WHAT MAKES A CONTRIBUTION THEORETICAL AND WHAT MAKES IT VALUABLE IN MATHEMATICS EDUCATION RESEARCH? AN AXIOLOGICAL EXPLORATION

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Abstract

Fundamental questions about what constitutes valuable theoretical work remain underexplored in mathematics education research. In this paper, I propose an axiological approach to understanding how theoretical contributions gain recognition and influence within our scholarly community. Drawing from critical philosophical investigations of value and systematic analysis of theoretical developments in the field, I argue that theoretical recognition emerges through dynamic engagement with four interconnected value dimensions: epistemic (advancing knowledge), practical (enhancing educational practice), cultural (respecting diversity and disciplinary norms), and ethical (promoting justice and well-being). These dimensions operate as historically situated commitments that both shape and are reshaped by emerging theoretical work within broader socioeconomic and political contexts. Through critical examination of pivotal theoretical developments—from constructivism's ascendance to contemporary sociopolitical frameworks—I demonstrate how axiological dynamics illuminate both historical patterns and contemporary debates about theoretical priorities whilst revealing the material conditions that influence theoretical production. This axiological perspective shows that theoretical recognition emerges through community negotiations about value and worth that are enacted within political and historical contexts, encompassing questions about whose knowledge counts and what kinds of transformation theoretical work should promote.

Keywords: theoretical contributions; axiology; values in research; mathematics education; theory valuation; philosophical analysis

1. INTRODUCTION

What transforms a scholarly insight into a recognised theoretical contribution in mathematics education research? Why do certain theoretical developments capture widespread attention whilst others, perhaps equally rigorous, remain marginal? These questions reveal deeper tensions about how our scholarly community determines what makes theoretical work valuable and worthwhile—questions that are fundamentally axiological in nature, involving complex negotiations about knowledge, purpose, and worth enacted within specific power structures and historical circumstances.

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Conventional explanations emphasise factors such as empirical support, logical coherence, or explanatory power—criteria aligned with traditional notions of scientific merit. Yet this explanation proves insufficient when we observe actual patterns of theoretical recognition. Constructivism's ascendance appears to reflect not only empirical validation but also its alignment with broader axiological shifts toward valuing individualistic approaches to learning that resonated with emerging educational policies (Radford, 2012). Sociocultural theories gained recognition partly through their capacity to address growing concerns about context and community that reflected broader value transformations questioning individualistic assumptions (Lerman, 2000). Critical and sociopolitical perspectives entered mainstream discourse as the field's axiological consciousness expanded to embrace questions of equity and social justice emerging from material struggles for educational access and transformation (Gutiérrez, 2013).

These observations suggest that theoretical value emerges through more complex axiological processes than standard accounts of scientific merit acknowledge. These processes appear deeply embedded within historical, political, and economic forces that shape both the production and reception of research work (Popkewitz, 2004; Schubring, 2021). Understanding these processes requires an *axiological* lens that examines both the value systems and the material constraints within which scholarly judgements about worth and significance unfold.

Axiology, the philosophical study of what makes things valuable or worthwhile, provides conceptual tools for understanding how communities determine worth and significance within specific historical contexts. Applied to theoretical contributions, this axiological approach asks not simply whether theoretical work meets abstract quality criteria, but what kinds of 'good' such work accomplishes, for whom, and under what conditions.

This investigation reveals that theoretical contributions in mathematics education gain recognition through complex processes involving multiple, interconnected value dimensions that emerge from both internal intellectual developments and broader social contexts. These dimensions encompass not only traditional epistemic concerns about advancing knowledge, but also practical aspirations for enhancing educational practice, cultural negotiations around diverse knowledge systems, and ethical commitments to promoting justice and well-being. Understanding how these value dimensions operate—both individually and in dynamic tension with one another—illuminates why certain theoretical contributions gain recognition whilst others remain peripheral.

The relationship between values and theoretical development proves dialectical rather than unidirectional. Whilst community values shape which theoretical contributions gain attention, emerging theoretical work also transforms community values by opening new possibilities for understanding and action. The field's increasing attention to equity concerns both reflects broader social justice movements and emerges from internal intellectual developments that reveal previously overlooked dimensions of mathematical experience. Similarly, growing emphasis on practical relevance responds to demands for educational improvement whilst theoretical frameworks that bridge research and practice develop through both external pressures and internal scholarly recognition of theory–practice connections.

This axiological perspective carries both descriptive and normative dimensions. Descriptively, it helps explain how evaluation processes operate in mathematics education research, revealing the often implicit value negotiations that determine theoretical recognition. Normatively, it suggests that explicit attention to

value dimensions can enhance both individual theoretical contributions and collective scholarly discourse by making visible the commitments that inevitably inform scholarly judgement.

2. THEORETICAL FOUNDATIONS: AXIOLOGY AND RESEARCH VALUATION

To understand how theoretical contributions gain recognition, we need to first examine the philosophical foundations of value and valuation in research contexts. Contemporary axiological theory, developed through philosophers such as Hartmann (1926) and Perry (1954), provides frameworks for understanding how values operate in human judgement and decision-making (Schroeder, 2021). Recent scholarship has increasingly advocated for the centrality of axiological considerations in educational research. For example, Urayama and Scheiner (2025) argue that axiology should be embedded as a core philosophical orientation in mathematics education research, proposing that values fundamentally shape ontological assumptions, epistemological positions, and methodological approaches.

Hartmann's (1926) insight that values exist in an ideal realm whilst requiring actualisation through human agency proves particularly relevant for understanding research valuation. Abstract values such as truth, justice, or beauty become operative through specific practices and judgements that bring these ideals into contact with empirical reality. In research contexts, general commitments to advancing knowledge or improving practice become meaningful through particular valuative decisions about which contributions merit attention, support, and development.

This perspective challenges objectivist accounts that assume quality criteria operate independently of human values and social context. Even apparently neutral criteria such as empirical adequacy or logical consistency gain their force through community commitments to particular conceptions of what makes research worthwhile (Douglas, 2009). Educational research faces particular complexities given its inherently applied character and the multiple stakeholder interests that shape its development (Lagemann, 2000).

The mathematics education research community has grappled with these complexities through ongoing discussions about the role and nature of theory (Assude et al., 2008; Mason & Waywood, 1996; Silver & Herbst, 2007; Steiner, 1985), with increasing calls for robust theory-building (diSessa, 1991; Schoenfeld, 2014), frameworks for productive dialogue between different theoretical traditions (Cobb, 2007; Radford, 2008; Scheiner, 2020), and recognition of paradigm pluralism (Scheiner, 2019). The field's international character adds complexity, as different cultural contexts may emphasise different aspects of research value (Darragh et al., 2024).

This axiological understanding provides the conceptual groundwork for examining how theoretical contributions are actually recognised and valued. Yet here lies the fundamental paradox of this investigation: whilst seeking to understand how theoretical contributions are valued, this analysis must itself advance theoretical claims that reflect particular axiological commitments. There exists no neutral standpoint from

which theories and their contributions can be evaluated with pure objectivity.[1] This recognition does not invalidate axiological inquiry but demands transparency about the theoretical lens through which such analysis proceeds. The framework developed here reflects commitments to democratic participation in knowledge production, recognition of diverse perspectives, and attention to how power relations shape intellectual activity (Scheiner et al., 2024)—commitments that readers need to evaluate alongside the framework's analytical utility.

3. THE NATURE AND RECOGNITION OF THEORETICAL CONTRIBUTIONS

Building on this axiological foundation, we now examine what constitutes a theoretical contribution in mathematics education research and how such contributions gain recognition. This analysis requires examining both epistemological questions about the nature of theory and sociological questions about how academic communities recognise different types of scholarly work. We need to distinguish between theoretical contributions (the scholarly work itself), theoretical recognition (community acknowledgement of such work), and theoretical value (the worth ascribed through evaluative processes).

3.1. Epistemological Dimensions: Phenomenological Framing and Explanatory Authority

Following Silver and Herbst's (2007) characterisation, theories in mathematics education represent systematic frameworks that explain phenomena through specification of concepts and their interrelationships. They provide particular modes of attention and interpretation that reveal aspects of mathematical experience that casual observation might miss. As Radford (2017) notes, the term 'theoretical' traces its origins to the Greek *theorein*, meaning 'to see' or 'to contemplate', emphasising theory's role in providing particular ways of seeing and understanding phenomena. This etymological insight underscores that theoretical contributions offer distinctive perspectives rather than merely descriptive accounts.

The epistemological dimensions of theoretical contributions concern fundamentally what phenomena they seek to explain and how they accomplish this explanatory work. However, theoretical contributions do not simply explain pre-existing phenomena but actively construct the very objects of their inquiry through processes of phenomenological framing. This constructive dimension reveals how theories accomplish their most fundamental epistemological work: determining what counts as a phenomenon worthy of explanation and how such phenomena should be conceptualised for systematic investigation.

Consider how different theoretical perspectives reconstruct 'mathematical understanding' in fundamentally distinct ways. Cognitive theories frame understanding as internal mental processes, directing attention toward individual knowledge structures and conceptual development pathways. Sociocultural theories reconstruct the same observable behaviours as participation in mathematical practices, shifting analytical focus toward social interaction and cultural mediation. Critical theories reframe mathematical

1 As one reviewer astutely observed, "the evaluation of theoretical contributions inevitably depends on viewing them through a theoretical lens". This investigation thus proceeds with full acknowledgement of its own axiological commitments and the assertive nature of its theoretical claims, seeking not transcendental objectivity but critical transparency about the value frameworks that inform scholarly judgement.

understanding as inherently political, emphasising how power relations and cultural positioning shape what gets recognised as legitimate mathematical knowledge. Each framing creates distinct analytical objects whilst potentially obscuring others visible only through alternative perspectives. This constructive process represents a crucial dimension of theoretical innovation, as powerful theoretical contributions often succeed by revealing previously unrecognised phenomena or by fundamentally reconceptualising familiar educational experiences.

The epistemic value of theoretical contributions also depends on their capacity to provide explanatory insights that go beyond surface-level description to reveal underlying mechanisms, structures, or dynamics that illuminate why mathematical experience takes particular forms. This explanatory depth distinguishes theoretical work from purely empirical description whilst establishing the intellectual authority that enables theoretical recognition within the research community. However, the epistemological authority of theoretical contributions in mathematics education depends partly on their relationship to empirical evidence. Yet this relationship proves more complex than simple verification or falsification models suggest. Different theoretical traditions establish different relationships between theoretical claims and empirical evidence, reflecting varying assumptions about the nature of educational phenomena and appropriate forms of systematic inquiry.

Theoretical contributions also vary in their structural configurations, each serving different functions within the broader project of understanding mathematics teaching and learning (Lester, 2005; Sriraman & English, 2005). Theoretical constructs provide conceptual building blocks for analysis—terms such as mathematical discourse, conceptual understanding, or mathematical identity that enable researchers to identify and examine particular aspects of mathematical experience. Theoretical frameworks offer more comprehensive organisational structures that specify relationships amongst multiple constructs, providing lenses through which complex phenomena can be analysed systematically. Theoretical models present specific representations of relationships that can guide both empirical investigation and practical application. Theories attempt to provide overarching explanatory accounts that integrate multiple levels of analysis within coherent conceptual systems. What unites these diverse forms is their shared aspiration to transcend the particularity of individual empirical findings by offering generalisable insights that inform understanding across multiple contexts whilst serving particular interests and purposes within specific historical contexts.

3.2. Sociological Dimensions: Recognition, Value, and Historical Situatedness

Theoretical value is not inherent in particular forms of scholarship but emerges through complex community processes of recognition that are historically situated and politically inflected. Work that begins as empirical investigation may gain theoretical standing through subsequent interpretation and application, whilst explicitly theoretical work may fail to achieve recognition if it proves unable to illuminate phenomena in ways that serve community interests or address pressing concerns. The process through which contributions gain or lose theoretical value reflects complex community negotiations about what counts as valuable explanation and understanding within specific historical moments.

Theoretical recognition refers to community acknowledgement of particular contributions as theoretically significant. This recognition is manifested through citation patterns, inclusion in foundational texts, adoption in research programs, and integration into educational practices. This recognition process

operates through various mechanisms including peer review, conference presentations, editorial decisions, and funding allocations—all embedded within institutional structures that privilege certain types of work over others (Lagemann, 2000).

Theoretical value emerges through community evaluative processes that assign worth to theoretical contributions based on their perceived capacity to advance valued goals and purposes. This value assignment reflects axiological commitments that operate within material constraints and power relations, revealing how judgements about theoretical worth are embedded within broader value systems about knowledge, purpose, and human flourishing. Theoretical contributions that align with dominant axiological commitments may receive greater recognition regardless of their intellectual merit, whilst those that challenge existing value frameworks may face marginalisation despite their potential significance.

Importantly, theoretical recognition often reflects temporal dynamics where contributions that appear to lack value within current axiological frameworks may gain recognition as community values evolve or material conditions change. Early work in critical mathematics education, for example, received limited attention when the field was dominated by cognitive perspectives but gained prominence as the community's ethical consciousness expanded to value social justice concerns more centrally. Similarly, apparently valuable work may lose relevance if it fails to address emerging challenges or becomes associated with discredited value commitments.

This sociological dimension connects directly to the historical evolution of theoretical priorities within mathematics education research. The field's movement from behaviourist to cognitive to sociocultural to critical perspectives reflects not merely intellectual development but responses to changing material conditions, political pressures, and social movements that have shaped educational discourse (Gispert & Schubring, 2011; Radford, 2021; Schubring, 2021). Understanding how theoretical contributions gain recognition thus requires examining both their intellectual merits and their positioning within these broader axiological dynamics.

The relationship between epistemological and sociological dimensions proves complex. The intellectual characteristics of theoretical contributions shape their potential for community recognition, whilst community recognition processes influence what kinds of intellectual work get developed and sustained. Most importantly, both dimensions operate within material conditions and power relations that constrain what becomes possible whilst opening space for particular forms of theoretical innovation.

Understanding what makes theoretical contributions valuable requires examining not only their internal characteristics but also their relationship to community values and recognition processes. Having established the epistemological and sociological foundations, we can now examine the specific value dimensions that structure their recognition and influence within mathematics education research.

4. FOUR VALUE DIMENSIONS: THE AXIOLOGICAL ARCHITECTURE OF THEORETICAL RECOGNITION

Through examination of how theoretical contributions gain and maintain recognition in mathematics education research, four interconnected value dimensions emerge as particularly salient in shaping community

valuation. These dimensions—epistemic, practical, cultural, and ethical—do not operate as independent criteria but form a complex axiological architecture within which theoretical worth is negotiated and established. Table 1 provides an overview of these value dimensions and their guiding questions.

Table 1.

Value dimensions and guiding questions for theoretical contributions

Value dimensions	Core focus	Guiding questions
Epistemic value (advancing knowledge)	Knowledge generation, explanatory power, empirical grounding, theoretical coherence	How does the theoretical contribution explain phenomena clearly and coherently? How is it supported by evidence or logical argumentation? How does it generate new knowledge, predictions, or research directions?
Practical value (enhancing practice)	Applicability, utility for educators, actionable guidance, theory–practice connections	How does the theoretical contribution provide actionable guidance for educational practice? How can it inform curriculum design, pedagogy, or professional development? How does it bridge theory–practice divisions?
Cultural value (respecting diversity and norms)	Cultural responsiveness, disciplinary engagement, international relevance, diverse knowledge systems	How does the theoretical contribution acknowledge and incorporate diverse cultural perspectives? How does it respect different ways of knowing? How does it engage with disciplinary traditions?
Ethical value (promoting justice)	Equity, social justice, student well-being, transformative potential, moral responsibility	How does the theoretical contribution promote ethical goals such as educational equity, inclusion, or student well-being? How does it challenge harmful biases or deficit perspectives? How can it contribute to social justice and transformation?

4.1. Epistemic Value: The Pursuit of Understanding

Epistemic value reflects the research community's fundamental commitment to advancing knowledge and understanding through systematic inquiry. This dimension encompasses traditional concerns about theoretical quality—explanatory power, internal coherence, empirical grounding, and capacity to generate productive research—whilst also embracing broader questions about how theoretical work contributes to collective understanding of mathematics teaching and learning within specific historical contexts.

Theoretical contributions demonstrate epistemic value through their capacity to reveal previously hidden patterns, connections, and mechanisms underlying mathematical experience. APOS (Action-Process-Object-Schema) theory (Arnon et al., 2014; Dubinsky & McDonald, 2001) exemplifies such epistemic

contribution through its systematic framework for analysing how students construct mathematical concepts through reflective abstraction. The theory's epistemic worth emerges not merely through its logical structure but through its capacity to make visible aspects of conceptual development that inform both research and practice.

Yet epistemic value in mathematics education research extends beyond traditional notions of scientific explanation to encompass understanding's inherently interpretive character. Unlike phenomena in natural sciences, educational phenomena involve human meaning-making, cultural context, and purposive action that resist reduction to mechanistic explanation. Theoretical contributions in mathematics education often demonstrate epistemic value by providing interpretive frameworks that illuminate the meaningful structures of mathematical experience rather than causal laws that predict behavioural outcomes.

This interpretive dimension creates productive tensions within epistemic valuation. Theoretical frameworks that acknowledge context and meaning may sacrifice predictive precision for interpretive depth, whilst those that seek generalisation may overlook significant aspects of particular situations that matter for specific communities. Theoretical contributions need to navigate these tensions creatively, providing insights that are both generalisable and sensitive to context whilst challenging dominant assumptions about whose knowledge counts.

4.2. Practical Value: Bridging Theory and Action

Practical value addresses theoretical contributions' capacity to inform and transform educational practice. This dimension reflects mathematics education research's inherently applied character and its complex relationship to educational reform movements, policy initiatives, and grassroots organising efforts. Yet practical value proves more complex than simple applicability. It involves questions about whose practice gets prioritised, what kinds of transformation are envisioned, and how theoretical insights can navigate the political tensions inherent in educational change.

Cognitively Guided Instruction (CGI) demonstrates how theoretical work can achieve significant practical value by providing teachers with research-based understanding of children's mathematical thinking development within existing classroom structures whilst potentially opening space for more transformative pedagogical approaches (Carpenter et al., 1999). The framework's practical worth emerges through its capacity to guide instructional decisions whilst remaining sufficiently flexible to accommodate diverse classroom contexts. Rather than prescribing specific teaching methods, CGI offers conceptual tools that enable teachers to interpret student thinking and adapt instruction accordingly.

This example illuminates the distinction between *instrumental utility*—direct applicability to practical problems within existing systems—and *transformative utility*—the capacity to reshape how practitioners understand and approach their work in ways that might challenge existing structure and power relations. Theoretical contributions need to achieve practical value not through simple application but through transformation of practical understanding that enables more thoughtful and potentially transformative action.

Practical value also encompasses contributions to policy development, curriculum design, and professional learning within broader political struggles over educational control and purpose (Lester & Wiliam, 2002; Radford, 2018). Theoretical frameworks that can inform multiple levels of educational practice whilst maintaining conceptual coherence demonstrate particular practical worth. Yet this breadth

creates challenges as different practical contexts may require different emphases or interpretations whilst serving competing interests.

The tension between instrumental and transformative utility reflects broader contradictions within educational systems that seek both to reproduce existing social relations and to promote individual development. Theoretical contributions need to navigate these contradictions by demonstrating value within existing structures whilst potentially opening space for more fundamental transformation.

4.3. Cultural Value: Negotiating Diversity, Tradition, and Power

Cultural value operates across two interconnected dimensions that reflect mathematics education research's position within both disciplinary traditions and broader social contexts, whilst revealing how cultural negotiations are fundamentally axiological processes involving questions about what kinds of knowledge are valued and what purposes they should serve, enacted within specific power relations.

Disciplinary-cultural value concerns how theoretical contributions engage with established scholarly traditions whilst potentially extending or challenging them productively. This involves demonstrating familiarity with relevant literature, building upon prior understanding, and contributing genuinely new insights whilst navigating disciplinary power structures that privilege certain theoretical traditions over others. The disciplinary dimension reflects the cumulative character of scholarly knowledge and the importance of building upon prior understanding. Yet it also reflects power relations that determine which traditions get preserved and developed whilst others are marginalised.

Societal-cultural value addresses whether theories acknowledge and incorporate diverse cultural perspectives of learners and educational contexts whilst challenging dominant assumptions about whose knowledge matters. This dimension has gained particular prominence as mathematics education research has become increasingly attentive to questions of cultural diversity, international variation, and educational equity. Yet it also reflects broader political struggles over cultural recognition and representation within academic institutions.

The emergence of ethnomathematics as a recognised theoretical tradition illustrates how cultural value operates across both dimensions. Initially challenging disciplinary norms by questioning assumptions about mathematical universality, ethnomathematics gained acceptance by demonstrating rigorous scholarship whilst expanding theoretical understanding to include diverse cultural mathematical practices that had been systematically excluded from academic consideration (D'Ambrosio, 1985). The tradition's cultural value emerges through its capacity to bridge scholarly rigour with cultural responsiveness whilst challenging colonial assumptions about mathematical knowledge (Bishop, 1990).

Yet cultural value creates complex tensions that require careful navigation within existing institutional structures. Respecting diverse knowledge traditions sometimes conflicts with conventional scholarly standards that reflect particular cultural assumptions, whilst maintaining disciplinary coherence may limit openness to alternative approaches that challenge dominant perspectives. Theoretical contributions need to address rather than avoid these tensions, developing sophisticated frameworks that honour both scholarly tradition and cultural diversity whilst revealing how disciplinary traditions themselves reflect particular cultural and political commitments.

These tensions become particularly acute in international contexts where theoretical frameworks

developed within particular cultural contexts may not transfer easily to different educational systems or cultural assumptions. The reception of different theoretical traditions across cultural boundaries often reflects not merely intellectual differences but different philosophical assumptions about learning, knowledge, and the relationship between individual and social development that are embedded within broader cultural and political frameworks.

4.4. Ethical Value: Promoting Justice and Human Flourishing

Ethical value concerns theoretical contributions' capacity to promote educational equity, social justice, and human well-being within existing systems whilst potentially challenging the systemic mechanisms that generate and sustain exclusion and oppression. This dimension has gained particular prominence through critical and sociopolitical perspectives that have expanded the field's value profile by making equity and social justice central rather than peripheral concerns (Vithal et al., 2024).

Critical mathematics education frameworks exemplify theoretical work with strong ethical value by providing conceptual tools for examining power relationships and promoting democratic participation through mathematics education (Skovsmose, 1994). Such frameworks demonstrate ethical worth not merely through advocacy but through rigorous analysis of how mathematics education can either reproduce or challenge social inequalities whilst providing resources for transformative action.

Martin's (2000) work on mathematics identity amongst African-American youth illustrates how theoretical contributions can achieve ethical value by addressing educational equity through sophisticated scholarship that reveals systemic barriers whilst opening possibilities for resistance and transformation. The theoretical framework's ethical significance emerges through its capacity to illuminate how social contexts shape mathematical experience whilst providing resources for promoting more equitable educational opportunities and challenging deficit perspectives that blame students for systemic failures.

Yet ethical value proves complex in its relationship to other value dimensions (Ernest, 2012). Ethically-motivated theoretical work needs to maintain scholarly rigour whilst addressing moral concerns, potentially creating tensions between advocacy and analysis that reflect broader contradictions within academic institutions. Moreover, different ethical frameworks may suggest conflicting approaches to theoretical development, requiring careful attention to how moral commitments inform scholarly practice.

Theoretical contributions need to integrate moral concern with intellectual sophistication, demonstrating how attention to justice and equity can enhance rather than compromise theoretical understanding. This integration requires moving beyond simple application of ethical principles to theoretical problems toward development of frameworks that embody ethical insights within their conceptual structure whilst providing tools for transformative action.

However, we need to acknowledge that theoretical contributions alone cannot achieve social transformation—they operate within broader material conditions and power relations that limit what becomes possible through intellectual work alone. Ethically valuable theoretical work thus needs to connect to broader social movements and struggles for justice whilst providing conceptual resources that can support transformative action.

4.5. Dynamic Interactions and Productive Tensions

These four value dimensions operate simultaneously and interactively rather than independently, creating a complex landscape within which theoretical recognition emerges through ongoing processes of negotiation, struggle, and transformation. The dimensions often create productive tensions that drive theoretical innovation whilst reflecting broader contradictions within educational systems and academic institutions.

Rather than viewing these tensions as problems to be resolved, I suggest they are better understood as creative forces that stimulate theoretical development. The tension between epistemic demands for generalisability and cultural requirements for contextual sensitivity has prompted development of sophisticated theoretical frameworks that can accommodate both general principles and local variation. Similarly, balancing practical utility with theoretical sophistication requires careful attention to how abstract insights can inform concrete action without losing conceptual depth whilst serving different interests and purposes.

The tension between instrumental and transformative approaches to practical value reflects broader contradictions within educational systems that seek both to reproduce existing social relations and to promote individual development. The relationship between ethical commitments and epistemic standards creates particularly complex negotiations as researchers attempt to maintain scholarly rigour whilst promoting social justice goals within institutional structures that may privilege narrow definitions of objectivity.

Innovative theoretical contributions may emerge through creative synthesis of different value considerations, demonstrating how apparently conflicting demands can be integrated within coherent frameworks. Such integration may represent the frontier of theoretical development in mathematics education research whilst requiring ongoing connection to broader social movements for educational transformation.

5. HISTORICAL PERSPECTIVES: THE EVOLUTION OF VALUE IN THEORETICAL RECOGNITION

Understanding how these value dimensions operate requires examining their role in shaping theoretical recognition across different historical periods in mathematics education research. This analysis reveals both the persistence of certain value commitments and their transformation through community negotiation and broader contextual changes. However, this periodisation necessarily simplifies complex developments and may obscure significant variation across different research traditions and geographical contexts.

5.1. The Cognitive Turn: Individualism and Educational Reform (1970s–1980s)

During the foundational decades of contemporary mathematics education research, epistemic value dominated community valuation of theoretical contributions, reflecting both the field's aspiration for scientific legitimacy and cognitive psychology's influence on educational research. This emphasis emerged through complex interactions between internal intellectual developments and broader cultural contexts, including growing interest in systematic approaches to understanding learning processes.

Constructivism's emergence illustrates how theoretical recognition involves negotiations between internal intellectual merit and broader axiological resonance. Early constructivist work gained attention

through its epistemic contributions—offering coherent explanations of how individuals build mathematical understanding that connected with empirical research whilst addressing persistent questions about the relationship between teaching and learning. Von Glasersfeld's (1995) radical constructivism exemplified this emphasis, providing systematic theoretical principles that enabled researchers to interpret learning phenomena within coherent conceptual frameworks.

However, constructivism's broader recognition may also have reflected its alignment with evolving axiological commitments that valued individual agency and personal knowledge construction, shifts that were embedded within broader cultural movements toward individualism and student-centred approaches that were reshaping educational discourse during this period. Constructivism's emphasis on personal knowledge construction appeared to connect both to genuine insights about learning processes and to broader value transformations emphasising individual agency and choice that served emerging capitalist educational policies (Radford, 2012).

Yet constructivism's sustained recognition required addressing multiple value dimensions. Critics questioned whether constructivist epistemology undermined mathematical authority (epistemic concerns) and whether the framework provided sufficient practical guidance for teachers (practical concerns). Constructivism achieved sustained recognition as proponents demonstrated both theoretical sophistication and practical applicability through research programs such as Cognitively Guided Instruction that translated cognitive insights into classroom applications (Carpenter et al., 1999).

This period established patterns of theoretical evaluation that continue to influence contemporary practice. The emphasis on empirical grounding, systematic explanation, and research productivity created expectations that subsequent theoretical work needs to address.[2] The gradual recognition that purely cognitive approaches overlooked important aspects of mathematical experience prepared the ground for subsequent expansions of value considerations whilst reflecting growing awareness of social inequalities that cognitive approaches could not address.

5.2. The Social Turn: Recognising Community and Context (1990s)

The 1990s witnessed significant expansion of valued theoretical work as the mathematics education community increasingly recognised learning's inherently social character. This transformation appears to reflect both internal theoretical developments and broader cultural movements toward multiculturalism, community-based organising, and challenges to individualistic assumptions (Lerman, 2000). This transformation occurred within contexts of growing awareness of persistent educational inequalities and increasing recognition of diverse cultural perspectives that had been marginalised by dominant theoretical frameworks.

Cobb and Yackel's (1996) work on sociomathematical norms exemplifies how theoretical contributions gained recognition during this period by addressing limitations in purely individual or purely social learning theories. Their framework achieved epistemic value by providing coherent explanations of how mathematical

2 For example, Schoenfeld (2010) proposed a set of criteria for evaluating theories in mathematics education research. These include: descriptive power; explanatory power; scope; predictive power; rigour and specificity; falsifiability; replicability, generality, and trustworthiness; and multiple sources of evidence (triangulation). While these criteria appear objective, they themselves reflect particular value commitments about what constitutes worthy theoretical work within specific historical and institutional contexts.

communities establish quality criteria, whilst demonstrating practical value through detailed classroom analysis that informed teaching approaches (Yackel & Cobb, 1996).

The framework's recognition also reflected expanding cultural values within the research community that appeared to connect to broader social movements questioning individualistic assumptions inherited from cognitive psychology and neoliberal political theory. As scholars increasingly valued diverse perspectives on learning, theoretical frameworks that could integrate personal and social dimensions gained particular recognition.

This period's theoretical developments illustrate how value evolution drives innovation within specific historical contexts. As the community's value consciousness expanded to include social and cultural considerations through engagement with multicultural movements and community organising efforts, theoretical work addressing these dimensions moved from margin to centre. Theories that previously held peripheral status gained prominence as community values evolved to illuminate aspects of mathematical experience that earlier frameworks had overlooked.

The social turn appeared to reflect broader political movements that were challenging individualistic assumptions and demanding recognition of community knowledge and collective approaches to social problems. Yet these challenges occurred within institutional structures that continued to privilege individual achievement and market-based approaches to educational reform, creating tensions that influenced theoretical development and reception.

5.3. The Sociopolitical Turn: Foregrounding Justice and Structural Analysis (2000s–2010s)

The early 2000s marked another significant shift as ethical value gained prominence in theoretical evaluation. This shift appeared influenced by broader social justice movements, critical examination of persistent educational inequalities, and growing awareness of how global economic pressures were reshaping educational systems (Gutiérrez, 2013). The mathematics education community increasingly valued theoretical contributions addressing power, identity, and social transformation alongside traditional concerns about learning and teaching, whilst operating within contexts of increasing educational privatisation and accountability pressures that limited transformative possibilities.

Martin's (2000) work on mathematics identity amongst African-American youth gained recognition by demonstrating strong ethical value through rigorous scholarship that addressed educational equity within broader contexts of racial oppression and economic inequality. The theoretical framework's significance emerged through its capacity to illuminate how social contexts shape mathematical experience whilst providing conceptual resources for promoting more equitable educational opportunities and challenging deficit perspectives that blame students for systemic failures.

Critical mathematics education frameworks achieved recognition during this period by providing tools for examining how mathematics education can either reproduce or challenge social inequalities whilst connecting to broader movements for social justice and democratic participation (Skovsmose, 1994; Gutstein, 2006). These theoretical contributions demonstrated that attention to social justice could enhance rather than compromise scholarly understanding, providing more comprehensive accounts of mathematical experience that acknowledged its inherently political character whilst challenging dominant assumptions about neutral knowledge.

This shift illustrates how emerging values can transform theoretical landscape whilst reflecting broader political struggles over educational purpose and control. Work that might have remained marginal during earlier periods gained centrality as the community's ethical consciousness expanded through engagement with social movements and growing awareness of persistent inequalities that cognitive and social approaches had not adequately addressed. Yet recognition still required demonstrating value across multiple dimensions—ethical commitment proved insufficient without epistemic rigour and practical relevance.

Transformative theoretical work during this period succeeded by connecting ethical commitments to broader material analyses of how educational systems reproduce social inequalities whilst providing tools for challenging these systems. Yet these contributions operated within institutional constraints that limited their transformative potential whilst potentially channelling critical energy into acceptable forms of reform rather than fundamental transformation.

5.4. Contemporary Synthesis: Navigating Multiple Values and Global Pressures (2010s–present)

Recent theoretical developments reflect increasingly sophisticated attempts to address multiple value dimensions simultaneously whilst operating within global pressures toward standardisation, privatisation, and accountability that constrain transformative possibilities. The mathematics education community seeks to account for epistemic rigour, practical relevance, cultural responsiveness, and ethical commitment within coherent frameworks whilst navigating institutional pressures and global policy initiatives that may limit critical perspectives.

Scholars have pursued diverse approaches to these challenges, including critical postmodern perspectives that explicitly embrace uncertainty and multiple perspectives (Stinson & Bullock, 2012). Contemporary work on culturally responsive mathematics teaching exemplifies these efforts by integrating insights from cognitive research, sociocultural theory, and critical pedagogy within practical frameworks for teacher education (Aguirre et al., 2013). Such work demonstrates ethical value through attention to equity, cultural value through incorporation of diverse knowledge traditions, practical value through teacher guidance, and epistemic value through coherent theoretical explanation.

Yet these synthetic efforts also reveal persistent tensions between different value considerations within contemporary capitalism's global reach. Balancing cultural specificity with generalisable principles requires sophisticated theoretical development that acknowledges contextual variation whilst maintaining conceptual coherence. Similarly, addressing complex equity issues whilst remaining practically accessible challenges researchers to communicate effectively across different audiences with different value priorities whilst navigating accountability pressures that may privilege narrow definitions of effectiveness.

6. THE DIALECTICAL RELATIONSHIP BETWEEN THEORY, VALUE, AND CONTEXT

The historical overview reveals that the relationship between community values, theoretical development, and contextual factors proves fundamentally dialectical. Whilst values shape which theoretical contributions gain recognition, emerging theoretical work also transforms community values and potentially challenges existing constraints by opening new possibilities for understanding and action.

Consider how constructivism both responded to and potentially helped shape values emphasising individual agency and meaningful understanding within broader contexts of educational reform. Early constructivist work gained recognition partly because it appeared to resonate with emerging educational values about active learning and student-centred pedagogy. Yet as Radford (2012) demonstrates, constructivism's theoretical development also may have reinforced and extended these values by providing conceptual tools for understanding learning as active construction rather than passive reception, whilst potentially obscuring structural inequalities and collective solidarity that are essential for transformative educational change.

This dialectical process becomes more complex when we consider how constructivism's emphasis on individual knowledge construction reflects particular axiological commitments about what constitutes valuable learning—commitments that parallel broader value systems emphasising individual choice while potentially obscuring collective and structural dimensions of mathematical experience. The theoretical framework's focus on learner agency may reflect broader political-economic transformations that were reshaping educational discourse (Popkewitz, 2004; Radford, 2018). Yet it also potentially provided conceptual resources that could challenge traditional authoritarian pedagogical approaches while fitting within various reform movements.

Similarly, critical perspectives in mathematics education both reflected and advanced ethical commitments to social justice (Gutiérrez, 2013; Skovsmose, 1994) within broader contexts of social movement activism and growing awareness of persistent inequalities. Growing concern about educational equity created receptive conditions for critical theoretical work whilst connecting to broader struggles for civil rights, economic justice, and democratic participation. Yet such work also provided conceptual resources that enabled more sophisticated analysis of how mathematics education relates to broader social issues whilst potentially being co-opted by institutional interests seeking to maintain legitimacy.

This dialectical relationship suggests that understanding theoretical value requires attending to temporal dynamics and material contexts rather than treating evaluation as static process. Theoretical contributions that appear to lack value within current axiological frameworks may gain recognition as community values evolve or material conditions change. Apparently valuable work may lose relevance if it fails to address emerging concerns or becomes associated with discredited political projects.

The relationship also implies that theoretical innovation often involves axiological innovation—the development of new ways of understanding what makes research worthwhile. This suggests that theoretical contributions gain value not through simple alignment with existing community standards but through creative tension and transformation, whilst providing new possibilities for understanding and action.

This perspective has important implications for contemporary theoretical development. Rather than simply conforming to established value expectations, innovative theoretical work might productively challenge and extend community value commitments whilst demonstrating worth within existing frameworks and connecting to broader struggles for social transformation. The challenge lies in achieving sufficient alignment with current values to gain recognition whilst proposing extensions that enhance the field's capacity to address emerging challenges and contribute to broader social transformation.

Yet we need to acknowledge that theoretical work alone cannot achieve fundamental social transformation—it operates within material constraints and power relations that limit what becomes possible

through intellectual activity. Transformative theoretical contributions need to connect to broader social movements and material struggles whilst providing conceptual resources that can support transformative action within and beyond educational institutions.

7. IMPLICATIONS FOR THEORETICAL DEVELOPMENT AND SCHOLARLY PRACTICE

Understanding the axiological foundations of theoretical recognition within their material contexts carries significant implications for how mathematics education researchers approach theoretical development and how the scholarly community values and supports such work.

7.1. Individual Research Development: Strategic Positioning and Ethical Commitment

For individual researchers, explicit attention to value dimensions and material constraints can enhance both research design and theoretical contribution whilst maintaining ethical commitments to social transformation. Rather than assuming that epistemic merit alone determines recognition, researchers can strategically consider how their theoretical work might address multiple value considerations whilst maintaining conceptual coherence and critical analysis of existing power structures.

This approach suggests the importance of temporal perspective in theoretical development that considers both current community values and emerging social movements that may influence future priorities. Researchers who anticipate evolving value priorities whilst connecting to broader struggles for justice can position their work to address emerging concerns whilst building upon established foundations. This requires sensitivity to broader social and educational trends that may influence community values alongside careful attention to internal theoretical developments within the field and material conditions that constrain what becomes possible.

The axiological analysis suggests particular promise for theoretical work that integrates multiple value dimensions. Such integration requires moving beyond superficial attention to different values toward deep theoretical work that embeds multiple value considerations within conceptual structure whilst challenging dominant assumptions. This might involve developing frameworks that demonstrate how rigorous analysis serves transformative purposes, how cultural responsiveness enhances epistemic understanding, or how ethical commitment strengthens rather than compromises scholarly inquiry within specific material contexts.

Yet individual researchers need to navigate institutional constraints and power relations that may limit transformative possibilities whilst potentially constraining critical perspectives that challenge dominant interests. Strategic approaches may involve developing theoretical contributions that demonstrate value within existing institutional frameworks whilst maintaining connections to broader social movements and critical analysis that can support longer-term transformation.

7.2. Community-Level Transformation: Democratising Valuation and Supporting Critical Work

At the community level, explicit axiological analysis can enhance valuation processes and scholarly discourse by making visible the value commitments and material constraints that inevitably inform judgement while

potentially democratising these processes. Rather than pretending that valuation operates through purely objective criteria, the community can explicitly engage in axiological reflection about different value commitments and how they operate within specific material contexts whilst seeking productive synthesis that serves broader social transformation rather than narrow institutional concerns.

This transparency can be operationalised through structured approaches such as the Axiological Reflexivity Framework (Urayama & Scheiner, 2025), which provides systematic guidance for examining how value commitments inform all aspects of research practice, from initial problem formulation through interpretive claims. Such frameworks demonstrate how making axiological positioning explicit can improve valuation fairness by helping authors and reviewers recognise when apparent disagreements reflect different value emphases or material constraints rather than simple quality differences. They can also enhance inclusivity by ensuring that diverse types of theoretical contribution receive appropriate recognition rather than being marginalised for failing to conform to narrow criteria that may serve particular interests whilst excluding others.

The approach suggests the importance of pluralistic valuation that recognises different pathways to theoretical value whilst maintaining quality standards that serve broader human flourishing rather than narrow institutional interests. This requires developing more sophisticated evaluation frameworks that can assess theoretical contributions across multiple value dimensions whilst acknowledging their material contexts and political implications.

Moreover, the community needs to actively support theoretical work that challenges existing power structures whilst potentially facing institutional resistance or marginalisation. This might involve creating alternative publication venues, funding mechanisms, and recognition systems that can sustain critical theoretical work whilst connecting it to broader social movements for educational transformation.

7.3. Institutional Change: Challenging Structures and Creating Possibilities

The axiological analysis reveals how institutional structures and material constraints shape theoretical development whilst potentially limiting transformative possibilities. Addressing these limitations requires coordinated efforts to challenge existing power structures whilst creating new possibilities for critical theoretical work that serves broader social transformation.

This might involve advocating for changes in funding priorities that support community-engaged research, challenging evaluation criteria that privilege narrow definitions of rigour whilst excluding critical perspectives, and creating institutional structures that can sustain theoretical work connected to social movements for justice and transformation.

Yet such institutional change requires connection to broader social movements and political struggles that can challenge existing conditions. The most promising approaches involve developing theoretical contributions that can support these broader efforts whilst working within existing institutions to create space for transformative possibilities.

8. CONCLUSION: TOWARD TRANSFORMATIVE THEORETICAL PRACTICE

This axiological exploration began with fundamental questions about what makes theoretical contributions valuable in mathematics education research. Through examination of valuation processes and historical developments, I have argued that theoretical value emerges through complex interactions between intellectual merit, community commitments, and contextual factors that shape both the production and reception of theoretical work.

The investigation reveals that theoretical recognition involves intricate negotiations encompassing epistemic, practical, cultural, and ethical considerations. These negotiations reflect both persistent scholarly commitments and evolutionary processes through which community priorities develop through internal theoretical advances and engagement with broader challenges.

Understanding these axiological foundations carries both descriptive and normative significance, connecting to broader philosophical questions about the nature of scientific revolution and paradigm change (Kuhn, 1962). Descriptively, it helps explain how valuation processes operate whilst revealing the often implicit value negotiations that determine theoretical recognition. The historical overview shows how mathematics education research has progressively expanded its conception of valuable theoretical work, from predominantly cognitive-epistemic frameworks in the 1970s–1980s, through social and cultural expansions in the 1990s, to contemporary efforts that integrate ethical and sociopolitical concerns alongside traditional scholarly criteria.

Normatively, the axiological perspective suggests that explicit attention to value dimensions can enhance both individual theoretical contributions and collective scholarly discourse by making visible the normative commitments that inevitably inform scholarly judgement. Rather than treating values as external constraints on objective research, this framework reveals how thoughtful engagement with multiple value dimensions can strengthen theoretical work by ensuring it addresses the complexity of educational phenomena.

Most importantly, the analysis reveals the dialectical relationship between theory, value, and context—how these elements mutually influence and transform each other over time. This suggests that innovative theoretical contributions involve axiological innovation alongside conceptual development, proposing new ways of understanding what makes research worthwhile whilst demonstrating worth within existing frameworks.

For the future of mathematics education research, this axiological perspective suggests both challenges and opportunities. The challenge lies in developing theoretical work that addresses multiple value dimensions whilst maintaining conceptual coherence and scholarly rigour. The opportunity lies in recognising how explicit attention to value considerations can enhance both theoretical quality and impact by aligning scholarly work with broader purposes that motivate educational research.

As mathematics education research continues evolving to address contemporary challenges—from technological transformation to global inequality—explicit axiological analysis can provide valuable resources for navigating competing demands whilst maintaining commitment to both intellectual sophistication and human flourishing. Understanding how values shape theoretical recognition enables more strategic and ethical approaches to theoretical development that serve both scholarly advancement and

broader educational purposes.

This investigation concludes with explicit acknowledgement of the paradox it has navigated throughout: the impossibility of evaluating theoretical contributions from a neutral standpoint, and the necessity of advancing theoretical claims whilst recognising their axiological commitments. The framework I have proposed demonstrates epistemic value through novel conceptual tools for understanding theoretical valuation, practical value by offering guidance for research development, cultural value by acknowledging diverse perspectives whilst engaging with scholarly tradition, and ethical value by promoting transparency and inclusivity in valuation processes.

Ultimately, the worth of theoretical contributions emerges through their capacity to enhance our collective ability to develop work that is intellectually rigorous, practically relevant, culturally responsive, and ethically committed. Recognising the fundamentally axiological nature of all theoretical evaluation opens new possibilities for more democratic, inclusive, and transformative scholarly practice—one that serves both the advancement of knowledge and the broader human purposes of educational improvement and social justice that give research its ultimate meaning.

Acknowledgements

I would like to thank the reviewers and guest editors of this special issue for carefully considering this manuscript and providing valuable feedback that significantly enhanced both the theoretical sophistication and political clarity of this analysis. Their comments and suggestions have been instrumental in developing a more nuanced understanding of the axiological foundations of theoretical recognition and the dialectical relationships between value, theory, and material conditions in mathematics education research.

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