the teacher's stern gaze. From that day on, I shut my mind off to the lesson." (S5)
Nonsense	"We were constantly given formulas, but the reason behind them was never explained. Being told to memorize them without questioning created an epistemological barrier in my mind. Resisting something whose logic I did not understand became a defense mechanism for my mind."(S11)
Fear of Making Mistakes and Being Labeled	"In class, those who did mathematics were considered smart, and those who couldn't were labeled lazy. When I gave a wrong answer, I chose never to raise my hand that is, passive resistance to avoid being tagged as 'not smart enough.' Being invisible felt safer than making mistakes."(S13)

What these accounts make clear is that the didactic contract was never honored: mathematics was not offered as something to understand, but as something to submit to. The affective barrier that developed was therefore not a response to mathematical difficulty per se, but to the authoritarian structure through which the subject was delivered.

3.2. Lived Essence

Resistance, as pre-service teachers described it, is not chosen. It arrives unbidden: a sudden cognitive shutdown, a wash of dread before a formula, the peculiar paralysis of knowing what one is supposed to do and finding it impossible to begin. Three core structural themes capture this involuntary dimension of the resistance experience: cognitive blockage, learned helplessness and the collapse of self-efficacy, and avoidance strategies.

Three core structural themes were identified as constituting this freezing experience: cognitive blockage, learned helplessness and the collapse of self-efficacy, and avoidance strategies. When Table 3 is examined, the distribution of participants across these structural themes becomes apparent; Table 4 presents representative direct quotes from participants for each theme.

Table 3. *Distribution of participants by theme*

Theme	Participant
Cognitive Lock	(S2, S4, S6, S9, S10)
Learned Helplessness	(S1, S7, S8, S11, S12, S15)
Avoidance Strategies	(S3, S5, S14, S13)

Table 4. *Direct quotes from the participants*

Theme	Participant's Direct Quote
Cognitive Lock	"When I encounter a math problem, it's as if a switch flips in my brain. I can read and write, but at that moment, the symbols look like meaningless shapes to me. This is a state of cognitive paralysis. I can't perform the operations because fear disables my thinking brain." (S10)
Learned Helplessness	"No matter how much I studied, when the exam paper was placed in front of me, my belief that I would fail was so strong that it overwhelmed everything else. This was a collapse of self-efficacy. Putting the pen down, thinking that the outcome would not change anyway, became the only way for me to relieve the pain." (S7)
Avoidance Strategies	"During the lesson, I would hide under my desk to avoid making eye contact with the teacher, or I would constantly ask for permission to go to the restroom. I was physically present, but mentally I had already escaped from the class." (S14)

Taken together, these accounts suggest that resistance operates as a kind of affective circuit-breaker. Before working memory is even engaged with the mathematical content, an anxiety response triggered by prior associative experience consumes available cognitive resources. The learner is not unwilling; she is cognitively unavailable occupied by the management of fear rather than the processing of mathematics.

3.3. Professional Transformation

A striking feature of the data is the degree to which negative experience is reconstructed as professional resource. Rather than simply registering what was done to them, many participants described a deliberate inversion: they intend to teach, as a matter of explicit commitment, in ways that contrast with what they endured. Three core transformational themes capture this reorientation: compensatory pedagogy, gamification and concretization, and an affective remediation orientation.

Three core transformational themes reflecting this affective alchemy process were identified: compensatory pedagogy, gamification and concretization, and an affective remediation orientation. When Table 5 is examined, the distribution of participants across these transformational themes becomes apparent; Table 6 presents representative direct quotes from participants for each theme.

Table 5. *Distribution of participants by theme*

Theme	Participant
Compensatory Pedagogy	(S3, S5, S7, S9, S10)
Gamification and Concretization	(S1, S2, S6, S12, S13, S14)
Affective Repair Focus	(S4, S8, S11, S15)

Table 6. *Direct quotes from the participants*

Theme	Participant's Direct Quote
Compensatory Pedagogy	"I learned fractions while crying; I want my students to learn them while laughing. My teaching will, in a sense, be a way of taking revenge on my own past. I will never humiliate my students at the blackboard. Like a wounded healer, I understand their fears better than anyone." (S3)
Gamification and Concretization	"When I learned to use materials in the mathematics teaching course, I found myself thinking, 'I wish this had been taught to me this way as well.' In my classroom, manipulatives and games will always come before abstract symbols. The way to break resistance is to embed mathematics within play." (S1)
Affective Repair Focus	"When a student says, 'I can't do it,' instead of getting angry, I will first connect with them. Improving their mathematical self-concept will be my priority before academic achievement." (S15)

What candidates are constructing, then, is not simply a pedagogical method but a counter-identity: a professional self defined in explicit opposition to the teachers they most remember. Whether this counter-identity proves robust enough to survive the demands of actual classroom practice is the question the final theme addresses.

3.4. Pedagogical Tension

Undergraduate mathematics education courses had opened something in many participants a new awareness of what teaching could look like, a set of methods they found compelling, a vocabulary for talking about mathematics as conceptual rather than procedural. But awareness is not resolution. Several participants described a version of the same discomfort: knowing how they should teach, doubting whether they actually could.

Four themes emerged from this tension: hidden avoidance risk, instrumental teaching as refuge, inadequacy anxiety, and concern about transmitting that anxiety to future students. When Table 7 is assessed, the distribution of participants across these four themes becomes apparent; Table 8 presents representative direct quotes from participants for each theme.

Table 7. *Distribution of participants by theme*

Theme	Participant
Hidden Avoidance Risk	(S1, S3, S5, S6, S9, S10, S12, S15)
Instrumental Teaching Shelter	(S2, S4, S13, S14)
Inadequacy Anxiety	(S7, S8, S11)

Table 8. *Direct quotes from the participants*

Theme	Participant's Direct Quote
Hidden Avoidance Risk	"I learned the methods in mathematics teaching courses, but the fear of making mistakes inside me hasn't completely gone away. To be honest, I might skim through the topics I struggle with (like pool problems) a bit more quickly. I am afraid I won't be able to answer if students ask deep questions." (S14)
Instrumental Teaching Shelter	"I will use games, but if I struggle to explain the logic behind them, there is a risk that I might end up saying, 'This is the rule, just do it this way.' My own shaky foundation may prevent me from teaching constructively. As a safe haven, I might still resort to the traditional method." (S2)
Inadequacy Anxiety	"I think I will hesitate to talk about mathematics in the teachers' lounge in front of other teachers. The worry of 'What if they realize I don't know math?' undermines my professional self-confidence." (S8)

This theme carries the sharpest implications. The gap between pedagogical intention and instructional capacity is not merely an inconvenience: under conditions of classroom pressure, it is precisely this gap that tends to close in the wrong direction. Candidates who reach the limit of their content knowledge mid-lesson face a familiar decision point and the path of least resistance leads back toward the very instrumental teaching they had resolved to abandon.

4. DISCUSSION

What emerges from the narratives of these fifteen pre-service teachers is not a story of academic underperformance. It is something considerably more entrenched: a set of epistemological injuries inflicted during formative years that have quietly reorganized how these individuals relate to mathematics, to their own competence, and to the kind of teacher they wish or fear to become. Resistance to learning mathematics, as documented here, is neither passive nor incidental; it is a structured psychological response with identifiable origins, a characteristic phenomenology, and traceable consequences for professional identity formation.

These findings extend the existing affective domain literature in mathematics education while simultaneously pressing it toward a harder theoretical problem: how does accumulated resistance translate into instructional practice, and under what conditions does the transformation remain incomplete?

4.1. The Construction of Resistance

Participants located the origins of their resistance not in mathematics itself but in the relational and pedagogical conditions under which they encountered it. Teachers who humiliated, procedures stripped of meaning, classrooms organized around shame rather than inquiry these were the recurring coordinates of participants' formative experiences. This resonates directly with Skemp's (1976) foundational distinction between relational and instrumental understanding: the kind of teaching recalled by participants systematically foreclosed the possibility of the former. More precisely, it corresponds to what Brousseau (1997) theorized as a breakdown of the didactic contract the implicit agreement between teacher and learner about what counts as legitimate mathematical activity. When that contract is violated through coercion, ridicule, or the demand for meaningless memorization, learners do not simply disengage; they develop structured defenses against the entire domain.

The consequence of such experiences is not merely a dislike of mathematics but what might be described as a categorical encoding failure: mathematics becomes associated not with

reasoning or discovery but with fear, surveillance, and the threat of public humiliation. Resistance, in this sense, functions as a rational adaptation a protective foreclosure against a cognitively meaningless and affectively threatening demand. Crucially, this has implications that extend beyond the affective: Ball, Thames, and Phelps (2008) have argued that robust mathematical content knowledge is a prerequisite for conceptually rich teaching. When that knowledge base is never formed because the conditions that would allow its formation were themselves traumatic the consequences reach forward into professional practice.

4.2. Professional Transformation

Perhaps the most theoretically generative dimension of the data is what participants did with their traumatic mathematical histories rather than merely what those histories did to them. Across multiple accounts, a recognizable pattern emerged: the past was not merely remembered but actively reinterpreted as a source of counter-pedagogy. “My students should not experience what I experienced” this formulation, in various guises, recurred throughout the interviews. Frank (1995), in his analysis of illness narratives, identified the figure of the wounded storyteller: the person who transforms suffering into testimony and testimony into a form of moral commitment to others’ protection. The pre-service teachers in this study are engaged in something structurally similar. Their pedagogical intentions are not simply theory-driven; they are wound-driven. This is not a weakness of their professional reasoning it is a distinctive source of motivational depth that teacher education programs rarely acknowledge or cultivate. Beauchamp and Thomas (2009), in their review of teacher identity research, argue that emotional experience constitutes a core rather than peripheral dimension of how teachers understand who they are and what they are for. The participants’ narratives bear this out: the choice of concrete materials over abstract symbols, of empathy over efficiency, of affective safety over curriculum coverage each reflects an identity position constructed in deliberate opposition to a remembered pedagogical wound.

What candidates are in effect describing is a reordering of Shulman’s (1987) pedagogical content knowledge one that places students’ affective readiness, rather than content coverage, at the center of instructional decision-making. This reordering is not theoretically arbitrary. In contexts where prior learning was organized around compulsion and shame, an affective-first orientation may represent a pedagogically legitimate and empirically grounded response to the actual conditions of mathematical learning. The question is whether it will hold under the pressures of real classroom life.

4.3. Pedagogical Tension

The most consequential finding of this study is not what candidates intend to do but what they fear they might actually do. Several participants, when pressed, described scenarios in which their well-intentioned constructivist commitments could quietly dissolve: moving too quickly through difficult topics, reverting to rule-giving when student questions exceed their content knowledge, or avoiding the kinds of open-ended mathematical discussion that require precisely the conceptual fluency they lack. This gap between espoused theory and theory-in-use is not new to the educational literature. Thompson (1992), in a landmark review of teachers’ beliefs and their relationship to practice, documented that what teachers say they believe and what they enact under pressure are frequently quite different and that content-related anxiety is among the most reliable predictors of this divergence. The tendencies observed in the present data extend and deepen this finding by tracing the anxiety back to its biographical origins: it is not random but specifically rooted in the kinds of experiences described in the first theme. These patterns are precisely what Beilock et al. (2010) identified as preconditions for anxiety contagion: teachers who are themselves anxious about mathematics transmit that anxiety to

their students through subtle instructional signals, even when they are consciously attempting to do otherwise.

The risk, then, is generational. A teacher who cannot explain why a procedure works who retreats to “just follow the rule” under conditions of cognitive demand does not merely fail one student. She reproduces, in her own classroom, the didactic conditions that produced her own resistance. This is the vicious cycle that deserves serious attention: not as a moral failure on the part of individual teachers, but as a systemic consequence of teacher education programs that address methodology without addressing the autobiographical dimension of candidates’ relationship to their subject. A candidate who has never been helped to examine, process, and partially resolve her own mathematical history carries that history into her first classroom, however sophisticated her theoretical preparation.

5. CONCLUSION AND IMPLICATIONS

Teacher education programs in primary mathematics have, for the most part, been designed around the assumption that candidates arrive as pedagogically neutral vessels: the task is to fill them with methods, content, and curriculum knowledge. What this study makes apparent is how consequential that assumption is. Candidates do not arrive neutral. They arrive already shaped by years of affective experience with mathematics, by teacher behaviors that either invited or foreclosed understanding, by the particular shame or triumph of a specific classroom moment they still carry with them decades later. Mathematics teaching courses that ignore this biographical substrate risk training candidates in constructivist techniques they will be emotionally unable to sustain. The curriculum changes needed are therefore not merely technical: they require space for mathematical autobiography, for structured reflection on past experiences of failure or resistance, and for the kind of carefully facilitated processing that can interrupt the intergenerational transmission of mathematical anxiety.

Resistance to mathematics, as encountered in these fifteen biographies, is not an individual pathology. It is a historically produced and institutionally transmitted condition that reaches from one generation of learners into the next through the very people entrusted to interrupt it. Making that interruption possible requires that teacher education treat the emotional and biographical histories of its candidates as legitimate professional material not as obstacles to efficient training, but as the ground from which meaningful teaching eventually grows.

Given the discrepancy between pedagogical beliefs and instructional practices, this study is based on teacher candidates’ self-reported accounts. However, the literature suggests that inconsistencies may exist between the pedagogies teachers espouse and those they enact in practice. In this respect, longitudinal studies are needed to examine how teacher candidates’ resistance manifests as actual classroom behavior within the chaotic dynamics of real instructional settings.

Furthermore, since this study focuses exclusively on pre-service teachers, future research may extend the investigation to in-service primary school teachers in order to better understand how resistance to mathematics evolves after the completion of undergraduate teacher education.

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