

The ACES Framework: Ambiguity Competence for Democratic Education



Co-funded by
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Ambiguity Competence for Education and Society (ACES)

Project number: 2025-1-DE03-KA220-SCH-000359164

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Contributing Partners: ACES Consortium

Version: 1.0

Document type: Conceptual framework report (working theoretical model)

Date: October 2026

Dissemination Level: Public

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Suggested citation: Gloe, M., & Männer, V. (2026). The ACES Framework: Ambiguity competence for democratic education (Version 1.0). ACES – Ambiguity Competence for Education and Society, project no. 2025-1-DE03-KA220-SCH-000359164. DOI: 10.5281/zenodo.23371346



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Co-funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the National Agency Erasmus+ School Education at the Pädagogischer Austauschdienst (PAD). Neither the European Union nor the granting authority can be held responsible for them.



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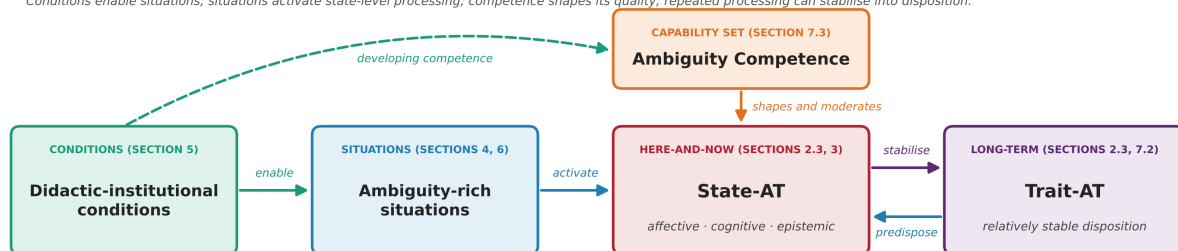
0. How to read this document

The ACES Framework presents a multi-level model of ambiguity tolerance for democratic education. It is addressed primarily to teacher educators, developers of curricula and teaching materials, and researchers in democratic and citizenship education, as well as to education policymakers and school leaders concerned with the institutional conditions of ambiguity-rich learning; for classroom practitioners, it provides the theoretical basis on which the practice-oriented ACES materials build, and it offers guiding questions and indicators for reflecting on the conditions of their own teaching (7.3.7).

The framework is structured into eight main sections. *Section 1* introduces the educational challenge of ambiguity, the construct of ambiguity tolerance, and the framework's specific contribution. *Section 2* establishes the conceptual foundations – defining ambiguity, situating ambiguity tolerance as a psychological construct, distinguishing trait and state perspectives, and considering cultural variability. *Section 3* examines the affective, cognitive, and epistemic mechanisms through which ambiguity is processed. *Section 4* contextualises ambiguity within social, cultural, and transnational settings. *Section 5* addresses the institutional and organisational conditions under which ambiguity-rich learning becomes possible. *Section 6* develops the pedagogical approaches – didactic principles, methodological approaches, and participatory learning processes – through which Ambiguity Competence is cultivated. *Section 7* integrates these elements into the framework's overall model: its core architecture, process logic, the five dimensions of Ambiguity Competence, and its application across European educational systems. *Section 8* concludes.

THE ACES FRAMEWORK AT A GLANCE

Conditions enable situations; situations activate state-level processing; competence shapes its quality; repeated processing can stabilise into disposition.



AMBIGUITY COMPETENCE: FIVE DIMENSIONS



Simplified overview; the full model is presented in Figure 2 (Section 7.1).

The European dimension of the framework is not concentrated in a single section but developed cumulatively. *Section 4* situates ambiguity tolerance in transnational and culturally variable contexts. *Section 5* refers its institutional conditions to the assessment regimes and curricular settings of the partner systems (5.5). *Section 7* develops the framework's claim to

comparative applicability and articulates its contribution to European democratic education. Read together, these sections set out the framework's response to a question central to any transnational educational project: what can be shared, and what must remain context-sensitive, when democratic competences are cultivated across diverse European educational systems.

A note on scope: This document presents the ACES Framework in its theoretical articulation. Its relation to empirical research runs along three lines, which the document handles differently.

The first comprises conceptual sources – the theoretical and empirical-conceptual literature on which the framework's constructs build. They range from the personality-psychological tradition of ambiguity tolerance (Budner, 1962; Frenkel-Brunswik, 1949; McLain et al., 2015) and the theory of transformative educational processes (Koller, 2016) to the systems-theoretical analysis of organisations (Kühl, 2020) and the RFCDC (Council of Europe, 2018a), and form the framework's foundational reference base.

The second comprises focused empirical evidence – specific studies cited where they underwrite particular substantive claims, such as the studies on game-based interventions in 6.2.6 or the meta-analytic findings on feedback in 7.2 (Wisniewski et al., 2020). Empirical anchoring at this level is selective rather than comprehensive.

The third comprises adjacent research traditions – epistemic cognition, controversial issues in education, formative assessment – to which the framework's claims are connected at specific points but which it does not systematically review. That review, together with measurement approaches, the operationalisation of state-level dynamics, and the design of intervention and longitudinal studies, belongs to the empirical companion paper: not a belated foundation for a free-standing theory, but the extension of an already empirically informed framework into the methodological registers it presupposes.

The framework presented here should therefore be read as a working theoretical model: empirically informed at the conceptual level, anchored in focused empirical evidence at substantive claim-points, and designed to enable – rather than to substitute for – systematic empirical engagement in subsequent work. It is stable enough to guide empirical work and pedagogical design, and open to refinement; adjustments will be documented in subsequent versions.

1. Introduction: Ambiguity as a Challenge for Democratic Education

Ambiguity as a structural condition of contemporary societies

Contemporary European societies operate under conditions of structural ambiguity. The pluralisation of values, the accelerated transformation of social, economic, and ecological orders, the multiplication of competing knowledge claims, and the pervasive contestation of formerly stable categories have made indeterminacy not an exceptional state but a permanent feature of social life (Bauman, 2007). What has been described as a polycrisis – the systemic interdependence and mutual reinforcement of multiple crises across ecological, economic, political, and social domains (Lawrence et al., 2024; Morin & Kern, 1999) – adds a further structural dimension to this diagnosis: present-day uncertainty is not a sequence of isolated challenges to be managed individually, but a condition in which crises co-produce one another and cannot be resolved in isolation. Climate change, migration dynamics, digital transformation, and democratic erosion are not separate problems with separate solutions; they are entangled in ways that resist linear analysis and demand sustained engagement with complexity. These developments generate complexity and uncertainty, but they also produce ambiguity in the more specific sense relevant to this framework: situations in which competing interpretations, knowledge claims, or normative orientations remain simultaneously defensible. This indeterminacy is not only a challenge: it is also the condition under which genuine plurality becomes possible – the space in which different values, perspectives, and ways of life can coexist without being reduced to a single authoritative order (Dengel & Kelch, 2021, p. 82).

Under these conditions, citizens are required to act, decide, and form judgments in the face of incomplete information, conflicting expert claims, and unresolved normative disputes. This condition is neither a transient phase to be weathered nor a deficiency to be eliminated; it is a structural feature of the kind of society in which democratic participation is now expected to take place. Democratic engagement today therefore presupposes the capacity to navigate ambiguity, and the complexity and uncertainty in which it is embedded, rather than to escape them.

Contemporary democratic challenges are characterised not only by uncertainty but also by the coexistence of multiple legitimate forms of knowledge and expertise. Scientific, professional, experiential, and community-based forms of knowledge frequently intersect in the interpretation of complex societal issues (Jasanoff, 2004). Learning to navigate ambiguity therefore requires the capacity to engage constructively with different perspectives, sources of knowledge, and competing interpretations of social reality.

The educational challenge: beyond clarity-oriented teaching

This poses a distinctive challenge for democratic education. Schooling has often been organised around what might be called a clarity imperative: structuring instruction around

well-defined questions, correct answers, and resolvable problems. Such an orientation has its place – not all subject matter is ambiguous, and didactic reduction is a legitimate pedagogical operation. Yet where the clarity imperative becomes the dominant or exclusive mode of teaching, it produces a systematic mismatch between the conditions of democratic participation and the conditions of democratic education: learners are left underprepared for precisely those conditions of indeterminacy that characterise democratic life. In an analogous sense, and borrowing Latour's (1993, pp. 10ff.) terminology, this clarity imperative can be understood as a pedagogical form of "work of purification": an effort to stabilise learning by excluding or suppressing the very ambiguities that characterise the social and political realities learners are expected to inhabit. Where Latour describes how modern thought separates hybrid phenomena into neatly bounded domains, the clarity imperative separates teachable content from the entangled realities it is meant to illuminate. The pedagogical task is therefore not to deny complexity in order to make it teachable, but to develop forms of teaching and learning that allow learners to engage productively with ambiguity itself – to recognise it, to sustain it, to form judgments under it, and to act on the basis of those judgments without pretending that the underlying ambiguity has been resolved.

This task cannot be met by adding a single teaching method or curricular module to existing practice. It requires a structural reorientation that addresses, simultaneously, the institutional conditions under which learning takes place, the situational dynamics through which learners encounter ambiguity, the competences that allow them to engage with it productively, and the dispositions that consolidate over time.

From ambiguity tolerance to Ambiguity Competence

Productive engagement with ambiguity – sustaining indeterminacy, entertaining multiple valid interpretations, weighing competing values, and acting under ambiguity without retreating into simplification – is what the educational and psychological literatures discuss under the heading of ambiguity tolerance (AT). The concept originates in post-war personality research, where Frenkel-Brunswik (1949) defined intolerance of ambiguity as an emotional and cognitive disposition associated with rigid, dichotomous, and authoritarian patterns of judgment (Adorno et al., 1950). Subsequent research has consolidated AT as a multidimensional construct involving affective and cognitive responses (McLain et al., 2015) and has refined its boundaries against related concepts such as intolerance of uncertainty (Grenier et al., 2005) and the need for cognitive closure (Kruglanski & Fishman, 2009). The present framework extends this multidimensional account analytically by incorporating an epistemic dimension grounded in research on epistemic cognition (see 2.2.2).

A central development in recent scholarship is the shift from understanding AT exclusively as a stable personality trait toward asking how productive engagement with ambiguity can be learned and developed; some authors describe this as reconceiving AT as a competence (de Vries, 2021; Gloe & Heindl, 2026; Heindl & Gloe, 2026). The present framework takes up this shift but draws the distinction more sharply: it separates ambiguity tolerance as a dispositional construct from Ambiguity Competence as the set of capacities through which engagement with ambiguity can be pedagogically cultivated (see Section 7).

The democratic significance of ambiguity tolerance follows directly from its conceptual structure. AT does not primarily concern the content of democratic judgments but the procedural conditions under which democratic judgments can be formed: the willingness to remain in deliberation, to recognise the legitimacy of competing perspectives without lapsing into relativism, and to make reasoned commitments under conditions in which certainty is unavailable. As Heindl and Gloe (2026) put it pointedly, ambiguity tolerance is “not a ‘soft’ secondary skill, but a prerequisite for democratic capacity to act. It enables people to deal productively with dissent, contingency, and provisional solutions” (p. 1458). Where ambiguity tolerance is weak, democratic participation becomes more vulnerable to authoritarian shortcuts: simplified narratives, the identification of scapegoats, and the rejection of plurality itself (Krieger, 2021, p. 110). The *Council of Europe’s Reference Framework of Competences for Democratic Culture (RFCDC)* accordingly lists tolerance of ambiguity among the core attitudes of a democratic culture, defining it as a positive orientation toward situations “perceived to be uncertain and subject to multiple conflicting or incompatible interpretations” (Council of Europe, 2018a, p. 45).

Aim and contribution of the ACES Framework

The ACES Framework sets out to make productive engagement with ambiguity pedagogically operationalisable. In doing so, it addresses a gap that runs through the existing literature. Psychological research on AT has produced a robust construct but few sustained connections to didactic practice; educational and didactic scholarship offers sophisticated reflections on dealing with uncertainty, controversy, and complexity, but rarely with explicit reference to the AT construct. The result is a conceptual disjunction: educators speak about ambiguity without a shared theoretical vocabulary, and researchers theorise ambiguity without sustained attention to the pedagogical conditions of its cultivation.

The framework bridges this gap through three connected moves. First, it integrates psychological and educational perspectives, distinguishing between AT as a relatively stable disposition (Trait-AT) and state-level ambiguity processing (State-AT), and connecting both to a multidimensional construct of Ambiguity Competence (see Section 7). This distinction matters pedagogically: educational interventions do not primarily or immediately target relatively stable traits, but they can systematically shape the situational conditions under which state-level processing occurs and competences develop. Second, the framework specifies the didactic-institutional conditions (see Section 5) and pedagogical principles – openness and non-closure, productive irritation, reflexivity (see Section 6.1) – under which ambiguity-rich learning situations can be staged without collapsing either into closure or into arbitrariness. Third, it offers a processual model (see Section 7.2) that hypothesises how repeated state-level engagement with ambiguity, mediated by competence-building, can stabilise into trait-level dispositions over time.

The framework is primarily analytical and developmental rather than a prescriptive curriculum or fixed pedagogical programme. It does not propose a single curriculum or a uniform set of methods, but provides a shared vocabulary and conceptual architecture within which curricula, teacher education programmes, and classroom practices can be designed, compared, and evaluated. Ambiguity Competence is articulated in five dimensions – interpretive, perspective, reflexive, normative, and decision competence (see Section 7.3) –

which together specify what it means, concretely and observably, to engage productively with ambiguity in democratic learning contexts. The framework's relation to the RFCDC is thereby one of specification rather than substitution: where the RFCDC identifies tolerance of ambiguity as an attitude within its competence model, ACES articulates the cognitive, perspectival, and judgmental capacities it concretely involves and shows how they can be pedagogically cultivated.

Relevance for European educational contexts and cooperation

The framework has been developed for European educational contexts and is intended to support transnational cooperation. The relevance of ambiguity tolerance for European democratic education has both a structural and a political dimension. Structurally, European societies are characterised by linguistic, cultural, religious, and political plurality – not as an exception, but as a defining condition. Cooperation across these differences depends on citizens who can engage with otherness without demanding its assimilation, and on educational systems capable of cultivating that capacity. Politically, the appeal of authoritarian-populist narratives across Europe illustrates the democratic relevance of mechanisms associated with low ambiguity tolerance: simplification, dichotomisation, and the rejection of complexity and plurality. In conditions of polycrisis, where simplifying responses are politically attractive precisely because they promise relief from complexity, the cultivation of ambiguity tolerance becomes a democratic necessity rather than an educational refinement. Strengthening it through education is, in this sense, not a culturally specific concern but a shared European task.

The framework is therefore designed to be both common and adaptable. It articulates a conceptual model that European partner institutions can share as a working language, while leaving the concrete pedagogical realisation open to context-sensitive elaboration. The cultural variability of ambiguity tolerance itself – indicated by cross-cultural research on related constructs (Hofstede, 1984; OECD, 2024; see also 2.5 and 4.4.1) – is treated not as a limitation of the framework but as a structural feature it must be capable of accommodating. Accordingly, it distinguishes the construct of Ambiguity Competence (which functions as a common European vocabulary) from its pedagogical realisation (which necessarily varies with national educational traditions, curricular structures, and cultural relations to uncertainty). What makes the framework European is thus not primarily the theoretical origin of its categories but the logic of shared conceptualisation combined with context-sensitive pedagogical operationalisation.

2. Conceptual Foundations

2.1 Ambiguity: definition and conceptual delimitation

Ambiguity refers to a property of situations, information, or signs that permit more than one defensible interpretation, evaluation, or response. Such plurality may arise because meanings are underdetermined, relevant claims conflict, normative principles compete, or the categories required for orientation are themselves contested. A term often used

interchangeably with ambiguity – in everyday language and even in parts of the educational literature – is uncertainty, though the two concepts denote structurally distinct phenomena. Uncertainty often concerns what is not known or cannot confidently be anticipated – the unpredictability of outcomes, the gap between what is known and what would need to be known to act with confidence (Grenier et al., 2005) – and frequently has a future-oriented character. Ambiguity, by contrast, concerns situations in which more than one interpretation, evaluation, or response remains defensible, whether or not further information is available. Ambiguity is not, however, a fixed property that situations simply have or lack: the framework distinguishes between the structural openness of an object, which constitutes its ambiguity potential, and operative ambiguity, which arises in a concrete situation only through the practices that take that object up (see 4.1).

This distinction has direct consequences for educational thinking. A pedagogy concerned with uncertainty is concerned with anticipation, prediction, and risk – with what may or may not happen. A pedagogy concerned with ambiguity is concerned with the present condition of meaning-making – with how learners engage with what is already in front of them when what is in front of them does not yield a single reading. The two concerns are related but not identical, and conflating them obscures what each requires of educational practice. The ACES Framework focuses primarily on ambiguity, while acknowledging that uncertainty often accompanies ambiguous situations and that the two frequently appear together in educational settings.

A second clarification concerns the conceptual neighbours of ambiguity. Ambivalence refers to the simultaneous experience of conflicting feelings or attitudes within an individual; it is a property of the experiencing subject, not of the situation (de Vries, 2021). Need for cognitive closure refers to the motivational tendency to reach a definite answer and to avoid ambiguity in arriving at it; high need for closure is associated with reduced openness to alternative interpretations and with discomfort in situations that resist resolution (Kruglanski & Fishman, 2009). Uncertainty avoidance, in the cross-cultural sense developed by Hofstede (1984), describes the institutional and cultural tendency of societies to minimise unstructured situations through rules, norms, and predictability. These concepts overlap with ambiguity tolerance but address distinct phenomena: ambivalence is a property of the subject, need for closure a motivational disposition, and uncertainty avoidance a cultural-systemic feature. Ambiguity tolerance, as the present framework develops it, refers to an individual's dispositional orientation toward ambiguity as a property of situations, whereas Ambiguity Competence designates the capacities through which such situations can be engaged with productively – without demanding premature resolution and without collapsing into indifference.

A third differentiation concerns the relation between ambiguity and complexity. Complex situations are not necessarily ambiguous, and ambiguous situations are not necessarily complex. A simple binary choice can be ambiguous (when both options have legitimate but incommensurable grounds), and a highly complex system can be unambiguous (when its complexity is structured by clear rules). The framework therefore treats ambiguity not as a synonym for complexity but as a specific feature that may or may not accompany complex

situations: the property of admitting more than one legitimate interpretation, response, or judgment.

These distinctions matter because they specify what ambiguity tolerance is a tolerance of. It is not a generalised tolerance for difficulty, complexity, or uncertainty; it is a specific orientation toward situations whose interpretive, evaluative, or practical resolution is not pre-given – one that neither forces closure nor relinquishes the demand for reasoned engagement.

DEFINITION

Ambiguity is a property of situations, information, or signs that permit more than one defensible interpretation, evaluation, or response. Such plurality may arise because meanings are underdetermined, relevant claims conflict, normative principles compete, or the categories required for orientation are themselves contested. It differs from uncertainty, which concerns what is not known or cannot be anticipated.

2.1.1 Types of ambiguity

The definition developed in 2.1 – ambiguity as a property of situations admitting more than one defensible interpretation, evaluation, or response – is structurally disjunctive: it covers a range of phenomena that share the basic feature of plurality but differ in what kind of plurality is at issue. For analytical clarity, and for the purposes of the framework's later operationalisation, three types of ambiguity must be distinguished. They are not exclusive: empirically, they are often interwoven in concrete situations, and one of the framework's pedagogical claims (developed in 4.2) is that learners encounter them most often in combination. But analytically, they constitute distinct phenomena, each with its own structural logic.

a) Interpretive ambiguity

Interpretive ambiguity describes situations in which an object – a text, a situation, a sign, a sequence of events – admits of more than one legitimate reading (T. Bauer, 2018; Eco, 1989). The plurality concerns meaning and interpretation: what something means and how it is to be understood. Prototypical instances include the interpretation of literary texts (Eco, 1989; Tengberg et al., 2025), the analysis of contested historical sources (Wineburg, 1991), the reading of social situations whose meaning is not fixed by surface features (Goffman, 1974), and the interpretation of complex visual material (Breckner, 2012; Gamboni, 2002). Interpretive ambiguity is fundamentally a cognitive phenomenon – it operates at the level of meaning-making – though it carries affective and epistemic correlates. Its resolution, where resolution is appropriate, proceeds through the weighing of evidence, the comparison of readings against criteria internal to the relevant practice, and the reflexive examination of one's own interpretive standpoint.

b) Normative ambiguity

Normative ambiguity describes situations in which legitimate values, principles, or commitments stand in a tension that cannot be eliminated by further factual inquiry alone. The plurality is evaluative in character: it concerns not what is the case but what ought to be done, what counts as good, just, or right. Prototypical instances include ethical dilemmas, political value conflicts (freedom versus equality, individual rights versus collective welfare, present generations versus future ones), and the negotiation of competing normative commitments in democratic deliberation. Normative ambiguity is structurally distinct from interpretive ambiguity in two respects. First, such situations require evaluative judgment rather than epistemic resolution: they are not settled by better evidence or sharper analysis but call for judgment under conditions in which incommensurable goods are at stake (cf. Berlin, 1969; Williams, 1981). Second, it is action-implicating in a way that interpretive ambiguity often is not: where normative ambiguity arises, decisions cannot be deferred indefinitely; refraining from decision is not a neutral option – it is itself a choice with normative consequences.

c) Pragmatic ambiguity

Communicative interaction is structurally open to pragmatic ambiguity: the meaning of an utterance, gesture, or action is never fully determined by the expression itself (cf. Winkler, 2022, on the structural ambiguity of language and communication). This openness is a permanent feature of interaction rather than an exception; in most exchanges it is resolved tacitly through shared conventions and context. It becomes ambiguity in the sense relevant to this framework, and pedagogically salient, where such shared understandings cannot be presupposed, so that more than one reading of what someone is doing remains defensible. The plurality is interactional in character: it concerns what someone is doing in saying or doing what they say or do. It becomes particularly salient in irony, indirect speech acts, mismatched conversational framings, the negotiation of role expectations, and culturally variable patterns of directness, silence, and address. Pragmatic ambiguity is structurally distinct from both interpretive and normative ambiguity in that its resolution depends on what participants are willing to recognise about each other and the situation – it is constituted moment by moment in the joint accomplishment of interaction (cf. Goffman, 1974; Schatzki, 2002). Unlike interpretive ambiguity, pragmatic ambiguity cannot simply be held open in contemplation: interaction continues, and participants must respond – reply, intervene, or remain silent – before the meaning of what has been said or done is settled. In this respect it is action-implicating, as normative ambiguity is. Pragmatic ambiguity is also the type most strongly conditioned by cultural and institutional context, a point developed further in 4.3 and 4.4.

The three types share a common structural feature – the non-uniqueness of a defensible interpretation, evaluation, or response – but they instantiate that feature in different phenomenal registers. Interpretive ambiguity operates on objects, normative ambiguity on commitments, pragmatic ambiguity on interactions. Each makes different demands on the engaging subject: interpretive ambiguity calls for analytic comparison and reflexive self-

examination, normative ambiguity for evaluative judgment under incommensurability, pragmatic ambiguity for situational sensitivity and relational attunement.

In educational settings, the three types are characteristically interwoven. A classroom discussion of a contested political issue contains interpretive ambiguity (what are the relevant facts, how is the issue best framed?), normative ambiguity (which values should weigh more heavily, what counts as a defensible position?), and pragmatic ambiguity (how do participants signal disagreement, who can speak, how is the discussion held open?). The framework's account of domain-specificity (4.2) takes this interweaving seriously: schools are sites in which all three types are simultaneously present, and democratic education adequate to ambiguity must address each in its own structural register.

This typology has consequences for the framework's central pedagogical claim. Ambiguity Competence, as developed in 7.3, is articulated as a set of capacities that engage with ambiguity in its different types. Some of these capacities are type-specific: interpretive competence (7.3.2) addresses primarily interpretive ambiguity, and normative competence (7.3.5) primarily normative ambiguity. Decision competence (7.3.6) is type-specific in a different sense: it addresses not a single type but the action-implicating dimension that normative and pragmatic ambiguity share – the necessity of acting before the ambiguity is resolved. Others are type-transversal: perspective competence (7.3.3) and reflexive competence (7.3.4) operate across all three types, because they concern not the substantive engagement with a particular kind of ambiguity but the meta-perspectival capacity to recognise one's own and others' standpoints toward whatever ambiguity is at hand. Pragmatic ambiguity accordingly has no competence of its own; it is addressed through the interplay of decision competence with the two type-transversal capacities, above all perspective competence, which carries the situational sensitivity and relational attunement this type demands. This division – two capacities tied to a single type, one tied to a dimension shared by two types, and two operating across all types – is not an arbitrary feature of the framework's architecture but is motivated by the typology developed here. Where existing accounts differentiate ambiguity tolerance by psychological components but not by type of ambiguity, the present framework articulates Ambiguity Competence as a constellation of capacities whose internal differentiation reflects the structural heterogeneity of ambiguity itself.

The typology also has consequences for the framework's claim to transnational applicability (developed in 7.4). The three types of ambiguity are not equally salient in all educational and cultural contexts. Educational systems differ in how they curricularly distribute interpretive, normative, and pragmatic ambiguity across subjects; cultures differ in how they organise interactional patterns and therefore in which forms of pragmatic ambiguity become pedagogically operative; political traditions differ in which normative tensions are treated as foundational disagreements and which as resolvable conflicts. The framework's transnational applicability rests not on the assumption that the same configurations of ambiguity prevail everywhere, but on the analytical resource that the typology provides: it allows partner institutions to identify, in their own educational and cultural contexts, which types of ambiguity are pedagogically operative, which are systematically under-addressed, and where common European pedagogical work might most productively focus.

2.2 Ambiguity tolerance as a psychological construct

Ambiguity tolerance has been studied across psychology, education, and the social sciences for over seven decades. Its conceptual development reflects a broader shift in psychological theorising: from understanding human responses to ambiguity as expressions of relatively fixed personality structures toward understanding them as patterns that are at once individually variable, situationally responsive, and educationally cultivable. The two subsections that follow trace this development in two steps: the shift from treating ambiguity tolerance as an either-or characteristic to understanding it as a continuum from aversion to attraction (2.2.1), and the recognition that it comprises several interrelated components (2.2.2).

2.2.1 Continuum from aversion to attraction

The original conceptualisation of ambiguity tolerance, developed in post-war personality research, was structured around the construct's negative pole. Frenkel-Brunswik (1949) introduced intolerance of ambiguity as an emotional and cognitive disposition characterised by the tendency to resort to dichotomous categories, to seek unambiguous solutions, and to avoid situations whose interpretive structure remained open. Together with the broader investigations of authoritarian personality patterns (Adorno et al., 1950), this work established intolerance of ambiguity as an analytically central category for understanding rigid, exclusionary, and dogmatic worldviews. The construct's political-psychological motivation was explicit from the outset: low ambiguity tolerance was identified as a structural feature of the kind of personality organisation that is susceptible to authoritarian appeals.

This early conceptualisation defined ambiguity tolerance largely via negativa – as the absence of intolerance – and treated it as a relatively unitary trait. Subsequent research has substantially refined this picture. Budner's (1962) influential operationalisation already allowed for graduated responses, and over the following decades, ambiguity tolerance came to be understood not as the simple absence of intolerance but as a continuum of dispositions ranging from active aversion to ambiguity, through neutrality, to active attraction. McLain et al. (2015) consolidate this development, defining ambiguity tolerance as an individual difference that “predicts short- and long-term reactions to complex, unfamiliar, confusing, indeterminate, and incomplete” (p. 2) situations and that operates as a stable but learnable disposition.

The continuum has two analytically important features. First, it makes clear that ambiguity tolerance is not a binary property – having or lacking the trait – but a dimensional one, with individuals located at varying points along a spectrum. Second, it acknowledges the existence of a positive pole. Some individuals do not merely tolerate ambiguity but actively seek it: they find ambiguous situations interesting, generative, or pleasurable, and they prefer them to situations whose meaning is fixed in advance. Research on creativity has linked this positive pole to divergent thinking, problem-finding, and innovative cognition

(Gabora, 2016; Roy et al., 2017); related work connects tolerance of ambiguous uncertainty to prosocial behaviour (Vives & FeldmanHall, 2018).

For educational thinking, the continuum has a specific implication. Pedagogies aimed at ambiguity tolerance cannot be content with reducing aversion; they should also create conditions under which curiosity, engagement, and, in some contexts, attraction to ambiguity can emerge. The educational task is not the elimination of discomfort with the indeterminate but the development of a productive relation to it – one in which ambiguity ceases to be experienced primarily as a threat and becomes legible, at least at times, as a resource. This pedagogical claim is what the ACES Framework specifies through its construct of Ambiguity Competence (see Section 7.3), which describes the capacities that allow learners to move along the continuum in a self-determined and reflexive manner.

A further development that the present framework builds on is the emerging trait-versus-competence differentiation in the more recent literature. While classical personality psychology treated ambiguity tolerance as a stable temperamental feature (Budner, 1962), more recent approaches emphasise its learnability and developmental character (de Vries, 2021; Heindl & Gloe, 2026). On this view, ambiguity tolerance remains a relatively stable disposition, while the capacities through which ambiguity is engaged can be fostered through reflective and dialogical educational processes. This differentiation is foundational for the ACES Framework, which separates the dispositional construct (Trait-AT) from the pedagogically cultivable construct (Ambiguity Competence) while specifying their hypothesised developmental relationship (see Section 2.3 and Section 7).

2.2.2 Multidimensional structure (affective, cognitive, epistemic)

The second decisive refinement concerns the internal structure of the construct. Early conceptualisations treated ambiguity tolerance as a relatively unitary disposition; subsequent research has shown that it is better understood as a multidimensional construct involving emotional as well as cognitive responses to ambiguous stimuli (McLain et al., 2015). Building on this literature and on research on epistemic cognition (Hofer & Pintrich, 1997), the present framework distinguishes three analytically distinguishable components: an affective, a cognitive, and an epistemic one. Each describes a different aspect of how individuals encounter and process ambiguous situations; whether they vary independently of one another is an empirical question the framework poses rather than presupposes.

The affective dimension concerns the emotional response to ambiguity. Ambiguous situations characteristically activate emotional states – anxiety, discomfort, curiosity, or fascination – that can precede and shape subsequent cognitive engagement. The affective dimension is therefore not merely a residual accompaniment of cognitive processing but one of its important conditions. Whether the affective response takes the form of aversion, neutrality, or attraction has consequences for whether and how the situation is subsequently engaged.

The cognitive dimension concerns the capacity to entertain multiple interpretations simultaneously, to shift between perspectives, and to resist the impulse to resolve

indeterminacy through premature categorisation. Cognitive ambiguity tolerance is closely related to, but distinct from, cognitive flexibility: it specifically describes the willingness and ability to hold more than one interpretation open while engaging with the material at hand. Where cognitive ambiguity tolerance is low, ambiguous situations tend to be resolved through dichotomous categorisation, recourse to familiar schemata, or appeals to authority; where it is high, learners can sustain plural readings while continuing to think about which is better grounded.

The epistemic dimension concerns the stance a person takes toward knowledge in the face of ambiguity: whether a multiplicity of interpretations is understood as a legitimate feature of the matter at hand or as a sign that inquiry is incomplete, and accordingly whether knowledge claims are held as provisional and revisable or as fixed. Where the epistemic stance is closed, ambiguity is treated as a defect to be removed by finding the one correct answer; where it is open, learners can recognise that some questions admit of more than one defensible reading without concluding that all readings are equally valid (see 3.3). Cognition concerns how multiplicity is processed; epistemic stance concerns what that multiplicity is taken to mean about knowledge.

The epistemic dimension articulated here connects to a substantial research tradition on epistemic cognition that the framework engages without systematically reviewing. Three lines of work are particularly consequential. King and Kitchener's (1994) Reflective Judgment Model traces a developmental progression in how individuals reason about ill-structured problems – problems that, like ambiguity in the framework's sense, do not admit of definitive solutions through standard procedures. Their work documents that the recognition of legitimate uncertainty as a feature of substantive questions, rather than as a deficiency to be eliminated, develops gradually and is by no means automatic – a finding that bears directly on the framework's pedagogical claims. Kuhn's (1991) work on argumentative competence and its developmental epistemology shows that the capacity to coordinate multiple perspectives on contested questions, while distinguishing better-grounded from less well-grounded claims, is itself a developmental achievement that schooling can support but does not guarantee. Sandoval's (2005) work on students' practical epistemologies in science education extends these concerns into specific subject-matter contexts, arguing that epistemic stances are shaped by how disciplines are pedagogically presented – whether learners are positioned as receivers of established knowledge or as participants in its construction. He distinguishes students' formal epistemologies – their views about professional science – from their practical epistemologies, the epistemic assumptions that guide their own inquiry in school, and argues that instruction can change how learners understand knowledge only if it takes the latter into account. How a discipline is pedagogically enacted thus becomes part of what learners come to believe about knowledge in that discipline. The framework's construct of epistemic ambiguity tolerance is consistent with the developmental and educational findings of this tradition: it describes a stance that some learners hold more readily than others, that develops over time, that is shaped by educational experience, and that can be expected to vary with how disciplines are pedagogically framed (a point the framework develops further in 3.3.1 and in its discussion of teacher epistemic stance in 5.2). The framework does not propose to add to this tradition

theoretically; it draws on its findings to ground the claim that epistemic ambiguity tolerance is both pedagogically consequential and pedagogically cultivable.

The three dimensions are conceptually distinct but empirically interwoven. A learner's affective response to ambiguity shapes whether cognitive engagement occurs at all; cognitive engagement, in turn, can modulate the initial affective response; and the epistemic stance frames both – determining whether the situation is treated as one that should admit of multiple readings or as one in which multiplicity is a problem to be eliminated. The framework's account of state-level ambiguity processing (see 2.3.2 and Section 7.1) is built directly on this tripartite structure: when learners encounter ambiguity, they engage with it affectively, cognitively, and epistemically, and the quality of their engagement depends on the interaction of all three dimensions.

The multidimensional structure has important pedagogical consequences. It implies that interventions aimed at fostering ambiguity tolerance cannot operate on a single dimension alone. On the framework's account, a purely cognitive intervention – for example, training learners to identify multiple interpretations – can be expected to achieve only limited effects if the affective experience of ambiguity remains predominantly aversive, or if the epistemic stance treats indeterminacy as a sign of insufficient inquiry. Conversely, addressing only the affective dimension (e.g., by creating supportive classroom climates) without developing the cognitive and epistemic capacities to engage substantively with ambiguity risks producing comfort with ambiguity without the resources to act under it. The ACES Framework treats the three dimensions as jointly constitutive: pedagogical interventions are designed to engage all three, and the framework's construct of Ambiguity Competence (see Section 7.3) specifies the interpretive, perspective, reflexive, normative, and decision competences through which the multidimensional structure of state-level processing becomes pedagogically cultivable over time.

DEFINITION

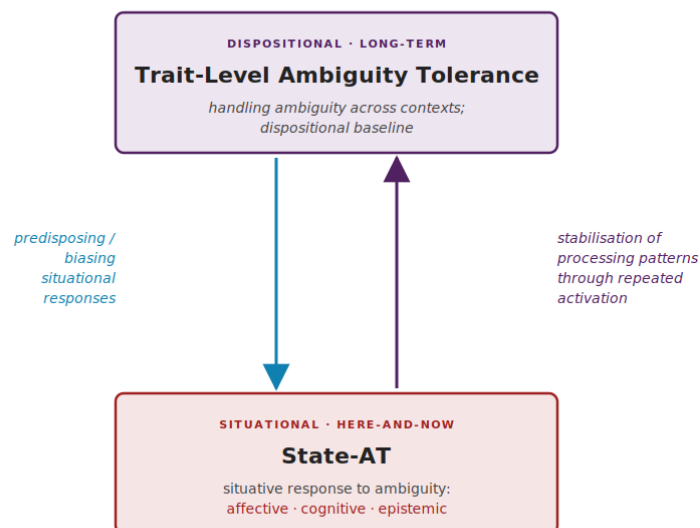
Ambiguity tolerance (AT) is an individual's dispositional orientation toward ambiguity as a property of situations, understood as a continuum from aversion to attraction and comprising affective, cognitive, and epistemic dimensions. Its development is conditioned by cultural and institutional contexts (see 2.5).

2.3 Trait and State perspectives

The dynamic relationship between Trait-AT and State-AT can be summarised visually (see Figure 1). Trait-AT predisposes individuals to respond to ambiguous situations in characteristic affective, cognitive, and epistemic ways; these situational responses, in turn, when activated repeatedly across a range of situations, are hypothesised to contribute to the stabilisation – or, where conditions warrant, the reshaping – of trait-level dispositions over time. Trait and state are thus neither identical nor independent: they constitute the two poles of a single dynamic, in which short-term situational responses and long-term dispositional patterns mutually condition one another.

This dynamic has direct implications for educational thinking. Treating ambiguity tolerance exclusively as a trait risks understanding it as something individuals either have or lack – a fixed property, comparable to height or eye colour, that lies largely beyond pedagogical reach. Treating it exclusively as a state risks reducing it to a set of momentary reactions whose accumulation across situations remains theoretically unaddressed. Neither account, taken on its own, can sustain a pedagogically productive understanding of ambiguity tolerance. The framework therefore develops both perspectives jointly: Trait-AT and State-AT are conceptually distinguishable but empirically and developmentally interrelated, and educational interventions operate on the dynamic that links them.

FIGURE 1
Dynamic Model of Ambiguity Processing
Trait-State Dynamics



Note. Trait-level ambiguity tolerance predisposes individuals to respond to ambiguous situations in characteristic ways (state-AT). Through repeated activation of these responses across situations, processing patterns are stabilised and contribute to the maintenance (or potential change) of trait-level ambiguity tolerance over time.

Figure 1. Dynamic Model of Ambiguity Processing: Trait–State Dynamics.

The figure depicts the bidirectional relationship between Trait-AT and State-AT. Trait-level ambiguity tolerance, as a relatively stable dispositional baseline, predisposes and biases situational responses to ambiguous encounters along their affective, cognitive, and epistemic components (downward arrow). Conversely, repeated activation of state-level processing across situations is hypothesised to contribute to the stabilisation – or, where conditions warrant, the gradual reshaping – of trait-level dispositions over time (upward arrow). Trait and state are thus neither identical nor independent, but constitute the two poles of a single dynamic in which short-term situational responses and long-term dispositional patterns mutually condition one another. The model provides the psychological foundation that the four-tiered architecture in Figure 2 extends pedagogically.

2.3.1 Trait-AT as relatively stable disposition

Trait-level ambiguity tolerance refers to the relatively stable disposition of an individual toward ambiguous situations across time and contexts. It describes characteristic patterns in how a person tends to respond to indeterminacy – emotionally, cognitively, and epistemically – that are recognisable across different situations and persist over extended periods of life.

In line with the multidimensional structure introduced in Section 2.2.2, the framework distinguishes three components of Trait-AT. It thereby hypothesises a structurally corresponding tripartite organisation at trait and state levels, an assumption open to empirical examination. The affective disposition refers to a stable emotional orientation toward ambiguity: the characteristic feeling-tone with which an individual approaches ambiguous situations, ranging from generalised anxiety or aversion to neutrality, openness, or active enjoyment. The cognitive openness component refers to a stable capacity to shift between perspectives, to entertain multiple interpretations, and to resist premature closure as a habitual mode of thinking – not as a one-off achievement but as a settled style of engagement with indeterminate material. The epistemic openness component refers to a stable acceptance of the provisionality and fallibility of knowledge: the dispositional recognition that not every question admits of a definitive answer, that legitimate disagreement can persist among reasonable people, and that some matters resist resolution not because of insufficient inquiry but because of their substantive nature.

Three features of Trait-AT, as the framework conceives it, deserve specific emphasis. First, Trait-AT is relatively stable rather than absolutely fixed. The literature suggests that dispositions of this kind, while stable over moderate time-spans, are subject to gradual change in response to sustained experience, formative events, and structured learning environments (de Vries, 2021; Heindl & Gloe, 2026). Trait-AT is therefore neither a permanent trait in the strict sense nor a freely modifiable preference; it occupies an intermediate position that makes it accessible through educational processes. Second, Trait-AT is not directly trainable. No pedagogical intervention can simply raise an individual's trait-level ambiguity tolerance in the way that a mathematics lesson can teach a procedure. The framework hypothesises that Trait-AT is shaped indirectly, through the cumulative effect of repeated, competence-mediated state-level engagement with ambiguity (see Section 7.2). Third, Trait-AT is consequential for behaviour: it predisposes individuals to characteristic responses in concrete situations, and it thereby shapes – without strictly determining – the quality of state-level processing.

This last point is particularly important for the framework's pedagogical logic. Trait-AT does not produce situational responses mechanically; it predisposes them. The same trait-level disposition can issue in different state-level responses depending on the situation, the available competences, and the surrounding conditions. A learner with relatively low trait-level ambiguity tolerance can, under supportive didactic conditions and with developed competences, sustain ambiguity in a particular situation; a learner with relatively high trait-level ambiguity tolerance can, under unsupportive conditions, foreclose it. Trait-AT is thus a probabilistic predictor of state-level processing, not its determinant – and this is what makes pedagogical work meaningful.

DEFINITION

Trait-AT is the relatively stable disposition of a person toward ambiguous situations across time and contexts. It predisposes, but does not determine, situational responses, and is hypothesised to be shaped indirectly, through repeated, competence-mediated state-level engagement with ambiguity.

2.3.2 State-AT as situational activation

State-level ambiguity processing (State-AT) refers to the situational activation of affective, cognitive, and epistemic responses when a learner encounters a specific ambiguous situation. Where Trait-AT describes how a person tends to respond to ambiguity in general, State-AT describes how a person actually responds to a particular situation, here and now. The abbreviation is retained for continuity, but it denotes state-level processing as a whole, including intolerant responses: its quality ranges from immediate foreclosure to sustained, open engagement.

State-AT is characterised by three features that distinguish it from Trait-AT. It is situation-bound: the same person can exhibit different state-level responses to different ambiguous situations, depending on the nature of the situation, its emotional valence, the resources available for engaging with it, and the surrounding conditions. It is transient: state-level activation rises and falls within a situation, intensifying with the encounter, modulating as engagement proceeds, and subsiding as the situation is resolved or left behind. And it is observable in real time: while Trait-AT must be inferred from patterns of behaviour across many situations, State-AT can in principle be observed as it unfolds – through verbal expressions, bodily responses, decisions made, or interpretations offered.

Like Trait-AT, State-AT is multidimensional. The affective component of State-AT consists in the immediate emotional response to the encountered ambiguity: does the learner experience the situation as threatening or as stimulating, as discomforting or as interesting? As noted in 2.2.2, ambiguous situations characteristically activate emotional states that can precede and shape cognitive engagement (McLain et al., 2015). The cognitive component consists in the actual processing of multiple interpretations: does the learner entertain the plurality of readings, or do they resolve it through quick categorisation? The epistemic component consists in the orientation toward the indeterminacy itself: does the learner treat the situation's ambiguity as a problem to be eliminated, or as a feature of the matter to be engaged?

The three components of State-AT operate in close interaction. The affective response shapes whether substantive cognitive engagement occurs at all: a strong aversive reaction can foreclose engagement before it begins, just as a strong positive reaction can sustain it through difficulty. Cognitive engagement, in turn, can modulate the initial affective response, as the act of identifying multiple legitimate readings can diminish the experience of threat. The epistemic component frames both, by determining whether the situation is one in which multiplicity is expected (and therefore not experienced as a deficiency) or one in which multiplicity is unexpected (and therefore experienced as a problem to be solved).

State-AT is the level at which pedagogical work makes its most direct difference. Didactic-institutional conditions structure the situations that activate state-level processing (see Sections 5 and 6.1); pedagogical methods stage the encounters that bring it into play (see 6.2); and Ambiguity Competence, once developed, shapes and moderates how state-level processing unfolds (see Section 7.3). State-AT is therefore not a downstream consequence of Trait-AT but the central locus at which pedagogical conditions, learner competences, and dispositional patterns meet – and at which their interaction may produce the developmental trajectory that the framework specifies.

The relationship between State-AT and Trait-AT, finally, is not one of simple expression. Trait-AT predisposes state-level responses, but it does not exhaust them. And state-level responses, when activated repeatedly, do not merely express trait-level dispositions but, on the framework's hypothesis, also reshape them: stable patterns are consolidated, unstable ones are revised, and over extended educational trajectories, trait-level dispositions develop in ways that depend on the qualified state-level engagement that pedagogical settings make possible. This is the developmental logic that Figure 2 (in Section 7.1) makes visible – and it is what justifies the framework's central pedagogical thesis: that ambiguity tolerance, while not directly trainable as a trait, may be cultivated indirectly through the conditions, situations, and competences that the framework specifies.

DEFINITION

State-AT is the situational activation of affective, cognitive, and epistemic responses when a learner encounters a specific ambiguous situation; it ranges from immediate foreclosure to sustained, open engagement. It is the level at which pedagogical work makes its most direct difference, since didactic-institutional conditions structure the situations that activate it.

2.4 Ambiguity tolerance in learning and democratic contexts

The conceptual development of ambiguity tolerance has, until recently, taken place largely in psychological research on personality, cognition, and emotion. Educational and democratic-theoretical discussions of comparable phenomena – controversy, complexity, multiperspectivity, the demands of pluralistic deliberation – have proceeded in parallel, often using different vocabularies, and only intermittently in dialogue. The present subsection traces what is at stake when the construct of ambiguity tolerance is brought into sustained connection with learning and democratic contexts: how learning theory has approached the productive engagement with indeterminacy, and what role ambiguity tolerance plays in democratic participation specifically.

In learning contexts, the productive engagement with ambiguity has been theorised under several headings. Educational theorists in the Bildung tradition have long argued that genuine learning involves moments in which the learner's existing patterns of interpretation become problematic and must be transformed (Combe & Gebhard, 2012; Koller, 2016). Such transformative moments, often described in terms of irritation or crisis, are characterised precisely by the breakdown of unambiguous orientation: the learner is

confronted with material that cannot be assimilated to existing categories, and learning consists in the development of new ones. Comparable arguments have been developed in the Anglophone tradition, most prominently in Mezirow's (1991) theory of transformative learning, where the disorienting dilemma serves as the entry point to learning that transforms frames of reference. While these traditions differ in vocabulary and theoretical commitments, they converge on a structural insight: learning that involves the transformation of existing interpretive schemes requires the capacity to remain in indeterminacy long enough for new patterns of understanding to develop. Ambiguity tolerance, on this view, is not an accessory to learning but among its conditions.

A second educational discourse has developed around the question of epistemological beliefs – learners' assumptions about the nature of knowledge and knowing (Hofer & Pintrich, 1997). Where learners hold absolutist epistemological beliefs (knowledge as fixed, certain, and authoritative), ambiguity is experienced as a deficiency to be eliminated; where they hold evaluativist beliefs (knowledge as constructed, fallible, and provisional within disciplinary standards), ambiguity is experienced as a legitimate feature of inquiry. Ambiguity tolerance is closely related to, though not identical with, the evaluativist position: it concerns not only the recognition that knowledge can be plural and provisional, but the capacity to engage with such plurality without succumbing to either dogmatism or relativism.

The democratic significance of ambiguity tolerance follows from a structural feature of democratic societies themselves. Democratic political orders institutionalise the legitimate coexistence of competing interpretations, values, and projects – and require their citizens to engage with this coexistence productively rather than to seek its abolition. The Council of Europe's Reference Framework of Competences for Democratic Culture (Council of Europe, 2018a) accordingly defines tolerance of ambiguity as a positive orientation toward situations "perceived to be uncertain and subject to multiple conflicting or incompatible interpretations" (p. 45), and lists it among the core attitudes of a democratic culture. In doing so, the RFCDC reflects a position widely shared in democratic theory and citizenship education: democratic deliberation, judgment-formation, and decision-making under conditions of pluralism systematically presuppose the capacity to remain in ambiguity rather than to foreclose it (cf. Heindl & Gloe, 2026).

Three features of democratic ambiguity deserve specific emphasis. First, democratic ambiguity spans all three types distinguished in 2.1.1: democratic disagreements concern how the relevant facts and issues are to be understood (interpretive), what ought to be done (normative), and how deliberation itself is to be conducted (pragmatic); ambiguity tolerance in democratic contexts must address all three. Second, democratic ambiguity is persistent rather than transitional: many democratic disagreements are not resolvable through further inquiry but are constitutive of the political community itself, which must develop ways of acting under sustained disagreement rather than expecting its eventual disappearance. Third, democratic ambiguity is productive rather than incidental: well-functioning democracies do not merely tolerate the persistence of ambiguity but use it as a resource – for the generation of new perspectives, the testing of claims, and the negotiation of legitimate compromise.

This convergence of learning-theoretical and democratic-theoretical considerations is the foundation for the ACES Framework's central pedagogical thesis: that ambiguity tolerance is not a peripheral or "soft" educational concern but a foundational condition for transformative learning and for democratic participation under conditions of persistent plurality. As argued in Section 1, where it is weak, democratic participation becomes more vulnerable to authoritarian shortcuts (Heindl & Gloe, 2026, p. 1458; Krieger, 2021, p. 110). Where it is present and competence-mediated, ambiguity becomes – in democratic learning as in democratic life – not a problem to be solved but a condition to be inhabited productively.

2.5 Cultural and contextual variability of ambiguity tolerance

The discussion of ambiguity tolerance has, so far, treated the construct as an individual-psychological phenomenon: a disposition of persons, activated in situations, developed through education. This treatment is necessary but insufficient. Ambiguity tolerance is also a culturally and contextually variable phenomenon: societies, institutions, and educational systems differ systematically in how they relate to indeterminacy, and these differences condition the individual-level dispositions that develop within them.

The most influential systematic account of this variability is Hofstede's (1984) cross-cultural research on uncertainty avoidance. In Hofstede's framework, societies differ along a continuum from high to low uncertainty avoidance: societies with high uncertainty avoidance tend toward stability, rule-orientation, formal procedures, and the minimisation of unstructured situations; societies with lower uncertainty avoidance favour openness, flexibility, and tolerance for situations whose meaning is not pre-given. Uncertainty avoidance is not treated here as a cultural-level equivalent of ambiguity tolerance; it is used as evidence that institutionalised relations to indeterminacy vary systematically across cultural contexts.

The OECD's recent work on tolerance of ambiguity and uncertainty as a future-oriented competence (OECD, 2024) extends this perspective into educational policy. Treating ambiguity tolerance as a key competence for the twenty-first century, the OECD identifies cultural and institutional conditions as constitutive of its development: educational systems that systematically reward unambiguous answers, penalise expressions of uncertainty, or organise instruction around closed problem-types create different developmental conditions than systems that build in space for open-ended inquiry, controversial discussion, and the productive engagement with indeterminacy. Ambiguity tolerance, on this view, is not only a property of individuals: the conditions for developing it are properties of educational systems – and the cross-cultural variability of ambiguity tolerance reflects, in part, the variability of the educational systems within which it develops.

This has three consequences that matter for the framework. First, ambiguity tolerance is not a culturally neutral concept. It carries with it specific assumptions about the value of indeterminacy, the legitimacy of plurality, and the relationship between certainty and authority – assumptions that are themselves variable across cultural and institutional contexts. A framework that articulates ambiguity tolerance as an educational goal must

therefore reflect on its own cultural situatedness rather than presenting itself as universally valid. Second, ambiguity tolerance is not equally accessible across contexts. Educational systems that have historically organised themselves around clarity, authority, and unambiguous transmission cannot be expected to foster ambiguity tolerance through the simple addition of new methods; the institutional and cultural conditions within which methods operate are themselves consequential, and pedagogical innovation in this domain typically requires changes at multiple levels (see Section 5). Third, ambiguity tolerance is legitimately variable in its pedagogical realisation. The competences described by the framework are, in their analytical structure, transferable across European educational systems; the pedagogical paths to them, however, must take seriously the institutional traditions, cultural orientations, and subject-specific conventions of the systems within which they are pursued.

The framework therefore distinguishes between the construct of Ambiguity Competence – articulated as a common European vocabulary that European partner institutions can share as a working language – and its pedagogical realisation, which necessarily varies with national educational traditions, curricular structures, and cultural relations to uncertainty. This distinction is developed substantively in Section 4, which addresses the transnational and European dimension of ambiguity in detail, and it shapes the framework’s account of its own transnational applicability in Section 7.4. The cultural variability of ambiguity tolerance is, in this sense, not an external limitation of the framework but a structural feature it must accommodate.

3. Mechanisms of Ambiguity Processing

The conceptual analysis in 2.2 established that ambiguity tolerance is not a unitary construct but a multidimensional one, encompassing affective, cognitive, and epistemic components. The present section develops what these dimensions mean as mechanisms – that is, as the processes through which an ambiguous situation, once encountered, is taken up, sustained, transformed, or foreclosed. Where 2.3 distinguished Trait-AT and State-AT as levels at which ambiguity tolerance can be conceptualised, this section specifies the internal architecture of state-level processing: what actually happens, in real time, when a learner – or a teacher – meets an ambiguous situation.

The distinction matters pedagogically. Educational interventions cannot operate on the construct of ambiguity tolerance as such; they operate on the mechanisms through which ambiguity is processed in concrete situations. A pedagogy informed by the mechanisms is in a position to ask diagnostically targeted questions: Is processing failing at the affective threshold (the situation feels too threatening to be entered)? At the cognitive level (multiple readings cannot be held simultaneously)? At the epistemic level (multiplicity is treated as a deficiency to be eliminated rather than as a feature of the matter)? Without an account of the mechanisms, “developing ambiguity tolerance” remains a slogan; with one, it becomes a set of tractable pedagogical tasks.

The three mechanisms are analytically distinguishable but dynamically interdependent (see 2.2.2). Affective registration influences whether and how engagement is sustained; cognitive processing changes the experienced structure of the situation; epistemic framing shapes how multiplicity itself is interpreted. Their relation is reciprocal rather than strictly sequential: in a given situation one mechanism may be functionally dominant, but none is generally prior to the others. The behavioural consequences (3.4) describe the conduct from which these internal processes can be inferred, and through which they become pedagogically addressable.

3.1 Affective mechanisms

Affective mechanisms designate the immediate feeling-tone with which an ambiguous situation is registered before – and often as a condition of – sustained cognitive engagement. The classical literature on intolerance of ambiguity gives this affective dimension particular weight: Frenkel-Brunswik (1949) characterised intolerance of ambiguity above all as an emotional response, and subsequent work has described the affective registration of ambiguity as preceding and shaping its cognitive processing (Budner, 1962; McLain et al., 2015).

Affective responses to ambiguity range along a continuum (see 2.2.1) from aversion – manifest as anxiety, discomfort, irritation, or the diffuse experience that something is “wrong” – through neutrality, to attraction, manifest as curiosity, intellectual excitement, or aesthetic engagement. Where affective response tends toward aversion, the body registers ambiguity as a state to be exited; where it tends toward attraction, the body registers ambiguity as a state worth sustaining. Research summarised by de Vries (2021) points to physiological correlates of the aversive pole, such as elevated arousal under conditions of unresolved ambiguity among individuals low in Trait-AT.

The pedagogical significance of the affective mechanism lies in what can be described as a threshold function: sustained cognitive and epistemic engagement with ambiguity is unlikely where the situation is foreclosed at the affective level. Where affective response is overwhelmingly aversive, learners often do not engage with ambiguity at all – they avoid, deflect, or prematurely resolve it (see Combe & Gebhard, 2009, p. 553, on the conditions under which irritation is sustained or evaded). This is why the framework’s account of didactic-institutional conditions (Section 5) emphasises classroom climate, psychological safety, and error tolerance: these are not peripheral comforts but the affective infrastructure without which cognitive and epistemic engagement cannot reliably occur.

It is important, however, not to treat the affective dimension as something to be neutralised. Productive engagement with ambiguity does not require the absence of discomfort; on the contrary, the experience of irritation – which has an affective as well as a cognitive dimension (see 6.1.2) – is constitutive of transformative learning processes (Bähr et al., 2019; Koller, 2016). The pedagogical task is therefore not to eliminate affective response but to enable learners to remain within ambiguous situations long enough for cognitive and

epistemic processing to take effect, and to develop, over time, a more differentiated affective repertoire in which ambiguity is no longer registered exclusively under the sign of threat.

3.2 Cognitive mechanisms

Cognitive mechanisms designate the operations by which an ambiguous situation is parsed, interpreted, and held open for further engagement. Where affective registration bears on whether engagement is sustained, the cognitive mechanism bears on how the engagement unfolds.

Three operations are central. The first is the recognition of multiplicity: the capacity to perceive that a situation, text, or claim admits of more than one legitimate reading. This is a non-trivial cognitive achievement: ambiguous material can be perceived as unambiguous if the cognitive apparatus simplifies it prematurely, and a substantial body of research on cognitive closure (Kruglanski & Fishman, 2009) has shown that under conditions of time pressure, fatigue, or motivational pressure, individuals tend to settle on the first available interpretation and screen out competing readings. The recognition of multiplicity is therefore not the passive registration of what is given but an active cognitive achievement that must be sustained against the gravitational pull of premature closure.

The second is the parallel maintenance of competing interpretations. Recognising that multiple readings are possible is one thing; holding them simultaneously available, without collapsing them into a single resolution or treating them as interchangeable, is another. This operation places real demands on working memory and attention, and cognitive flexibility – understood as the capacity to shift between perspectives without losing track of any of them – contributes to this operation (see 2.3.1 on the related dispositional component of cognitive openness).

The third is the resistance to premature closure. Under many conditions, cognitive processing favours resolution, particularly when maintaining competing interpretations is demanding; the impulse to settle on an answer is then less a deliberate choice than a default. Resistance to premature closure is therefore not simply the absence of resolution but the active inhibition of the closure impulse – a form of cognitive self-regulation that allows the situation to remain genuinely open until the grounds for resolution are themselves examined.

These three operations form the cognitive substrate of what the framework later articulates as interpretive competence and perspective competence (see 7.3.2 and 7.3.3). They also clarify a pedagogical point: cognitive engagement with ambiguity cannot be cultivated by exposing learners to ambiguous material alone. Exposure produces the occasion; the cognitive work – recognising multiplicity, sustaining it, resisting closure – must be supported by didactic structures (slowed-down inquiry, explicit articulation of alternative readings, structured comparison) that give the operations time and space to occur.

3.3 Epistemic mechanisms

Epistemic mechanisms designate the level at which an ambiguous situation is framed as a particular kind of object – as something whose multiplicity is a feature to be engaged with, or as something whose multiplicity is a deficiency to be eliminated. The epistemic mechanism interacts with both affective and cognitive responses: how a situation is epistemically framed shapes whether it is felt as threatening or stimulating, and whether it is parsed as having multiple legitimate readings or as having one correct reading that has not yet been identified.

Epistemic framing rests on what the literature on epistemological beliefs has called personal epistemologies: assumptions about the nature, certainty, and source of knowledge that learners and teachers bring to learning situations (Hofer & Pintrich, 1997). Where knowledge is held to be fixed, certain, and authoritative, ambiguity is experienced as a sign that something has gone wrong – that the inquiry is incomplete, that the source is unreliable, or that the learner has failed to grasp the matter. Where knowledge is held to be constructed, fallible, and provisional within disciplinary standards, ambiguity is experienced as a legitimate feature of inquiry – as the form in which substantive questions actually present themselves.

The epistemic mechanism is particularly consequential because it shapes how the multiplicity encountered in a situation is interpreted. It does not simply add to the affective and cognitive dimensions; it inflects them, and is in turn inflected by them. A learner who frames a controversial historical question epistemically as one with a single correct answer that has not yet been found will respond affectively to its multiplicity as a problem and will cognitively work toward closure. A learner who frames the same question as one in which competing interpretations rest on different but legitimate evidentiary grounds will respond affectively to its multiplicity as a feature of the matter and will cognitively work toward sustained comparison. The same situation, epistemically framed differently, becomes a different object of engagement.

This has direct pedagogical consequences. Epistemic framing is not a private cognitive event but a feature of the educational situation, which is itself epistemically structured by the way teachers introduce material, the way subjects are conventionally understood (see Krebs & Szukala, 2021, on the epistemic specificity of social-scientific knowledge), and the way classroom interactions handle disagreement. The framework therefore distinguishes between the epistemic mechanism as it operates on the side of the teacher (3.3.1) and as it operates on the side of the learner (3.3.2) – not because the mechanism is fundamentally different in each case, but because the pedagogical task differs depending on whose epistemic framing is at issue.

3.3.1 Teachers

The teacher's epistemic stance shapes the epistemic structure of the learning situation in ways that are largely independent of explicit instructional content. A teacher who treats their subject as one in which all substantive questions admit of definitive answers – and who treats their own knowledge as authoritative in the strong sense – will, even when employing

formally open methods, communicate to learners that ambiguity is a problem to be resolved by recourse to authority. A teacher who treats their subject as one in which legitimate disagreement is possible, and who treats their own knowledge as situated, partial, and revisable, will, across a wide range of methods, communicate that ambiguity is a feature of substantive inquiry.

Three aspects of teacher epistemic framing are particularly consequential. The first is the teacher's understanding of the nature of their subject. Subjects in the social sciences, in particular, are vulnerable to being taught through a simplified school-science model of knowledge, in which the existence of one correct answer is presupposed and pedagogical work consists in conveying it (Krebs & Szukala, 2021; see also 6.1.2). Where teachers themselves do not recognise the epistemic specificity of their subject – that is, the constitutive role of perspective, value, and interpretation in social-scientific knowledge – they will, with the best of intentions, transmit a framing under which ambiguity registers as deficiency.

The second is the teacher's self-understanding as a knowledge authority. The traditional teacher role is heavily invested in the position of knowing: to teach is, on this conception, to know what the learner does not yet know and to convey it. An epistemic stance compatible with ambiguity tolerance does not require abandoning this role wholesale, but it requires inflecting it: the teacher remains a more knowledgeable participant in the inquiry, but not a holder of final answers. This shift is demanding, because it asks teachers to inhabit positions of not-knowing without forfeiting professional credibility – a tension that the literature on teacher professionalisation has repeatedly identified as a significant developmental challenge (Lübke et al., 2019, p. 187).

The third is the teacher's handling of their own uncertainty in the classroom. Teachers who can articulate uncertainty about a substantive question without compromising their pedagogical authority demonstrate, in practice, that uncertainty and competence are compatible – that not-knowing is itself a recognisable mode of expert engagement. Where teachers conceal uncertainty or resolve it artificially, the implicit epistemic message is that competent participation in the subject requires the appearance of certainty.

The epistemic stance of teachers is therefore not a private matter of professional belief but a structuring condition of the learning situation itself. That this condition cannot be taken for granted is indicated by a survey of 211 student teachers in Germany: their ambiguity tolerance largely corresponded to reference values for the general population with higher educational attainment, and students of a subject related to citizenship education did not score higher than other student teachers (Gloe & Heindl, 2026, pp. 139–140). The framework's account of professional orientation (see 5.2) develops this point in institutional terms; the present section establishes its mechanism-level rationale.

3.3.2 Students

The epistemic mechanism on the side of learners operates through what learners take the situation to be – what kind of question is being asked, what kind of answer is expected, what

kind of activity is appropriate. These framings are largely tacit: learners rarely articulate their epistemological assumptions explicitly, and they may not be aware of holding them. But they are nonetheless consequential, because they determine how learners orient themselves to ambiguous material before any explicit cognitive engagement begins.

Three patterns warrant particular attention. The first is the expectation of unique correctness: the assumption that legitimate questions have single correct answers, and that one's task as a learner is to identify them. This expectation is not a learner deficit but a reasonable inference from the structure of much classroom experience, in which questions are indeed posed under conditions of unique correctness (mathematical procedures, factual recall, well-defined exercises). The expectation becomes problematic only when it is generalised across subject types – when learners apply it to interpretive, evaluative, or controversial material for which it is structurally inadequate.

The second is the equation of multiplicity with arbitrariness. Where learners encounter material that legitimately admits of multiple readings, they often respond either by insisting that one reading must be correct (and asking the teacher to identify it) or by concluding that the material is “just confusing” and that “anything goes” (see the negative example in the description of interpretive competence, 7.3.2). Both responses share an underlying epistemic assumption: that legitimate disagreement is impossible, and that apparent multiplicity is therefore either a sign of incomplete inquiry or of unconstrained subjectivity. The pedagogical task is to make available a third option: that legitimate disagreement, grounded in different but defensible evidentiary or interpretive bases, is itself a feature of substantive inquiry.

The third is the displacement of epistemic uncertainty onto self-evaluation. Where learners hold absolutist epistemic assumptions, encountering ambiguity may redirect attention from the matter toward self-evaluation: if there is a correct answer and I cannot identify it, the problem must lie with me. This pattern conjoins the epistemic and the affective mechanisms in ways that can foreclose engagement entirely: the learner's energy is redirected from the substantive question to the management of self-evaluation, and the ambiguity itself never becomes the object of inquiry.

The development of more adequate epistemic framings on the side of learners is, on this account, not a matter of explicit instruction in epistemology – though such instruction has its place – but of repeated experience with situations in which substantive ambiguity is treated as a feature of the matter rather than as a defect of the inquiry. This is what the framework's account of reflexive competence (see 7.3.4) describes as a learnable capacity: the recognition that one's own epistemic framing is itself situated, and that other framings are possible. The epistemic mechanism, on the side of learners, is therefore not only the substrate on which competence develops but also, over time, an object of competence in its own right.

3.4 Behavioural consequences

The mechanisms described in 3.1 to 3.3 are internal processes; their behavioural consequences provide observable indicators from which these processes may be inferred – and which make them pedagogically and empirically tractable.

Behavioural consequences fall, broadly, into two patterns. The first is the engagement pattern: learners and teachers who process ambiguity productively remain in the situation, articulate multiple readings, ask clarifying rather than closing questions, attribute disagreement to substantive grounds rather than to deficiency in the disagreeing party, and act on provisional judgments while marking their provisionality. These behaviours are not the products of any single mechanism but of the joint operation of all three: affective tolerance permits sustained engagement, cognitive processing permits the parallel maintenance of readings, and epistemic framing permits the situation to be treated as one in which multiplicity is a feature.

The second is the foreclosure pattern: where one or more mechanisms fail, ambiguity is exited rather than engaged. Foreclosure takes characteristic forms. Affective foreclosure manifests as withdrawal, avoidance, or visible distress; cognitive foreclosure manifests as the rapid identification of a single reading and the dismissal of alternatives; epistemic foreclosure manifests as appeals to authority, insistence on the existence of a correct answer, or the interpretation of multiplicity as arbitrariness. Foreclosure can also take the form of premature consensus, in which a group settles on a shared resolution not because the grounds for resolution have been examined but because remaining in disagreement has become uncomfortable.

Two further patterns deserve mention because they are easily mistaken for productive engagement. The first is false openness: the rhetorical acknowledgement that multiple readings are possible, accompanied by the practical treatment of one reading as actually correct. The second is normative indifference: the treatment of all readings as equivalent precisely because they are multiple, with the consequence that no judgment is formed at all. Both patterns appear, on the surface, to engage with ambiguity, but in fact evade the work that productive engagement requires – in the first case by retaining closure under a veneer of openness, in the second by abandoning the standards under which openness becomes substantive (see 6.1.1 on non-closure as structured rather than indifferent openness).

The pedagogical and empirical significance of the behavioural consequences is twofold. Pedagogically, they make the mechanisms diagnosable: a teacher who recognises foreclosure in its various forms can intervene at the level of the failing mechanism rather than treating the surface behaviour as the problem. Empirically, they ground the framework's indicator system. The performance indicators developed for each dimension of Ambiguity Competence (see 7.3.2 to 7.3.6) are, in effect, operationalisations of the engagement pattern at the level of specific competences, and the negative examples articulate forms of foreclosure that the indicators are designed to distinguish from genuine engagement.

The behavioural consequences thereby form the bridge between the internal architecture of state-level processing, developed in this section, and the contextual analysis of where and how ambiguity is encountered, developed in the next.

4. Contextualising Ambiguity: Situations and Social Environments

4.1 Situational nature of ambiguity

The framework's developmental hypothesis – that ambiguity tolerance is cultivable through repeated, competence-mediated state-level engagement – presupposes that ambiguity is a property of situations, not only of persons. State-AT, as developed in 2.3.2, is by definition situation-bound: it is what happens here and now, in this encounter with this material, under these conditions. The mechanisms developed in Section 3 specify how situations are processed once encountered, but they do not yet specify what makes a situation an ambiguity-relevant situation in the first place. Section 4 develops this contextual layer; 4.1 begins by establishing what it means to treat ambiguity as situationally constituted.

Three structural features distinguish situations in which ambiguity becomes pedagogically operative. The first concerns the structural openness of the situational object. Situations differ in the degree to which what they present admits more than one defensible interpretation, evaluation, or response – a poem, a contested historical event, a value conflict, an open-ended task, or an aesthetic encounter carries such openness in its structure, while a mathematical procedure or a factual recall task does not. The openness may be interpretive, normative, or pragmatic (2.1.1). This is not a binary distinction but a matter of degree, and it is not reducible to subject matter: the same historical event can be presented with its openness intact or with foreclosed unanimity, depending on how the situation is staged. The pedagogical relevance of a situation for ambiguity tolerance therefore depends not only on its content but on its situational design, a point developed further in 6.1 and 6.2.

The second concerns what social-psychological research on situations has called situational strength (Funder, 2016; Mischel, 1977) – the degree to which a situation imposes uniform behavioural expectations across persons. Strong situations channel responses narrowly: examination contexts, formalised assessments, situations with clear behavioural scripts. Weak situations leave room for variability: open discussions, exploratory tasks, situations whose normative structure is itself part of what is at stake. Ambiguity tolerance is required in strong situations as well, but it becomes observable and developable primarily in weaker ones – not because strong situations are unambiguous (they may contain considerable substantive ambiguity), but because they suppress the variability of response through which state-level processing becomes visible and can be worked on. The didactic-institutional conditions developed in Section 5 can be read, in this light, as conditions that systematically modulate situational strength.

The third concerns the practice-theoretical constitution of ambiguous situations. Drawing on Schatzki's (2002) account of social practices as constituted through bodily doings, sayings, and shared understandings, the framework distinguishes two levels: the structural openness of an object constitutes its ambiguity potential, but operative ambiguity in a concrete situation

arises only through the practices that take it up. A controversial classroom discussion is not ambiguous because the topic “is” controversial in the abstract; it becomes a site of operative ambiguity when the practice of discussion itself – turn-taking, justification, the entertaining of competing claims – constitutes the topic as one admitting of legitimate disagreement. This has direct pedagogical consequences: an object can admit of more than one legitimate reading without that openness ever becoming accessible in class. Ambiguity-rich situations are therefore not simply discovered but staged, and their staging depends on practices that learners and teachers enact together.

These three features specify, in different registers, what it means to treat ambiguity situationally rather than only dispositionally. They also clarify what the framework calls exposure in its process logic (7.2): exposure is not merely physical co-presence with ambiguous material but situational placement under conditions in which the material’s ambiguity potential, the situation’s weakness, and the constitutive practices align to make ambiguity operative. Where these conditions hold, what Combe and Gebhard (2009, p. 553; 2019, pp. 143ff.) describe as moments of irritation become possible – moments in which interpretive routines break down and learners are confronted with the indeterminacy of what is in front of them. The transformative potential of such moments, developed in 6.1.2, depends on the situational structure 4.1 has now made explicit.

The remaining subsections of Section 4 specify how this situational structure is shaped by domain (4.2), by social and cultural embedding (4.3), and by the transnational dimension of European educational contexts (4.4).

4.2 Domain-specificity (education, politics, social interaction)

The structural features of ambiguous situations developed in 4.1 – structural openness, situational strength, practice-theoretical constitution – operate across domains, but their specific configurations differ systematically with the domain in which a situation is located. For an educational framework, domain-specificity matters in a particular way: schools are sites in which all three of the domains discussed below are simultaneously present and pedagogically operative. A democratic education adequate to ambiguity must therefore engage not only with the structural variability of ambiguity across domains but with the specific challenge that schools, as institutions, encounter ambiguity in all three forms at once – and must cultivate competences that travel across them.

Educational ambiguity is constituted, first and foremost, by the epistemic structure of subject matter as it is taken up in school curricula. Of the three types of ambiguity distinguished in 2.1.1, subject-matter learning characteristically foregrounds interpretive ambiguity, which tends to be functionally dominant in educational settings: the substantive plurality of legitimate readings that schools encounter wherever subject matter admits of more than one well-grounded interpretation. Normative and pragmatic ambiguity are present in educational settings as well – in the values that disciplines transmit and in the interactional patterns of classroom talk – but the constitutive register of educational ambiguity in the narrow sense is interpretive. Disciplines differ in the degree to which their substantive questions admit of

multiple legitimate answers – a distinction that learners and teachers register, often tacitly, as a property of “the subject” itself. School mathematics presents little interpretive ambiguity in its operative core (procedures yield unique correct results) but considerable ambiguity at higher levels (in the choice of modelling approaches, in the framing of problems, in the interpretation of statistical evidence). The school sciences operate within disciplinary norms of evidentiary closure but contain ambiguity in their interpretive frameworks, in the boundaries between settled and unsettled questions, and in the social and ethical implications of scientific knowledge. The social-scientific subjects, as Krebs and Szukala (2021) have argued, characteristically foreground interpretive and normative ambiguity: their objects are interpretively constituted, their generalisations carry normative load, and the perspective of the inquirer is part of what is inquired into. Subjects in the humanities and the arts treat interpretive plurality not as a deficiency but as a feature of their substantive engagement. School-based educational ambiguity is therefore structurally heterogeneous across the curriculum – not “more or less” the same kind of ambiguity but different kinds, requiring different forms of pedagogical handling. The framework’s account of teacher epistemic stance in 3.3.1 takes its point of departure from this heterogeneity: a teacher who treats a social-scientific question through a simplified school-science model of knowledge transmits a domain-mismatched epistemic framing under which legitimate ambiguity registers as deficiency. Crucially, the curricular allocation of subjects – which subjects exist as separate fields, which are integrated, how the social-scientific subjects are organised – varies considerably across European educational systems, with direct consequences for where and how educational ambiguity becomes pedagogically operative.

Political ambiguity is constituted differently; in democratic societies, it takes the form of the democratic ambiguity described in 2.4. It is not primarily epistemic but normative and procedural: political situations are ambiguous because legitimate values stand in tension, because reasonable people, deploying defensible criteria, can arrive at different conclusions, and because the procedures through which collective decisions are reached are themselves part of what is contested. In political settings, normative ambiguity accordingly tends to be functionally dominant: the tension among legitimate values, principles, and commitments that further inquiry cannot eliminate, and which constitutes political life as a domain of ongoing collective negotiation rather than of technical problem-solving. Interpretive ambiguity is present in political settings – factual disagreements, contested historical narratives, competing readings of legal and constitutional texts – but the substantive register that distinguishes political ambiguity from educational ambiguity in the narrow sense is normative. The Council of Europe’s Reference Framework of Competences for Democratic Culture (2018a) accordingly defines tolerance of ambiguity as a positive orientation toward situations “perceived to be uncertain and subject to multiple conflicting or incompatible interpretations” (p. 45). For schools, political ambiguity becomes operative wherever curricular content engages contested questions of collective life – in civics and politics teaching, in history’s treatment of contested pasts, in literature’s engagement with social and ethical questions, in the school’s own handling of controversial events in its environment. Three features distinguish political ambiguity from educational ambiguity in the narrower sense. It is persistent rather than transitional: many political disagreements are not resolvable through further inquiry but constitutive of the political community itself. It is action-

implicating: political situations require decisions that have consequences for others, and waiting for clarity is itself a political position. And it is legitimacy-bound: political ambiguity operates within shared procedural norms that make disagreement productive rather than destructive. Schools differ markedly in how they handle this dimension of ambiguity. The German Beutelsbacher Konsens (Wehling, 1977), with its prohibition of indoctrination and its imperative of controversy, operationalises political ambiguity for the classroom in a particular way (Dengel et al., 2021); other European systems institutionalise controversy through different curricular and professional traditions. The structural challenge is the same across systems – how to make political ambiguity pedagogically inhabitable without collapsing it into either indoctrination or relativism – but the institutional and curricular forms in which the challenge is met differ in ways that 4.4 will develop.

The handling of political ambiguity in classroom settings has been the subject of a substantial research tradition on controversial issues in education that the framework engages without systematically reviewing. Hess and McAvoy's (2015) work on the political classroom has documented how teachers actually navigate the pedagogical challenge of contested political questions: their multi-year mixed-methods study shows that productive engagement with political controversy depends not on the absence of teacher conviction, but on the careful structuring of classroom conditions under which competing positions can be articulated, examined, and held in tension without either premature foreclosure or evaluative collapse. Their distinction between disclosure and non-disclosure of teacher views, and their argument that the appropriate pedagogical handling depends on the type of controversy at stake (open versus tipping-point versus settled questions), connects directly to the framework's claim that political ambiguity is legitimacy-bound: pedagogical handling cannot be derived from a single procedural rule but requires judgment about what kind of disagreement is at stake. Earlier work by Oulton et al. (2004) had already established that teacher handling of controversial issues varies systematically with teachers' epistemic and normative orientations – a finding that aligns with the framework's account of teacher epistemic stance in 3.3.1 and that bears on the institutional conditions developed in 5.2. Kelly's (1986) influential typology of teacher stances toward controversy (committed impartiality, exclusive neutrality, exclusive partiality, neutral impartiality) provides a vocabulary that the German Beutelsbacher tradition has developed in its own register; the framework's transnational orientation (4.4) requires keeping both vocabularies in view rather than presupposing the universal applicability of either. The controversial-issues research, taken together, offers empirical support for the framework's central claim about political ambiguity: it is pedagogically inhabitable, but only under structural and dispositional conditions that classroom and school must actively maintain.

A more recent empirical contribution to this tradition (Efimova & Nygren, 2026) bears directly on this claim. In a randomised experiment on a charged controversy (the regulation of public Quran burnings in Sweden), exposure to a multiperspectival text reduced affective polarisation, with no further significant reduction attributable to the subsequent discussion alone. Moreover, the depolarising effect was concentrated among students who reported having no classmate with an opposing view – that is, in precisely those classroom configurations in which the structural conditions for political ambiguity are weakest. Where homogeneity might have been expected to amplify polarisation through deliberation, the

structured engagement with reconstructed opposing perspectives operated instead as what civic education research has called a compensation effect: the text supplying the perspectival diversity that the classroom itself lacked. The framework's account of political ambiguity as legitimacy-bound and procedurally dependent receives, in this finding, an empirical specification: the procedural conditions under which legitimate disagreement remains pedagogically productive may be most consequential precisely where the classroom itself lacks perspectival diversity.

Interactional ambiguity is constituted at a still different level – that of social interaction itself, where meaning is produced moment by moment in the joint accomplishment of conversational turns, role expectations, and situational definitions. In interactional settings, pragmatic ambiguity tends to be functionally dominant: the underdetermination of communicative and relational meaning that characterises social interaction wherever what someone is doing in saying something is not directly given by the propositional content of the utterance. Interpretive and normative ambiguity flow through interactional settings constantly – any classroom discussion of a contested issue is simultaneously interpretive, normative, and pragmatic – but the register specific to interactional ambiguity is pragmatic. Here ambiguity arises not primarily from substantive content but from the relational and pragmatic structure of interaction: irony, indirect speech acts, mismatched framings, the negotiation of who can say what under what conditions. In schools, interactional ambiguity is the medium through which the other two domains become operative: educational and political ambiguity are encountered, almost always, as classroom interaction. Three features distinguish it. Interactional ambiguity is relational: its resolution depends on what participants are willing to recognise about each other and themselves. It is pragmatically charged: interactional misreadings have immediate social consequences. And it is culturally embedded: what counts as a clear or ambiguous communicative act varies systematically across cultural and linguistic contexts. This last feature is particularly consequential for transnational educational cooperation: classroom interaction patterns that are unmarked in one educational system – the level of teacher-student informality, the directness with which disagreement is voiced, the role of silence, the conventions for addressing controversial topics – are interactionally ambiguous when transposed to another. The capacity to engage productively with interactional ambiguity is therefore not reducible to either epistemic or normative competence; it has its own pragmatic structure, and the framework's account of perspective competence (7.3.3) and reflexive competence (7.3.4) takes it up at the level of competence development.

These three domains are analytically distinct as contexts in which one of the three types of ambiguity established in 2.1.1 tends to be functionally dominant, but in school settings they are empirically interwoven in ways the framework must accommodate. The assignment is heuristic rather than exclusive; but in the empirical reality of school practice, all three types are typically present in any concrete situation, with one usually dominant and the others co-present. A controversial classroom discussion of a political issue is simultaneously educational (it operates within the epistemic structure of a subject), political (it engages normative tensions), and interactional (it unfolds through the pragmatic structure of classroom talk). The structural features of ambiguity from 4.1 operate in all three domains, but they take domain-specific forms: openness is predominantly interpretive in education,

normative in politics, pragmatic in interaction; situational strength is curricular in education, procedural in politics, conventional in interaction; the constitutive practices are pedagogical, deliberative, and conversational respectively. Ambiguity Competence, as developed in 7.3, is articulated at a level of generality that allows it to operate across these domain-specific forms – not by collapsing their differences but by specifying capacities (interpretive, perspective, reflexive, normative, decision) that take domain-specific shape in each setting. Two consequences follow that 4.4 will develop further. First, competence in handling ambiguity in one domain does not necessarily transfer to others; such transfer has to be supported through encounters that make the structural commonalities across domains recognisable. Second – and this is where domain-specificity meets the transnational dimension of European educational cooperation – the configurations of educational, political, and interactional ambiguity vary systematically across European educational systems. What counts as a normal level of interpretive openness in one literature classroom, as legitimate political controversy in another civics tradition, or as appropriate interactional directness in another educational culture: these are not only pedagogical but cultural-systemic variables that condition where and how ambiguity becomes pedagogically operative. The framework's commitment to transnational applicability (developed in 7.4) therefore requires not the export of a single domain-configuration but the articulation of competences that can travel across configurations – while taking the variability of those configurations seriously as a substantive feature of European democratic education rather than as an obstacle to common pedagogical work.

4.3 Social and cultural embedding

The structural and domain-specific features developed in 4.1 and 4.2 describe the immediate composition of ambiguous situations: how a situation is staged, what kind of openness it carries, which type of ambiguity it foregrounds. But situations do not stand on their own. They are embedded in wider social and cultural contexts that shape, in advance, what counts as ambiguous, how ambiguity is experienced, and what responses to it appear plausible or appropriate. Section 2.5 introduced this point at the level of the individual disposition, showing that ambiguity tolerance varies across cultural and institutional contexts. Section 4.3 develops it at the level of the situation: it specifies how social and cultural embedding enters into the situational constitution of ambiguity itself.

Three layers of embedding are pedagogically consequential. The first is the layer of cultural orientation toward uncertainty. As Hofstede's (1984) cross-cultural research established and the OECD (2024) has more recently developed for the educational domain, societies differ systematically in how strongly they organise themselves to minimise unstructured situations. Where uncertainty avoidance is high, ambiguous situations are more likely to be experienced as deficiencies of order, more likely to trigger demands for resolution, and more likely to be foreclosed before they can become pedagogically productive. Where uncertainty avoidance is lower, the same situations may be sustained more easily, and learners may be more readily disposed to engage with them. Uncertainty avoidance is used here as an analytically neighbouring indicator, not as a cultural-level equivalent of ambiguity tolerance

(see 2.5). This cultural layer does not determine individual responses, but it shapes the background against which any ambiguous situation is encountered.

The second layer is the layer of social context – the immediate communities of practice within which a situation unfolds. A classroom is a social context with its own norms, routines, and shared understandings about what kind of plurality is welcome and what kind is not. Drawing on Schatzki's (2002) point already used in 4.1, situations are constituted through the practices that take them up: a controversial topic becomes pedagogically ambiguous only where the practices of the classroom – how disagreement is voiced, how silence is handled, how teacher and students relate – make it inhabitable as such. The same topic, in the same school, can be a site of productive ambiguity in one classroom and a site of foreclosure in another. This is not a matter of teacher disposition alone but of the social fabric of the setting: the conditions developed in Section 5 (psychological safety, professional orientation, school culture, collaborative structures, assessment regimes) operate, in part, as conditions that shape this layer.

The third layer is the layer of communicative convention. Goffman (1974) showed that interactional meaning is organised through shared frames – implicit understandings about what kind of activity is going on, what counts as a serious utterance, what register is in play. These framing conventions are culturally variable, and they bear directly on the pragmatic ambiguity introduced in 2.1.1 and developed for the interactional domain in 4.2. What counts as a normal level of teacher-student informality, how directly disagreement may be voiced without giving offence, when silence signals reflection and when it signals withdrawal: these are not technical features of communication but conventions that learners and teachers bring with them from the cultural and institutional environments in which they have been formed. Where conventions align, interactional ambiguity is low; where they diverge – across migration backgrounds, across disciplinary cultures within the school, across national systems in transnational cooperation – pragmatic ambiguity intensifies, and the framework's account of perspective and reflexive competence (7.3.3, 7.3.4) becomes pedagogically operative.

Two implications follow for the framework. First, ambiguous situations are never culture-free. Any pedagogical claim about how learners can be brought to engage with ambiguity has to take seriously that what registers as ambiguous, what feels uncomfortable about ambiguity, and what response feels available depend in part on social and cultural embedding. A pedagogy that ignores this layer risks treating cultural variability as noise rather than as substantive information about the conditions under which ambiguity becomes pedagogically operative. Second, the embedding works in both directions. Social and cultural contexts shape ambiguous situations, but ambiguous situations also work back on those contexts: classrooms in which legitimate plurality is sustained over time may contribute to shifts in classroom and school practices. The framework's process logic (7.2) is formulated at the level of individual development; how such practice shifts feed back into institutional and cultural conditions is a further question that the framework names but does not model.

The next subsection turns from this general account of social and cultural embedding to the specific conditions of European educational cooperation, where the variability addressed here becomes a constitutive feature of the pedagogical work itself.

4.4 Transnational and European dimension of ambiguity

The framework is designed for European educational contexts and for cooperation across them. This commitment is not external to its conceptual structure: it shapes what the framework can claim, what it has to leave context-sensitive, and where its central distinctions become pedagogically consequential. Section 4.4 develops three aspects of this transnational dimension that the rest of the framework presupposes. The argument is not that ambiguity tolerance functions differently in Europe than elsewhere, but that European educational cooperation makes a particular set of features of ambiguity tolerance unavoidable: cultural variability has to be taken seriously, plurality is a structural rather than an accidental condition, and pedagogical work across systems requires distinguishing what can be shared from what must remain context-specific.

4.4.1 Cultural differences in dealing with uncertainty

European educational systems differ in how they relate to uncertainty in ways that bear directly on the framework's pedagogical claims. The cross-cultural research already cited in 2.5 – Hofstede (1984) and the OECD (2024) – documents this variability at the level of national cultures. For the framework, three implications matter. First, the curricular and didactic forms in which ambiguity becomes pedagogically operative are not the same across systems. A system that organises its civic education around structured controversy will produce different developmental conditions for normative competence than one that organises it around the transmission of constitutional knowledge. A system that builds open-ended inquiry into its science teaching will produce different conditions for interpretive competence than one that retains a strong subject-matter authority. Whether integrated subject structures or multi-grade classrooms systematically expose learners to competing perspectives more than standalone subjects do is an open empirical question. These are not better or worse arrangements but legitimate variations, and the framework's competence dimensions (7.3) are formulated at a level of generality that accommodates them.

Second, the institutional handling of uncertainty in schools is itself culturally inflected. Examination cultures, the role of teacher authority, the conventions for student dissent, the place of error in classroom learning – all of these vary across European systems, although how they bear on ambiguity has rarely been examined directly. These differences are not merely surface phenomena but conditions under which state-level processing of ambiguity occurs. It is plausible, and a question for the comparative work of the project's second work package (WP2), that a learner in a system with strong examination orientation registers the same ambiguous task differently from a learner in a system where assessment is more formative; the affective, cognitive, and epistemic mechanisms developed in Section 3 operate within these institutionally given conditions, not in abstraction from them.

Third, cultural variability is not an obstacle to common pedagogical work but a substantive feature of it. The framework treats variability not as noise to be reduced but as information

about the conditions under which ambiguity becomes pedagogically operative in different settings. The comparative work in WP2, in particular the National Context Notes, is the natural site for documenting this variability and for testing whether the framework's competence indicators (7.3) function across systems in ways that the methodological literature on cross-cultural comparability – Davidov et al. (2014) for quantitative, Pike (1967) and Berry (1989) for qualitative research – has identified as the relevant criterion.

4.4.2 Ambiguity in pluralistic European societies

European societies are pluralistic in a structural rather than an accidental sense. Linguistic, cultural, religious, and political plurality is not an exception to be managed but a condition under which European democratic life takes place. The introduction (Section 1) cited Bauman (2007) for the diagnosis that contemporary societies have made indeterminacy a permanent feature of social life; in European societies, this diagnosis carries a specific political register. Plurality across language, religion, and political tradition is not a temporary state on the way to integration but a constitutive feature of the European political space, and the cooperation that European institutions and educational systems pursue presupposes the capacity to engage with this plurality without demanding its assimilation.

Ambiguity tolerance becomes, in this context, a democratic precondition rather than a pedagogical refinement. Where citizens cannot sustain the legitimate plurality of perspectives that characterises a European public, democratic participation becomes more vulnerable to authoritarian alternatives – the simplification of complex questions, the identification of scapegoats, the rejection of plurality as a weakness of democratic order itself (cf. Heindl & Gloe, 2026). The Council of Europe's Reference Framework of Competences for Democratic Culture (2018a) accordingly treats tolerance of ambiguity as a core attitude of democratic culture, and the framework developed here can be read as a specification of what this attitude concretely involves – interpretive, perspective, reflexive, normative, and decision competence – and how it can be cultivated.

The pedagogical consequence is that European educational cooperation is not adequate to its task if it treats ambiguity as a generic challenge for which a single methodological response can be developed. The plurality that characterises European societies is itself the subject matter that ambiguity-rich learning has to engage. Multiperspectival classroom discussion, the structured engagement with controversial issues, the cooperative work across cultural and linguistic boundaries – these are not techniques applied to arbitrary content but pedagogical responses to the specific structural condition under which European democratic education takes place. Recent empirical work on multiperspectivity in classroom discussion (Efimova & Nygren, 2026) supports this point: where learners encounter reconstructed opposing perspectives in structured form, the depolarising effect is concentrated where structural plurality in the classroom itself is weakest. The framework's pedagogical hypothesis – that ambiguity tolerance can be cultivated through repeated, competence-mediated engagement under supportive didactic conditions – receives a specifically European inflection here: in pluralistic societies, the conditions under which such engagement becomes possible cannot be presupposed but have to be deliberately staged.

4.4.3 Implications for cross-national educational cooperation

The two preceding subsections have implications for what cross-national cooperation in this project can and cannot claim. Three follow directly.

First, the framework distinguishes systematically between the construct of Ambiguity Competence and its pedagogical realisation. The construct is articulated as a common European vocabulary that partner institutions can share as a working language. The realisation – the curricular forms, didactic methods, institutional arrangements through which the competence is cultivated – necessarily varies with the systems within which it is pursued. This distinction is not a concession to local difference but a structural feature of the framework: it specifies what is shared (the analytical architecture of competences and conditions) and what remains context-sensitive (the pedagogical pathways through which the competences develop). Section 7.4 develops the consequences of this distinction for the framework's transnational applicability; here it is enough to mark that it organises the framework's relation to its European context throughout.

Second, the comparative work of the project is itself a form of pedagogical inquiry rather than a preliminary to it. WP2's comparative study and National Context Notes are not external descriptions of the systems within which the framework will be applied; they are the work through which the framework's transnational applicability is tested and refined. Where the framework travels well across systems, that is a finding rather than a presupposition. Where it requires adaptation, the adaptations are themselves contributions to the framework's development. Where it identifies genuine differences in pedagogical conception that the framework cannot smooth over, those differences become substantive features of the framework's articulation. The cooperative work of the partner consortium is, in this sense, internal to the framework rather than its application.

Third, the cross-cultural comparability of competence indicators is an empirical question that the framework formulates but does not answer. Section 7.5 returns to this point in its methodological register; for the substantive argument of Section 4, it is enough to note that the framework's commitment to transnational applicability requires the project to test, rather than to presuppose, that what is observed as a competence in one system is observed as the same competence in another. The methodological literature on this question has converged on a clear requirement: comparability across contexts cannot be assumed but must be examined (Berry, 1989; Davidov et al., 2014; Pike, 1967). The framework integrates this requirement into its own claim to European applicability.

Taken together, the three implications shape what European cooperation in this project can produce. Not a single curriculum, not a uniform set of methods, not a harmonised pedagogical model – but a shared analytical resource within which the partner systems can compare their pedagogical traditions, identify where common work is most productive, and develop adaptable strategies for cultivating Ambiguity Competence in democratic education. This is the specific pedagogical contribution that the framework's European character makes possible.

5. Institutional and Organisational Conditions

The framework's first tier – didactic-institutional conditions – comprises the structural and pedagogical features of educational settings under which ambiguity-rich learning becomes possible. Sections 5.1 to 5.5 develop these conditions in turn: the affective infrastructure of the classroom (5.1), the professional orientation of teachers (5.2), the cultural and leadership configurations at school level (5.3), the collaborative structures that enable school-based innovation (5.4), and the design of assessment regimes compatible with ambiguity-tolerant learning (5.5). Before they are developed individually, however, the tier itself requires an analytical differentiation that the existing literature on school development frequently elides.

Sections 5 and 6 address the first tier of the framework's architecture (Figure 2, 7.1): the didactic-institutional conditions under which ambiguity-rich situations arise and the pedagogical approaches through which they are staged.

Discussions of institutional conditions for ambiguity-tolerant learning tend to oscillate between two registers. The first treats conditions as a matter of professional disposition: classrooms become ambiguity-tolerant when teachers adopt the right epistemic stance, when school leaders cultivate the right culture, when collegial relations exhibit the right qualities. The second treats conditions as a matter of formal structure: schedules, assessment regulations, conference formats, and procedural arrangements that determine what is possible within an institution regardless of the dispositions of its members. Each register, taken on its own, produces a distorted picture. The first risks individualising structural problems by attributing them to deficient mindsets; the second risks ignoring the substantive role of professional orientation in shaping how structures are inhabited.

The framework therefore draws, at this point, on a distinction developed in systems-theoretical organisational sociology (Kühl, 2020): between the formal side of an organisation (its official rule-system – schedules, assessment procedures, role definitions, conference structures), the informal side or organisational culture (the recurrent practices that emerge in response to, and accommodation of, the formal side), and the display side (the organisation's external self-presentation, including mission statements, strategic visions, and *Leitbilder*¹). Three implications of this distinction matter for the framework.

First, organisational culture is not a primary object of direct intervention. It emerges in part as the reaction to formal structures and their gaps, and in part from professional biographies, subject cultures, collective traditions, and informal networks. Formal structures are an important and comparatively addressable condition of organisational culture, but they neither exhaust nor determine it. Informal expectations consolidate, in Luhmann's formulation that

¹ The German term *Leitbild* designates an institutional vision or mission statement, typically formulated as a programmatic articulation of an organisation's values, goals, and self-understanding. It is widely used in German-language school development discourse (Burow, 2021; Philipp, 2017) and is retained here in its German form because the English translations "vision" or "mission statement" lose its specific institutional connotations.

Kühl takes up, “where problems arise that cannot be solved by directives” (Kühl, 2020, p. 119) – that is, in the spaces that formal structures leave open or generate as side-effects of what they do regulate. The pedagogical implication follows from this asymmetry: while formal structures can be directly designed and changed, the cultural patterns that emerge in response to them cannot. “One can never predict precisely”, as Kühl notes, “what effects a change in formal structures will have at the level of organisational culture” (2020, p. 115). What can be known, on the basis of organisational research, is the direction in which particular structural features tend to operate. The framework therefore treats the relation between formal structure and organisational culture as one of consequential but indeterminate influence: where ambiguity-tolerant learning requires a cultural change, structural intervention is the most readily available lever, but the cultural reaction must be empirically observed rather than presumed.

This has a specific consequence for the framework’s pedagogical claims. The capacity to engage with ambiguity in classroom interaction cannot be installed by directive. Schools cannot formally require that teachers teach in ambiguity-tolerant ways – the substantive quality of pedagogical engagement is precisely the kind of problem that, in Luhmann’s terms, “cannot be solved by directives” and will therefore consolidate informally regardless of formal pronouncement. What schools can do is to design the formal structures – assessment formats, time allocations, evaluation procedures, subject-team configurations – within which informal pedagogical practice takes shape, and to do so with attention to the cultural reactions such structures tend to generate. This is the structural-pedagogical translation of Kühl’s general thesis: the formal side is the most readily addressable lever, and it operates on culture indirectly, through the conditions it creates rather than the outcomes it prescribes.

Second, the display side must be distinguished analytically from both formal structure and culture. Mission statements, strategic visions, and educational *Leitbilder* serve important functions in the organisation’s self-presentation to external audiences (parents, education authorities, partner institutions), but Kühl’s analysis (2020, pp. 121–141) shows them to be systematically decoupled from the formal structures and cultural patterns through which the organisation actually operates – a decoupling that is not a deficiency to be corrected but a structural condition of organisational survival under contradictory environmental expectations (Kühl, 2020, pp. 129–137). A school whose display side announces a commitment to ambiguity-tolerant democratic education is not, on this analysis, thereby committed structurally; the announcement may even substitute for structural change rather than indicate it. The framework’s empirical work in WP2 and in the pilot implementations of the project’s fourth work package (WP4) must therefore distinguish, in each partner system, between what schools say about their conditions for ambiguity-rich learning, what their formal structures actually afford, and what cultural patterns have consolidated around those structures over time.

Third, this differentiation imposes a temporal logic on institutional change. There is a temporal analogy, rather than a structural identity, with the process logic articulated for learners in 7.2: both involve cumulative stabilisation over time and resist direct short-term intervention. Neither process is short-cuttable, and neither is fully predictable. Educational interventions that seek to install ambiguity-tolerant cultures through workshops on

professional disposition – without addressing the formal structures within which dispositions operate – run a comparable risk to interventions that seek to install Trait-AT through single ambiguity-rich lessons: they mistake the long-term, partially indeterminate outcome of cumulative structural conditions for a directly trainable target.

This threefold distinction does not displace the substantive content of 5.1 to 5.5, but it specifies how each section should be read. Classroom climate (5.1) is not a property teachers can install through pedagogical commitment alone; it is shaped by, and over time consolidates around, formal and interactional structures of assessment, error handling, and classroom interaction. Professional orientation (5.2) is not adequately captured at the level of individual mindset; it is shaped by the formal structures – of teacher education, subject-team organisation, evaluation procedures – within which professional self-understandings develop. School culture (5.3) is not a primary object of direct intervention; leadership shapes it above all through decisions that are themselves structural. Collaborative structures (5.4) are themselves formal arrangements whose introduction generates new cultural reactions that subsequent development must anticipate without being able to fully predict. Assessment regimes (5.5) are not adequately addressed at the level of individual grading practice; whether assessment is process- or result-oriented, summative or formative, is a question of formal assessment arrangements and of the shared culture that consolidates around them at the level of the school.

The framework therefore treats the conditions tier as internally differentiated: each of the conditions developed in 5.1 to 5.5 is approached with attention to its formal-structural, its cultural, and – where relevant – its display-side dimensions, and to the temporal logic through which structural change yields cultural reaction.

5.1 Classroom climate and psychological safety

The mechanism-level analysis of affective response developed in 3.1 has direct institutional consequences. Where ambiguous material is registered affectively under the sign of threat, learners tend not to engage with it but to exit the situation – through avoidance, deflection, or premature resolution; where it is registered as a state worth sustaining, the cognitive and epistemic operations on which ambiguity tolerance depends become possible. The affective threshold function identified in 3.1 therefore makes the affective infrastructure of the classroom not a peripheral comfort but a central condition of the framework's developmental claim. Three dimensions of this infrastructure warrant specific attention: psychological safety as a cultural pattern shaped by formal and interactional structures, the handling of error and incompleteness as a structurally encoded normative orientation, and the modulation of situational strength (4.1) through formal arrangements of classroom interaction.

Psychological safety – the shared assumption that interpersonal risk-taking will not be penalised – is by now a well-documented condition of team learning in organisations (Edmondson, 1999) and has been adapted to educational settings (Wanless, 2016). Within the framework's analysis, however, it must be located on the cultural side of the formal/informal distinction introduced at the start of Section 5. Psychological safety is not

something teachers can install by pedagogical commitment alone; it is shaped by the interpersonal quality of classroom interaction – teacher conduct, peer dynamics, trust – and, over time, consolidates around formal structures of assessment, error handling, and classroom interaction. Where assessment formats reward unambiguous reproduction, where errors are formally recorded as deficits rather than as epistemically informative events, where the procedural specification of classroom interaction leaves no slot for the slow articulation of half-formed positions, the cultural reaction is likely: learners learn that the safest contribution is the one that risks nothing. The pedagogical implication follows: teachers can influence classroom climate directly through their conduct of interaction, but they cannot fully control it; its more durable conditions lie in the formal structures within which its cultural pattern consolidates.

The handling of error and incompleteness is, in this register, particularly consequential. The framework's mechanism-level account treats irritation – the moment in which interpretive routines break down (Combe & Gebhard, 2009, p. 553; see 6.1.2) – as constitutive of transformative learning. But irritation is sustainable only where the institutional handling of incompleteness does not formally code it as failure. Error tolerance is therefore not only a matter of teacher disposition (“being patient with mistakes”) but also a structural property of the assessment regime, the documentation practices, and the procedural arrangements of feedback through which incompleteness is processed. Where these structures treat the unfinished contribution, the revised position, the productively mistaken inference as legitimate components of substantive engagement, a different cultural pattern can consolidate over time: one in which learners orient toward inquiry rather than toward the management of self-evaluation (see 3.3.2 on the displacement of epistemic uncertainty onto self-evaluation).

The third dimension concerns the modulation of situational strength developed analytically in 4.1. Strong classroom situations – those that channel responses narrowly through clear behavioural scripts, examination conditions, or rigidly procedural interaction formats – suppress the variability of response through which state-level engagement with ambiguity becomes observable and developable. Weak situations leave that variability intact. Classroom climate, in the framework's reading, depends on the formal arrangements that systematically modulate situational strength: the time allocations that permit or prohibit slowed-down inquiry, the participation formats that distribute or concentrate the right to speak, the routines through which controversial questions are taken up or foreclosed. These arrangements are structural levers; the climate that emerges is shaped by them, though not by them alone. This does not render teacher disposition irrelevant: well-developed professional orientation remains a necessary resource, but it becomes pedagogically effective only under supportive structural conditions.

Two implications follow for the empirical work of WP2 and WP4. First, partner-system descriptions of “a good classroom climate” cannot be taken at face value: in Kühl's terms, such descriptions typically belong to the display side and may be decoupled from the formal structures and cultural patterns through which the climate is actually produced. Second, interventions that target classroom climate directly – through workshops on teacher disposition or on “safe space” rhetoric – remain analytically incomplete if they are not

accompanied by changes to the formal structures within which disposition becomes effective. The framework treats classroom climate as a cultural outcome whose most durable addressable conditions lie in the formal structures of assessment, error handling, and interaction.

5.2 Teacher roles and professional orientation

Facilitating ambiguity-rich learning places particular demands on teachers: they are required to resist premature closure and to sustain open inquiry and democratic dialogue in situations whose outcomes cannot be fully predetermined. Professional development and teacher education can support this by creating opportunities to reflect on one's own responses to ambiguity (Gloe & Heindl, 2026, p. 141).

Professional orientations are neither free-standing individual dispositions nor simple products of organisational structure; the framework treats orientation and structure as mutually conditioning. The mechanism-level analysis of teacher epistemic framing developed in 3.3.1 has direct institutional consequences. Where teachers' professional self-understanding is shaped predominantly by the model of the knowledge authority, and where the institutional structures of teacher education and school organisation reinforce that model, the conditions under which ambiguity-tolerant teaching can be sustained are systematically narrowed. Three dimensions of professional orientation deserve specific attention: teachers' understanding of their own subject, their self-understanding as knowledge authorities, and their handling of their own uncertainty within school cultures that either support or undermine the inhabitation of not-knowing as a legitimate professional stance.

The professional orientations described above – teachers' understanding of their subject, their self-understanding as knowledge authorities, their handling of their own uncertainty – cannot be addressed in isolation from the formal structures within which they develop and operate. The introduction to Section 5 has set out the general principle; what it requires here is specification. Three formal structures are particularly consequential for the orientations at issue.

The first concerns the formal conditions of teacher membership in the school as an organisation. As Kühl notes (2020, pp. 21–43), membership in formal organisations is structured by conditions that specify, among other things, the kinds of expectation members are obligated to fulfil. In schools, these conditions are encoded in service regulations, subject department assignments, evaluation procedures, and the procedural specification of teaching duties. They are typically silent on questions of epistemic stance – schools rarely require, formally, that teachers treat their subjects as admitting of legitimate disagreement – but the structures within which membership is enacted nonetheless shape the orientations that develop. Where evaluation procedures reward unambiguous transmission, where subject department assignments reproduce subject-traditional epistemic conventions, where service regulations leave no time for the slow, exploratory engagement that ambiguity-rich teaching requires, the formal conditions of membership systematically disadvantage the orientations on which ambiguity-tolerant pedagogy depends.

The second concerns subject department configurations and their procedural arrangements. The subject department is the immediate organisational context within which subject-specific epistemic stances are negotiated, transmitted, and reproduced. Its configuration – how leadership is assigned and rotated, how meetings are structured, how disagreements are handled, how new members are inducted – can shape the epistemic culture of subject teaching more directly than any individual teacher's disposition. The example reported in Kühl et al. (2026, p. 43) is instructive: a school that introduces annual rotation of subject department leadership (in the German Fachschaft tradition) may alter the conditions under which authority and revision are negotiated in the treatment of subject knowledge, shifting authority away from accumulated seniority. The framework treats such structural arrangements as enabling conditions for epistemic openness, not as guarantees of it.

The third concerns the formal handling of teacher uncertainty. The capacity of teachers to articulate uncertainty about a substantive question without compromising their pedagogical authority – identified in 3.3.1 as a mechanism-level condition for ambiguity-tolerant learning – is itself shaped by formal structures: by evaluation criteria that do or do not include reflective uncertainty as a component of professional competence, by collegial structures that do or do not provide protected spaces for the articulation of substantive doubt, by accountability regimes that do or do not penalise the explicit acknowledgement of not-knowing. Where these structures formally treat uncertainty as a deficit, individual teachers cannot easily develop a different relation to it, however reflective their personal orientation.

The point is not that professional orientation reduces to formal structure. The personal capacities developed in teacher education, professional experience, and individual reflection remain consequential, and the framework does not collapse them into structure. The point is rather that orientation and structure are co-constitutive: the orientations described at the start of this section develop within structural conditions that enable some and disable others, and the design of those conditions is itself part of what the framework treats as the work of institutional preparation for ambiguity-tolerant pedagogy.

5.3 School culture and leadership

Classroom climate (5.1) and professional orientation (5.2) consolidate within a wider configuration that the framework, following the distinction set out in the introduction to Section 5, calls school culture: the recurrent informal patterns through which the school as an organisation responds to, accommodates, and reworks its own formal arrangements. School culture is not a primary object of direct intervention; it develops in response to structural conditions, among which the decisions and practices of school leadership are particularly consequential, as well as to professional traditions and constellations within the staff. Three considerations clarify how the framework treats this configuration.

The first concerns the analytical location of school culture itself. Across the school development literature, the term is frequently used in ways that conflate three distinct phenomena: the school's display side (its stated values, its mission, its educational Leitbild), its formal structure (the arrangements through which membership, time, evaluation, and

decision-making are organised), and the cultural patterns proper (the informal regularities that consolidate in response to and around the formal side). Kühl's (2020, pp. 121–141) analysis cautions against the conflation: a school whose display side announces a commitment to dialogical inquiry, controversial discussion, or epistemic openness is not, on that basis, structurally committed to any of these, and the cultural patterns that have actually consolidated may diverge substantially from the announcement. The framework therefore reserves “school culture” for the informal level – for what teachers, learners, and leaders actually do recurrently – and treats display-side claims as a separate object of analysis whose decoupling from culture is a structural condition of organisational survival rather than a pathology to be corrected.

The second concerns the role of leadership within this configuration. School leadership cannot install an ambiguity-tolerant culture by directive; the substantive quality of pedagogical engagement will consolidate informally regardless of formal pronouncement. What leadership can do is operate on the formal structures within which cultural patterns consolidate: assessment regulations, the distribution of teaching loads, the configuration of subject departments and conference formats, the procedures through which collegial disagreement is handled, the allocation of protected time for collaborative work. The framework therefore treats leadership not as the source of ambiguity-tolerant culture but as the structural level at which the conditions for such a culture become addressable – on the same temporal logic developed in the introduction to Section 5: cumulative, partially indeterminate, not short-cuttable.

The third concerns the specific structural decisions through which leadership shapes the conditions for ambiguity-tolerant pedagogy. Four are particularly consequential on the framework's analysis. First, the configuration of evaluation procedures (5.2): where teacher evaluation rewards the appearance of certainty and the unambiguous transmission of subject content, the cultural reaction systematically disadvantages the inhabitation of not-knowing identified in 3.3.1 and 5.2 as central to ambiguity-tolerant pedagogy. Second, the formal handling of error and disagreement at the level of the school: whether substantive disagreement among teachers, between teachers and leadership, or between school and parents is formally processed as a problem to be eliminated or as a legitimate feature of educational inquiry. Third, the allocation of time: time allocation is one of the formal structures through which leadership can often exert comparatively direct influence, although leadership autonomy over time budgets varies considerably across European systems; time-allocation decisions and the cultural reactions to them – whether protected slots exist for collegial exchange, whether teaching loads permit slowed-down inquiry, whether reflective work is institutionally recognised – shape much of the affective and epistemic infrastructure within which classroom climate (5.1) and professional orientation (5.2) develop. Fourth, the formalisation of collaborative structures (5.4): whether the school formally institutes protected, role-specified, evaluation-decoupled arrangements for collegial work is itself a leadership decision whose cultural consequences will be developed in the following subsection (5.4).

The empirical work of WP2 and WP4 will accordingly attend to school culture not as a unitary variable but as a configuration of formal-structural decisions and the cultural

reactions that have consolidated around them, and will distinguish, in each partner system, between what schools state about their cultures, what their formal structures actually afford, and what cultural patterns have, over time, taken hold.

5.4 Collaborative structures and school-based innovation settings

Collaborative structures – subject teams, professional learning communities, schoolyard labs, and comparable arrangements for school-based innovation – occupy a specific position in the architecture developed in this section. Unlike classroom climate (5.1) or professional orientation (5.2), which involve structural conditions whose effects are realised primarily through teaching practice, collaborative structures are themselves formal arrangements that shape how teaching practice develops over time. They are, in Kühl's terms, formal structures created precisely to address what cannot be solved by directive: the ongoing development of pedagogical practice through reflective collegial exchange.

This position generates a specific dynamic that the framework must address. The introduction of formal collaborative structures does not, by itself, install collaborative practice. As Kühl argues with respect to formalisation generally (2020, pp. 100–119), every formal structure generates its own informal reactions, which can either support or undermine the structure's intended function. Schoolyard labs, subject teams, and professional learning communities are no exception. Where they function well, they consolidate as protected spaces for the kind of sustained, exploratory exchange that ambiguity-tolerant pedagogy requires; where they function poorly, they generate informal reactions – perfunctory attendance, ritualised contribution, the displacement of substantive disagreement into corridors and car parks – that hollow out the formal arrangement without abolishing it.

Three structural features distinguish well-functioning from poorly functioning collaborative arrangements, on the framework's analysis. The first is protected time: collaborative structures whose meeting times are scheduled into formally protected slots generate different cultural reactions than those that depend on the residual availability of teachers after primary teaching duties. The second is role specification: structures that formally specify roles within the collaboration (facilitation, documentation, follow-up) reduce the informal pressures that otherwise concentrate these tasks on whoever takes initiative, which can lead to uneven engagement. The third is decoupling from evaluation: collaborative structures that are formally decoupled from teacher evaluation generate different cultural reactions than those whose proceedings feed into individual professional assessment – the latter tend to incentivise the foreclosure of substantive disagreement, since disagreement under evaluative observation becomes professionally costly.

These features illustrate the general principle established in the introduction to Section 5: formal structures are a comparatively addressable lever, and they operate on collaborative culture indirectly, through the conditions they establish rather than through the outcomes they prescribe. A school cannot formally require that its subject teams engage productively with pedagogical ambiguity. What it can do is design the formal arrangements – protected

time, specified roles, decoupling from evaluation – within which productive engagement becomes a likely cultural reaction rather than an exception.

The framework's interest in collaborative structures, accordingly, is not in their formal existence but in their structural design. The empirical work of WP4 will need to attend not only to whether partner schools have collaborative arrangements in place but to how those arrangements are formally configured, and to the cultural reactions that have consolidated around them over time.

5.5 Assessment regimes as a condition: a constructive sketch

Section 5 and the Conclusion identify assessment regimes as a structural condition that can strongly orient classrooms either toward or against ambiguity-tolerant learning; 7.2 draws on research on formative assessment. This section offers a constructive sketch of what ambiguity-compatible assessment would look like, to be elaborated through WP2 and WP4.

Three design principles follow. First, assessment of process rather than only of result. Where the pedagogical purpose is to develop the capacity to hold openness, what is assessed must include how the learner held openness, not only the final position. Reflective journals, learning portfolios with iterative entries, and documentation of revisions are the practical instruments. Second, assessment of reflection rather than only of answer. The conditions under which an answer was given, the alternatives considered, the assumptions made explicit, and the revisions undertaken are themselves assessable. This shifts the locus of assessment from the correct answer to the quality of inquiry. Third, formative learning under summative constraints. Where high-stakes or externally regulated examinations constrain assessment practice, as they do across the partner systems, the framework's intervention is not to replace them: even where a final examination remains summative and binding, the learning process that precedes it can include formative elements, so that examination preparation does not exclusively train closure.

Two cautions are in order. First, ambiguity-compatible assessment is not the abolition of evaluative judgment. The principles above presuppose that the assessor can distinguish careful inquiry from random elaboration, reflexive revision from inconsistency, and productive non-closure from incoherence. Without trained judgment, the principles collapse into procedural rituals. Second, the introduction of ambiguity-compatible assessment is itself a school-cultural intervention. It requires negotiation with parents and other stakeholders who often expect, and may demand, the closure-oriented assessment culture in which they were themselves educated. The institutional analysis of Section 5.3 applies to this negotiation. A fuller treatment is reserved for WP4 piloting and for the next iteration of the framework.

Application note (Greece). The Greek case offers a specific institutional anchor. The Skills Labs (Εργαστήρια Δεξιότητων), introduced by Ministerial Decision 94236/ΓΔ4/2021 (Ministry of Education and Religious Affairs, 2021) and now compulsory in nursery, primary and lower-secondary schooling, are organised in four thematic cycles and address four groups of skills: 21st-century skills (the 4Cs), life skills, technology and STEM skills, and skills of the

mind (case study, problem solving). They offer an institutional setting in which the framework can be taken up in the Greek system without requiring major additional curricular restructuring. Since the 4Cs are now Greek curricular reality, the framework's relation to them is one of extension rather than opposition: the five dimensions of Ambiguity Competence (7.3) specify what critical thinking and collaboration require where the matter at hand admits of more than one legitimate reading.

6. Pedagogical Approaches to Ambiguity: Methods and Learning Processes

6.1 Didactic Principles

The shift from Section 5 to Section 6 marks a change in analytical register that requires explicit thematisation. Sections 4 and 5 have located ambiguity in the situational and institutional layers within which it becomes pedagogically operative: the structural features of ambiguity-relevant situations (4.1), the domains and the social, cultural, and transnational contexts across which they vary (4.2 to 4.4), and the didactic-institutional conditions under which they can be sustained (5.1 to 5.5). Section 6 develops these principles in three steps: 6.1 articulates the didactic principles that orient the design of ambiguity-rich learning settings; 6.2 specifies the methodological forms in which those principles are realised; 6.3 examines the participatory and co-constructive conditions under which both become substantively educative.

The didactic principles developed in this section are not techniques but orientations: structural commitments that distinguish ambiguity-tolerant pedagogy from its alternatives, and that the methodological approaches of 6.2 will subsequently instantiate. Three principles are central. Openness and non-closure (6.1.1) specifies the structured refusal of premature resolution, articulated against both naive openness and instrumental closure. Productive irritation (6.1.2) addresses the moments of unsettlement in which interpretive routines become available for transformation, and the conditions under which such moments issue in inquiry rather than avoidance. Reflexivity (6.1.3) designates the pedagogical cultivation of the turn from the ambiguous object to the process of one's own engagement with it – the didactic counterpart to reflexive competence as developed in 7.3.4. The three principles are functionally differentiated and often mutually reinforcing. A typical sequence runs as follows: openness establishes the situational conditions, irritation marks the affective and cognitive threshold within those conditions, and reflexivity allows the threshold to become educationally productive rather than merely disorienting. The sequence is not fixed, however: reflexivity can precede irritation, irritation can open a situation, and reflection can generate new irritation. A fourth subsection (6.1.4) applies these principles to a specific and increasingly pressing context: the pedagogical challenge posed by generative AI tools whose affordance of immediate fluent answers can encourage precisely the premature closure that the three principles are designed to counteract.

6.1.1 Openness and non-closure

Democratic education faces a structural tension: conveying complex subject matter in a way adapted to learners' needs requires a degree of complexity reduction (didactic reduction) – but such clarification must not become simplification. On the contrary, it must also be a goal of democratic education to address the very fact of societal complexity. This requires keeping ambiguous situations deliberately open in pedagogical settings, rather than resolving them prematurely. In the spirit of the Beutelsbacher Konsens, this is a fundamental task of democratic education, since inappropriate simplification would also violate the imperative of controversy (Kontroversitätsgebot), to which multiperspectivity is didactically closely related (Dengel et al., 2021, p. 21; Dengel & Kelch, 2021, p. 81). Sustaining this openness in the classroom is a precondition for developing perspective competence and reflexive competence as two dimensions of Ambiguity Competence: learners can only learn to navigate multiperspectivity and reflect on their own assumptions if they are repeatedly exposed to ambiguity without premature closure.

Therefore, Ambiguity Competence is most likely to emerge where learning itself is reoriented: democratic education should not only produce ready-made answers to given questions, but also raise new ones. This requires an open learning environment that resists instrumental rationality and cannot be efficiently straightened into a single line (Dunker, 2017, p. 126).

Non-closure, however, is not normative indifference. Sustaining the openness of interpretive and deliberative processes does not entail abandoning the standards by which interpretations and arguments are assessed. What is held open are the spaces of meaning-making and negotiation – not the criteria of plausibility, evidence, and reasoned justification that make a discourse a discourse rather than a juxtaposition of opinions. The Beutelsbacher Konsens itself makes this distinction visible: alongside the imperative of controversy and multiperspectivity, it formulates a prohibition of indoctrination and overpowering – principles which presuppose that not every position is equally defensible and that pedagogical openness operates within, not against, normative orientation. Non-closure is therefore a structured openness, complemented in the ACES Framework by the dimensions of normative competence and decision competence (see Section 7.3).

Such an open learning environment can be realised across multiple dimensions: in the choice of questions and topics (open-ended and problem-oriented, resisting premature closure), and in the design of tasks (Maier et al., 2010, p. 87) and materials, where divergent and open-ended tasks allow for multiple valid responses and resist closure. It further extends to the teaching methods employed, which themselves generate the ambiguity-rich situations that openness requires (see 6.2), and to the social and communicative forms of interaction in the classroom, where openness is not only a didactic principle but a lived practice of dialogue and co-construction (see 6.3). All of this presupposes a climate of psychological safety and error tolerance: learners can only engage productively with ambiguity where mistakes are not penalised and uncertainty is treated as a legitimate part of the learning process – a climate that depends, not least, on the teacher's own stance toward uncertainty, not-knowing and mistakes (see Section 5).

6.1.2 Productive irritation

Where openness and non-closure create the structural conditions, a second didactic principle takes hold: productive irritation. When learners are openly confronted with ambiguous situations – with what is unresolved or contradictory – they can experience moments of genuine unsettlement in which established routines of perception, thought, and interpretation are disrupted. Irritation designates one possible subjective experience of an encounter with ambiguity: the moment in which one's interpretive routines become problematic and established interpretations of self and world develop cracks (cognitive dimension; Combe & Gebhard, 2019, p. 143). In Koller's (2016, pp. 215ff.) understanding of transformative Bildung (transformative educational processes), such a moment of unsettlement is not incidental but constitutive: Bildung without an initial failure of one's own routines is impossible. This carries direct didactic consequences: if Bildung depends on moments of irritation, then classroom engagement with subject matter must, not always but repeatedly, go beyond the mere acquisition of certainties and include moments of enduring and working through irritation (Bähr et al., 2019, p. 4).

Yet irritation is not productive by default. It is by no means self-evident that irritation gives rise to a process of inquiry and exploration – resistance and avoidance are equally possible responses (affective dimension; Combe & Gebhard, 2009, p. 553). Empirical observations support this: learners frequently interpret irritating moments as errors to be corrected, seek to exclude what is unsettling, or deflect responsibility rather than engaging with the open situation (Gebhard et al., 2019, p. 251; Pfeiffer, 2019, p. 338). What distinguishes productive from unproductive irritation is therefore not the irritation itself but what follows: whether it opens further and deeper thinking or brings the thought process to an end (Lübke & Gebhard, 2016b, p. 128).

Cultivating such moments requires what Bähr et al. (2019, p. 31) call irritation-friendly teaching: a pedagogical approach that does not rush toward resolution but creates the conditions under which irritation can be sustained and explored. This may involve breaking institutional routines, slowing down rapid interpretation processes, and confronting learners with the unresolved, unfinished, and contradictory – or presenting the already familiar in an estranged and defamiliarising way. The educational processes that follow from such encounters cannot be neatly goal-directed or fully surveyable in advance; they are, of necessity, tentative, probing, and experimental movements into unfamiliar terrain, opened up only through exploratory action (Schnurr, 2021, p. 48).

One constructive, non-resistant way of engaging with irritation – as Combe and Gebhard (2009, p. 555) argue – is the opening of a space for imagination and fantasy (Vorstellungs- und Phantasieraum). At the crossroads of the experience process, where the question is whether learners accept or resist what is unfamiliar, this imaginative space proves decisive: fantasy and inner imagery serve as the dynamic medium of exchange between the learner and the subject matter, transforming irritation into constructive engagement (epistemic dimension) and carrying the experience process beyond resistance. Without this opening, the process ends before it has productively begun. This imaginative and inherently affective quality of irritation points toward the particular potential of arts-based approaches, explored further under 6.2.4.

But what enables teachers and learners to engage productively with irritation in the first place? On the teacher's side, this requires a particular professional orientation: rather than acting as a provider of answers, the teacher's role is to hold the situation open and engage as a dialogue partner, creating the conditions under which irritation can be sustained rather than prematurely resolved (Lübke et al., 2019, p. 187). On the learners' side, the willingness to remain exposed to irritation is itself shaped by learners' assumptions about the nature of the subject (for biology, see Lübke et al., 2019, pp. 186–187; Lübke & Gebhard, 2016b, pp. 127–128). Where social science subjects are perceived through a natural-science lens – as dealing primarily with facts and correct answers – learners may be less likely to sustain irritating moments (on the nature of social-scientific knowledge, see Krebs & Szukala, 2021, pp. 23ff.). Equally important is learners' sense of agency: the capacity to experience oneself as capable of acting, even in situations that feel uncertain or uncomfortable, strongly influences whether irritation is sustained or deflected (Lübke et al., 2019, p. 187). This connects productive irritation directly to democratic learning – cultivating experiences of self-efficacy is not incidental but an important condition supporting sustained engagement with ambiguity.

All of these conditions point toward another underlying requirement: productive irritation depends not only on exposure to ambiguous situations, but on space and time for reflectiveness – a central condition for the possibility of productively engaging with irritation (Lübke et al., 2019, p. 187). This is why productive irritation finds its complement in the next didactic principle: reflexivity.

6.1.3 Reflexivity

Reflexivity constitutes a central dimension in educational processes (Combe & Gebhard, 2012, pp. 112ff.; Lübke & Gebhard, 2016a, p. 12). Promoting general reflectiveness and creating open and/or irritating spaces in which individual and collective ideas, as well as fundamental assumptions about the self and the world, can be articulated and productively challenged are considered key indicators of teaching quality (Dittmer, 2015, pp. 85ff.; Lübke & Gebhard, 2016a, pp. 22–23). As a didactic principle, reflexivity refers to the pedagogical cultivation of learners' capacity (reflexive competence) to examine not only what they think about a given situation but how and why they think it: What in me is shaping how I see this – and what would it take to see otherwise? This means becoming aware of the assumptions, experiences, and cultural affiliations that shape one's knowledge, perceptions, judgments, and interpretations of oneself and the world, and recognising one's own perspective as contingent and perspectival (see Section 7.3.4; Council of Europe, 2018a, pp. 52–53; 2018b, pp. 46ff.). In this sense, reflexivity also has a metacognitive dimension, involving the monitoring and regulation of one's own cognitive processes and representations. It entails a second-order activity in which individuals do not take their own thinking for granted but subject it to critical scrutiny (Keestra, 2017, pp. 121ff.). As a didactic principle, reflexivity is accordingly distinct from reflexive competence as described in the ACES competence model (Section 7.3): while the latter designates a learnable competence that develops through repeated engagement with ambiguity, the former designates the pedagogical condition under which such development becomes possible in the first place.

The didactic cultivation of reflexivity presupposes the structural conditions established by the preceding principles: openness and non-closure create the situations in which interpretive routines are exposed to challenge, and productive irritation generates the moments of unsettlement in which those routines become visible as routines. Reflexivity is what follows when these moments are not resolved but inhabited: the turn of attention from the ambiguous object to the process of one's own engagement with it. This movement is not spontaneous. It requires explicit pedagogical scaffolding: learning arrangements that slow down the interpretive process, make perception visible and shareable, and create the conditions for the comparison of different perceptual and interpretive pathways (Combe & Gebhard, 2012, p. 92, 2019, p. 150; Hoffmann, 2021, p. 177).

Reflexivity as a didactic principle also has a social dimension that is irreducible to individual self-examination. It is through encounter with others who see and interpret differently that one's own perspective becomes visible as a perspective – not as a View from Nowhere (Nagel, 1986), but as a situated perspective (see Sections 7.3.3 and 7.3.4). This requires a learning environment in which learners can bring different experiences and perspectives to bear on a shared subject matter and reflect on them together (Combe & Gebhard, 2012, p. 92). What Combe and Gebhard (2012, p. 92) call the *Gegeneinanderführung von Perspektiven* – the productive collision of perspectives – makes this possible: the perspectives of others serve as a mirror surface in which one's own interpretive stance can be reflected and examined. Crucially, this process need not end in harmony or agreement; it can issue in the mutual recognition of a perhaps unbridgeable difference – and this recognition is itself a form of reflexive achievement, not a failure of the process.

Methods such as the Community of Inquiry, Visual Thinking Strategies, and the Visual Segment Analysis operationalise this principle (see 6.2.1, 6.2.4).

6.1.4 Application case: Artificial intelligence and premature closure

The pedagogical landscape since 2023 has been transformed by the wide availability of large language models and other generative AI systems. Generative AI offers learners and teachers the possibility of immediate apparent closure on questions that the pedagogical situation would benefit from holding open. The risk is not that AI produces wrong answers (although it sometimes does), but that AI produces fluent answers fast, and that the production of fluent answers fast can encourage epistemic outsourcing. This corresponds to the foreclosure pattern that Section 3.4 identifies as the behavioural expression of failing ambiguity processing.

Two pedagogical responses are compatible with the framework. The first is integrative: AI tools become objects of inquiry within the methodological approaches of 6.2, treated as one voice among others whose framing assumptions are made visible (multiperspective discourse, 6.2.3; reflexive competence, 7.3.4). The second is structural: the design of tasks (question-based inquiry, 6.2.1; open-ended tasks, 6.2.2) is adjusted so that the value of the task lies in the process rather than the deliverable. Both responses depend on teachers' capacity to hold openness against the affordance of immediate apparent closure that the tool offers.

6.2 Methodological Approaches

The didactic principles articulated in 6.1 – openness and non-closure, productive irritation, reflexivity – do not operate in a vacuum; they require concrete methodological forms in which they are enacted. The approaches developed in this section are accordingly not a catalogue of techniques but pedagogical instantiations of the principles: learning arrangements that create ambiguity-rich situations, sustain the openness and unsettlement these principles require, and generate the conditions under which ambiguity can be productively inhabited and reflected upon. The relation between principle and method is therefore neither one of derivation (no principle can be mechanically translated into a single method) nor one of indifference (not every method is compatible with every principle), but one of structured affordance: each approach makes some principles operative more readily than others, and the framework's interest is in which approaches make which principles operative under which conditions.

Six methodological approaches are developed in turn. Question-based inquiry (6.2.1) stages openness at the level of the question and of dialogical inquiry, through the Question Formulation Technique and the Community of Inquiry. Open-ended tasks and wicked problems (6.2.2) extend this orientation to the structure of the learning task itself. Multiperspective discourse (6.2.3) addresses the situated collision of standpoints through which perspective and reflexive competence (7.3.3, 7.3.4) become accessible to learners. Arts-based learning (6.2.4) develops the imaginative and affective registers of ambiguity engagement signalled in 6.1.2. Experiential and simulation-based learning (6.2.5) addresses the action-implicating dimension that decision competence (7.3.6) presupposes. Game-based learning (6.2.6) explores the structured suspension of consequence within which ambiguity-rich exploration becomes available. The approaches are not exclusive of one another and frequently combine in practice; what the section articulates is their distinct pedagogical logic, not a prescriptive sequence. For each approach, three questions are decisive: which type of ambiguity it makes accessible, which dimensions of Ambiguity Competence it engages primarily and which only secondarily, and which condition decides whether it actually becomes competence-building. One condition holds across all of them: the reflective phase is constitutive rather than an appendix – the pedagogical work begins where the method's own procedure ends. Table 1 summarises the primary and secondary affordances of the approaches. The approaches are presented here only insofar as they illuminate the framework's logic; procedures, materials, and classroom examples are documented in a separate ACES methods compendium.

Table 1. Primary and secondary affordances of the methodological approaches in 6.2 for the five dimensions of Ambiguity Competence

Approach	Type of ambiguity foregrounded	Primary dimensions	Secondary dimensions
Question Formulation Technique (6.2.1)	interpretive	interpretive, reflexive	perspective, decision
Community of Inquiry (6.2.1)	interpretive, normative	perspective, reflexive	interpretive, normative
Scenario technique (6.2.2)	interpretive, normative (temporal openness)	interpretive, perspective, normative	reflexive, decision
Model-perspectival panel discussion (6.2.2)	normative (theoretical openness)	perspective, normative	interpretive, reflexive
Service-learning (6.2.2)	normative, pragmatic	normative, decision, perspective	interpretive, reflexive
Multiperspective discourse (6.2.3)	interpretive, normative	perspective, reflexive	interpretive, normative
Arts-based learning: VTS, VSA (6.2.4)	interpretive	interpretive, reflexive	perspective
Simulation-based learning (6.2.5)	normative, pragmatic	normative, decision, perspective	interpretive, reflexive
Game-based learning (6.2.6)	normative	decision, normative	perspective, reflexive

6.2.1 Question-based inquiry

“Children enter school as question marks and leave as periods” (Postman, 1995, p. 70). Question-based inquiry responds to this diagnosis by withholding closure deliberately: learning situations are organised around questions that admit more than one defensible response, and a lesson may legitimately end with new, more precise questions rather than with an answer (Krieger, 2021, p. 122; Lübke & Gebhard, 2016b, p. 128). Two methods realise this orientation at different levels.

The Question Formulation Technique (QFT; Rothstein & Santana, 2011) stages openness at the level of the question itself. Learners generate questions on a stimulus that is deliberately formulated as a non-question, under rules that suspend discussion, judgment, and answering; they then convert closed into open questions and vice versa, prioritise their questions, and reflect on what they have learned (Minigan & Beer, 2017, pp. 117ff.; Rothstein & Santana, 2011). The method makes interpretive ambiguity accessible and engages interpretive and reflexive competence primarily: the form of a question becomes recognisable as shaping what can be found out. Perspective and decision competence are engaged only secondarily, in anticipating what others might ask and in the low-stakes prioritisation of questions. Repeated use has been found to increase the quantity and thematic breadth of student questions (Summers et al., 2024, pp. 5–6). The decisive condition is that the phase without judgment and the final reflection are protected; where the teacher answers the questions quickly, the method reverts to conventional closure.

Philosophising with children and young people in the form of a Community of Inquiry stages openness at the level of sustained dialogical inquiry into questions that admit of no settled answer (Lipman, 2003, p. 83; Michalik, 2015, p. 429). The conversation clarifies key concepts, collects experiences and perspectives, examines theses and counter-theses, and ends with a reflection on the conversation itself; its aim is a differentiated understanding of the problem rather than a definitive answer (Gloe, 2022, pp. 672–673). The method foregrounds interpretive and normative ambiguity and engages perspective and reflexive competence primarily, interpretive and normative competence secondarily. Helzel (2018) documents that children who engage with open and ambiguous questions develop an increasingly complex repertoire of thinking strategies and that regular philosophical inquiry fosters perspective-taking; Lübke et al. (2019, p. 188) describe the “creative movements of thought” such settings elicit. The decisive condition lies in the procedural norms of the Community of Inquiry – respect, active listening, and the acknowledgement of plural standpoints (Glaser, 2007, p. 155) – which allow plurality to be sustained without collapsing into either consensus or relativism. In this sense, philosophising with children has been described as democracy in action (Conrad et al., 2018, pp. 137, 139).

6.2.2 Open-ended tasks and wicked problems

Open-ended tasks and wicked problems stage openness at the level of the problem itself. Rittel and Webber (1973) distinguished “wicked” from “tame” problems: wicked problems cannot be conclusively formulated without already taking a position on what would count as a solution, their solutions are not true-or-false but better-or-worse, and they are interlocked with other problems. Klafki’s epoch-typical key problems (epochaltypische Schlüsselprobleme; Klafki, 2007, pp. 56ff.) – among them peace, the ecological question, and inequality – specify which such problems carry educational weight; filtered through the capacities for self-determination, co-determination, and solidarity, their treatment is constitutively democratic (Klafki, 2007; see Kron et al., 2024, p. 131). Rittel and Webber thus clarify the structure of such problems, Klafki their educational relevance. The corresponding task structure follows: where the matter is wicked, a convergent task, which admits of one solution that can be judged right or wrong, misrepresents it; where the matter is tame, artificial openness produces a false complexity (Maier et al., 2010, p. 87; see 6.1.1).

Three methods address different aspects of what makes a problem wicked. Scenario technique addresses its temporal openness: learners define a future-oriented problem, identify influence factors, construct contrasting scenarios that are plausible rather than utopian, and develop strategies (Petrik, 2025, pp. 502–510; Röhl-Berge, 2019, pp. 193–197); the future is held open as a structured space of possibilities, neither collapsed into a single forecast nor dissolved into speculation (Petrik, 2025, p. 501). The model-perspectival panel discussion addresses theoretical openness: panellists represent not opinions but theoretical models of democracy and discuss a contested question from their standpoint, before a reflection phase separates role-bound arguments from learners’ own positions (Fischer, 2025, pp. 515–518). The method makes visible that disagreements about wicked problems also concern the conceptual frames within which facts and values are organised. Service-learning addresses the presence of such problems in the community: curricular learning is

combined with engagement that responds to a real need, and the experience becomes the object of systematic reflection (Mauz & Zentner, 2022, pp. 698–699, 702; Seifert et al., 2019). The competence model of Mauz and Gloe (2019, p. 14) already names tolerance for ambiguity and uncertainty as a sub-competence of democratic competence, and service-learning integrated into regular instruction can reach learners whose access to civic engagement outside school is limited (Mauz & Zentner, 2022, p. 697). Research on its institutionalisation suggests that such innovations depend on leadership, partnership structures, and resource allocation (Furco, 2007; Holland, 2005; Ribeiro et al., 2021; see Section 5). As Table 1 shows, the three methods differ in their primary affordances: scenario technique in interpretive, perspective, and normative competence; the panel discussion in perspective and normative competence; service-learning in normative, decision, and perspective competence.

These methods call for methodological self-criticism. W. Friedrichs (2024, p. 22) argues that established futures methods can sustain a planning-oriented relation to the future in which uncertainty is held at arm's length and resolved in favour of a decided-upon course; Kenner (2025, pp. 230–231) warns of an affirmation risk where engagement with sustainability is reduced to individual behaviour change and becomes depoliticising. The framework's response is the decisive condition for all three methods: they are retained, but their reflective phase must make explicit which futures and which normative premises the engagement itself produces.

6.2.3 Multiperspective discourse: from additive to reflexive multiperspectivity

Multiperspective discourse stages openness at the level of the perspectives from which a shared object is engaged. Developed in history didactics as the recognition that historical phenomena are themselves perspectively constituted (Bergmann, 2016), the concept has been extended to the social sciences (Müller, 2021) and to media ethics (Röben, 2013). Bergmann (2016, pp. 29–30) distinguishes multiperspectivity in the strict sense (the perspectives of contemporaneous actors), controversiality (those of later interpreters), and plurality (the positions learners develop in the present); the Beutelsbach principle of *Kontroversität* concerns the second level. Methodologically decisive is the distinction between additive and reflexive multiperspectivity (Müller, 2021, pp. 38–40). Additive multiperspectivity collects and juxtaposes viewpoints; reflexive multiperspectivity places them in qualitative relation and makes their normative presuppositions explicit. Additive staging risks the short-circuit from “perspectives differ” to “all perspectives are equally valid”, the normative indifference identified in 3.4. Efimova and Nygren (2026) support the distinction empirically: in a study with 676 Swedish secondary students, gains in the range and quality of arguments derived mainly from individual engagement with a multiperspectival text that made the grounds of positions reconstructable, while the subsequent structured discussion added little.

The approach foregrounds interpretive and normative ambiguity and engages perspective and reflexive competence primarily – in the charitable reconstruction of positions and in the turn back to one's own situatedness – and interpretive and normative competence

secondarily. The decisive condition is whether perspectives are reconstructed in terms that their proponents would recognise and whether learners are required to take and justify a position of their own; normative competence (7.3.5) is integral to, not external to, the approach's success.

6.2.4 Arts-based learning

Many forms of art are structurally open to multiple legitimate interpretations: meaning is produced in the encounter between work and recipient (Bentwich & Gilbey, 2017, p. 6). Arts-based learning therefore finds ambiguity already embedded in its object rather than having to create it. Art positioned between arbitrariness and unambiguous clarity opens a space for experimentation and for enduring competing interpretations (Dengel & Kelch, 2021, p. 83; Schnurr, 2021, p. 46); T. Bauer (2018, pp. 95–96) accordingly locates a deliberate “ambiguity training” in art, music, and literature. Images are a particularly productive entry point, since their meaning is constructed in perceiving and speaking about them and differs with viewer, context, and prior knowledge (Hoffmann, 2021, p. 177). For democratic education, images are then not merely illustrations of political issues but themselves objects of inquiry (Dengel & Kelch, 2021, pp. 78–79).

Two methods illustrate the range. Visual Thinking Strategies (VTS) structure a group discussion of an artwork around three questions – What is going on in this picture? What do you see that makes you say that? What more can we find? – while the teacher paraphrases contributions without privileging any reading (Nolan, 2022, pp. 130ff.; Yenawine, 2013). VTS treats multiple readings as potentially legitimate, provided that they can be grounded in observable features of the image; it engages interpretive competence in particular. The Visual Segment Analysis (VSA) begins earlier, with the perceptual process itself: learners document how their gaze moves across an image (Breckner, 2012, p. 152) before analysing its composition and its contexts of production and use (Breckner, 2010, pp. 288ff.). Comparing perceptual processes shows that the same image was never quite the same image for different viewers, which engages reflexive competence (Tiborra, 2021, pp. 214–215). Used in the classroom, the procedure transforms individual perception into a shared analysis, in which comparison expands the range of readings instead of reducing it to one (Männer, 2026). The approach foregrounds interpretive ambiguity and engages interpretive and reflexive competence primarily, perspective competence secondarily. The decisive condition is a protected space of explication in which perception is made visible and shared (Hoffmann, 2021, p. 177).

6.2.5 Experiential and simulation-based learning

Simulation-based learning works with the structural ambiguity of acting itself. Role play has learners act from a defined role and foregrounds perspective-taking and the constructive engagement with conflict (Brüning, 2019). Simulation games present “a relatively open political and economic problem situation, pedagogically and didactically simplified, that calls for some form of solution” (Klippert, 2002, p. 20, as cited in Studtmann, 2019, p. 219), in

which players represent the positions of groups rather than individual persons. Their constitutive feature is the imperative to decide: simulated decisions “may not be deferred within the framework of the simulation game; they must be resolved” (Studtmann, 2019, p. 219). The method foregrounds normative and pragmatic ambiguity and engages normative, decision, and perspective competence primarily; role-taking helps to dismantle the barriers to understanding positions outside one’s own experience (Autorengruppe Fachdidaktik, 2015, p. 148).

The decisive condition is that the decision is not mistaken for a resolution. A formula that T. Bauer (2018, p. 23) recovers from the practice of the early modern Holy Office – nihil esse respondendum, “there shall be no answer” – can be transferred, as the framework’s own move, to the frame of the simulation: the simulation must produce a decision, but the surrounding educational process must resist treating it as the answer to the question the model represents. The decision is reached within a “didactically prepared version” of the matter (Klippert, 1988, p. 140). Grammes and Leps (2018) illustrate the risk: students who “solve” the Middle East conflict in a simulation game may infer that those who fail to do so in political reality lack competence or will. The pedagogical work therefore begins where the simulation ends – in a reflection phase that examines what was decided, why, under what conditions, and whether the situation demanded a decision at all; judging whether a decision is required is itself part of decision competence.

6.2.6 Game-based learning

Game-based learning adds the possibility of iteration: digital and serious games can stage variants of the same decision under shifting conditions and make the comparison of one’s own choices an object of reflection. Empirical studies are consistent with the framework’s distinction between levels: short game-based interventions can shift cognitive and competence-related outcomes while having limited effects on underlying attitudes (Ferreira et al., 2021; Olivier et al., 2019; Yang et al., 2021). Moffett et al. (2023) found no pre-post change on trait scales of ambiguity and uncertainty tolerance despite participants’ qualitative reports of gains, whereas Namaziandost et al. (2025) report gains in ambiguity tolerance after an entire gamified course. Game-based learning is therefore suited to activating state-level processing and cultivating competence, not to serving as a shortcut to dispositional change. Design features that matter include decision points with consequences that can be revisited and formative feedback that prompts revision (Tapingkae et al., 2020), role-shifting within one dilemma (Grasse et al., 2021), and scripted opposing roles that shift collaborative talk toward argumentation (van der Meij et al., 2020). In AI-augmented games, about a quarter of learners defaulted to uncritical acceptance of AI-generated suggestions (Daniels, 2025), a variant of the closure risk discussed in 6.1.4.

The decisive quality criterion follows from Hoofd’s (2019) critique of the cybernetic pre-structuring of serious civic games, which can turn them into a “fake game without stakes”: whether ambiguity is merely the theme of a game or part of its decision architecture. Games whose architecture converges on one intended outcome risk the false openness described in 3.4; games with several defensible endings and with feedback on the grounds rather than

the correctness of decisions engage decision and normative competence primarily and perspective and reflexive competence secondarily. As with simulation, the educational work begins where the gameplay ends.

6.3 Participatory and Co-Constructive Learning Processes

The didactic principles developed in 6.1 and the methodological approaches developed in 6.2 share a structural premise that has so far remained implicit and now requires explicit thematisation: that learners are not the passive recipients of pedagogical settings but active participants in their constitution. Where 6.1 specifies the principles by which such settings are designed, and 6.2 specifies the methodological forms in which those principles are realised, 6.3 specifies the participatory and co-constructive conditions under which both become substantively educative rather than merely procedurally implemented. The argument proceeds in four steps: learners as co-creators of meaning (6.3.1), the negotiation of ambiguity in social interaction (6.3.2), democratic classroom practices as lived experience (6.3.3), and collective sense-making under ambiguity (6.3.4).

6.3.1 Learners as co-creators of meaning

The position of the learner in pedagogical theory has shifted decisively over the past three decades, and the shift bears directly on the framework's argument. Where earlier conceptions of pedagogy treated learners as recipients of curricular content whose receptiveness was the variable of interest, contemporary work in democratic education treats them as co-creators of the meaning that emerges in the pedagogical situation. The position of the learner as co-creator implies that meaning is not transferred from teacher to learner along a quality-controlled pipeline, but emerges in the engagement between learner, teacher, matter, and setting – and that the meaning so produced cannot be specified in advance without negating the very conditions of its emergence.

The most articulate philosophical development of this position in current education theory is offered by Biesta (2006, 2010, 2014). Biesta distinguishes three functions of education that have been increasingly displaced by what he calls the learnification of educational discourse: qualification (the acquisition of knowledge, skills and dispositions necessary for specific tasks), socialisation (the inscription of learners into the cultural, professional and political orders into which they will enter), and subjectification – the dimension at which a human being comes to stand in relation to her own freedom and to the questions her life poses (Biesta, 2010, pp. 19–22). Biesta's claim is not that qualification and socialisation are unimportant, but that an educational discourse that addresses only these two functions misrepresents what education is for. The subjectification dimension is constitutively non-instrumental: it cannot be planned for, measured by output, or guaranteed by method, because what it cultivates is the very capacity for response that the planner, measurer and methodologist would presuppose in those they address. To take seriously the claim that learners are co-creators of meaning is to take seriously the claim that the educational

situation contains something that is not under the educator's control – and that this uncontrolled element is not a failure of education but a condition of it (Biesta, 2014, p. 1).

The methodological correlate of this philosophical position has been developed in the student voice tradition, of which Cook-Sather (2006, 2020), Rudduck and Fielding (2006), Mitra (2018), and Fielding (2001) have produced the most consequential analyses. Student voice in this tradition is not a procedural addition by which learners express preferences; it is a structural reconfiguration in which learners are positioned alongside educators as critics and creators of educational practice (Cook-Sather, 2020, p. 182). The reconfiguration involves three movements that the framework will later operationalise: the recognition that learners hold legitimate epistemic standpoints on their own learning, the development of structures through which those standpoints can travel into decisions that affect them, and the willingness on the part of educators to revise practice in response to what they hear. Crucially, Rudduck and Fielding (2006) warn that none of these movements is automatic: student voice can become a perilous popularity in which the rhetoric of participation legitimates the unchanged distribution of authority, and where the structures developed for hearing learners function as devices for filtering out what is institutionally inconvenient.

The framework's response to this risk is methodologically continuous with the principle of structured non-closure articulated in 6.1.1: the conditions under which learners are positioned as co-creators of meaning must include the conditions under which the consequences of that co-creation are visible to them. This is the point at which Dewey's (1916/2008) classical insight becomes pertinent. For Dewey, democratic learning is constituted by the experiential link between expression and observable consequence: an act becomes educative only insofar as the actor can trace how the act has shaped the situation. Where this link is broken – where learners express but do not see their expression travel into outcomes – the experiential basis of democratic learning is itself disrupted, and the educational setting trains, against its own intent, a habit of dissociation between voicing and acting.

In the framework's terms, the position of learners as co-creators of meaning activates two of the five dimensions of Ambiguity Competence with particular density. Reflexive competence (7.3.4) is engaged whenever learners take their own contributions as objects of analysis, examining the conditions under which their voice is or is not heard, the criteria by which their contributions are taken up, and the forms of recognition that make engagement worthwhile. Decision competence (7.3.6) is engaged whenever learners make choices about the matter at stake in the engagement under conditions where the underlying ambiguities and uncertainties – about what the matter is, about how others will respond, about whether the setting can accommodate substantive influence – cannot be resolved in advance. The methodological challenge is therefore not to eliminate these ambiguities and uncertainties, but to construct settings in which engaging with them becomes itself the site of learning.

The implications for ACES-oriented pedagogy are direct. A pedagogical setting that treats learners as co-creators of meaning is not one in which learners are given more procedural choices, but one in which the matter at stake is genuinely open to their constitutive engagement – including the question of what the matter at stake is. Co-creation of meaning is not the gift of a generous educator; it is the structural condition under which the receptive-

epistemic core of Ambiguity Competence (7.3.2, 7.3.3, 7.3.4) and its action-oriented complement (7.3.5, 7.3.6) become jointly cultivable in the same setting.

6.3.2 Negotiation of ambiguity in social interaction

If 6.3.1 establishes the position of learners as co-creators of meaning, 6.3.2 specifies the social-interactional condition under which co-creation is enacted. The condition is not simply that learners speak but that they negotiate – and negotiation is, on the framework’s analysis, an irreducibly ambiguous practice in which the matter at stake, the standing of the participants, and the conditions of legitimate uptake are all simultaneously in play.

The negotiation of ambiguity in social interaction has its most developed German-language articulation in the literature on conflict and dialogue capacity within democratic education. Mauz and Gloe (2019, p. 20) define the relevant sub-competence as the capacity to recognise diversity, differences and divergences of positions, perspectives and interests, to be convinced of the importance of negotiating differing positions and opinions, to recognise the multilayered nature of conflicts, and to shape conflict situations in a fair and respectful manner. The articulation is consequential because it specifies that the negotiation is not the consequence of a deficit (a conflict to be managed) but the constitutive form in which democratic engagement under conditions of difference proceeds. Reinhardt’s (2022) principle that conflict is constitutive of citizenship education, rather than an obstacle to be managed, has its social-interactional correlate here: the negotiation of disagreement is the form in which the matter is engaged, not the form in which engagement is delayed.

The empirical literature on the class council (Klassenrat) in German-speaking democratic education (B. Friedrichs, 2014; Rademacher, 2022) provides a structured setting in which this negotiation can be examined. The class council, in its developed form, is a regular meeting of the class in which children themselves take responsibility for moderation, agenda-setting, and the resolution of issues the class has raised. The empirical literature documents that the cultivation of conflict and dialogue capacities under such conditions is real but contingent: Rademacher (2022, p. 743) reviews evidence indicating positive effects on speech behaviour, willingness to take responsibility, self-esteem, and the practice of democratic structures, but also documents A. Bauer’s (2013) typology of council practice – bureaucrats who orient strictly to formal procedure, covert opponents who use the structure to subvert it, powerless idealists who oscillate between procedural commitment and avoidance of public negotiation. The typology suggests that the form of the setting does not, by itself, generate the engagement; what matters is the practice the form sustains. Evaluations also name the conditions on which its success depends: fixed scheduling in the timetable, support from school leadership, and a cooperative collegial culture (Altenburg-van Dieken, 2019; Rademacher, 2022, p. 743).

The framework’s argument requires, however, an analytical step that the literature on the class council has not yet fully developed. The negotiation enacted in such settings is not symmetrical: children must perform voice within institutional scripts whose terms they did not author. The framework tentatively draws here on the category of epistemic disappointment, currently being developed (Gloe & Heindl, in preparation) – the second-order interpretive

category through which children diagnose the patterned non-consequence of their voiced contributions. The argument, drawing on generational order theory (Alanen, 2001; Mayall, 2002; Qvortrup, 2005), on Komulainen's (2007) account of voice as a performative accomplishment, on Fricker's (2007) theorisation of testimonial and hermeneutical injustice, and on Dewey's (1916/2008) experiential link between expression and consequence, identifies a distinct interpretive moment in which children come to treat the absence of impact not as an isolated failure but as a structural feature of the institution they are addressing.

The category is consequential for the framework in two respects. First, it shows that the negotiation of ambiguity in social interaction has an epistemic dimension that exceeds the procedural one: what is at stake in the negotiation is not only what is decided, but whose contribution is granted the interpretive weight to shape the decision. Where this weight is systematically denied, learners do not simply fail to participate; they develop a sophisticated, second-order theory of why participation does not function as it claims to. Second, the category names a learning outcome that participatory settings can produce against their stated intent. A setting that invites voice without admitting consequence trains learners not in democratic engagement but in the diagnosis of its institutional simulation – and the diagnosis, once developed, is not easily unlearned.

The framework's response is structurally cognate to the responses developed in 6.2.5 (the simulation-as-resolution risk) and 6.2.6 (the cybernetic-closure risk): the method itself is preserved, but the reflective phase is treated as constitutive rather than as an appendix. In the case of 6.3.2, this means that settings designed to cultivate the negotiation of ambiguity in social interaction must keep the conditions of negotiation themselves available for examination. Whether the matter actually was open to influence, whether the voice raised actually was taken up, whether the outcome actually reflects the negotiation – these are not external evaluations of the setting but constitutive features of what is to be negotiated within it. In the framework's terms, the social-interactive negotiation of ambiguity activates perspective competence (7.3.3) and reflexive competence (7.3.4) in conjunction with normative competence (7.3.5): learners must enter the standpoints of others, examine their own situation in the structure, and articulate criteria by which the negotiation can be assessed. Where this conjunction is sustained, the setting becomes formative; where it collapses into procedural performance, it produces, as Gloe and Heindl's analysis suggests, the second-order disappointment that is the framework's most demanding diagnostic case.

6.3.3 Democratic classroom practices as lived experience

The third condition under which participatory and co-constructive learning becomes substantively educative is that democratic practice in the classroom is lived rather than taught about. The distinction is conceptually grounded in Himmelmann's (2016) tripartite conception of democracy as a form of life, a form of society, and a form of government. On Himmelmann's analysis, democratic education that addresses only the third register – the institutional and procedural facts of democratic government – will produce learners who can describe democratic systems, but who have not encountered democracy as a way of acting

and being acted upon. The first two registers, form of life and form of society, are addressed only where democratic practice is enacted in the classroom, the school, and the community in which learners live (Mauz & Gloe, 2019, p. 11; see 6.2.2).

The German-language literature documents three practices in which the lived character of classroom democracy has been most extensively developed: the class council (Rademacher, 2022, treated above), student representation through Schülervertretung (Hahn-Laudenberg, 2022), and participatory assessment (Ruberg et al., 2022). The three practices share a structural feature that distinguishes them from procedural forms of student involvement: they redistribute consequence. Student representation, on Hahn-Laudenberg's (2022, pp. 724–725) analysis, has the dual function of representing learner interests and of constituting a setting for political socialisation and democratic learning; the dual function generates a productive tension that the practice cannot resolve definitively but must hold as a condition of its operation. Participatory assessment, on Ruberg et al.'s (2022, p. 759) analysis, treats learners “as constructors of their world-knowledge and experience” (DeGeDe, 2017, as cited in Ruberg et al., 2022, p. 759) and integrates instruments such as learning maps, learning logs, and dialogical learning-development conversations that change the relationship between learner and assessor from vertical to horizontal – without dissolving the structural responsibility of the assessor.

The empirical state of these practices in primary schools has been recently documented by Gloe (2025) in the scientific evaluation of the Bavarian school pilot (Schulversuch) Mitdenken! Mitreden! Mitgestalten! – SMV an Grundschulen. The three-year mixed-methods study documents both the structural progress and the structural limits of primary-school participation. Class-level structures – class assemblies, class spokesperson elections, class councils – are widely established; school-wide bodies such as student parliaments are rarer, although the school trial increased their frequency. At the same time, children themselves report a recurrent pattern: opportunities to speak exist, but their proposals are rarely implemented (Gloe, 2025, p. 188). Teacher attitude and school leadership emerge from both the quantitative and the qualitative data as the decisive variables: structures that exist on paper without being supported by a participatory orientation in the staff and leadership produce the form of participation without its substance.

The findings have direct implications for the framework. First, the form-of-life dimension of Himmelmann's articulation cannot be cultivated by procedural innovation alone: structural anchoring in the timetable, in the school programme, and in the legal framing must be combined with professional development that addresses the orientation of the staff toward democratic engagement (Gloe, 2025, pp. 191–193). Second, the empirical pattern in which proposals are heard but rarely implemented is the structural correlate of the epistemic disappointment that 6.3.2 thematises: the gap between formal opportunity and substantive influence is not a marginal inefficiency but the central diagnostic feature of participation regimes that fail to be educative.

Gloe (2025, pp. 189–190) closes the report by recommending that future research address the impact of participatory school structures on central dimensions of democratic competence as articulated in the Council of Europe's Reference Framework of Competences for Democratic Culture (Council of Europe, 2018a), naming “tolerance of

ambiguity” explicitly among the dimensions whose cultivation through participatory school structures has yet to be empirically established. The framework’s argument and Gloe’s empirical agenda therefore meet at the same conceptual point: the claim that participatory school practice cultivates ambiguity-tolerant democratic engagement is theoretically motivated by the framework, whereas the empirical conditions under which this cultivation actually occurs remain open questions for subsequent research.

In the framework’s terms, democratic classroom practices as lived experience are the methodological setting at which the form-of-life dimension of democracy and the typological architecture of Ambiguity Competence converge.

6.3.4 Collective sense-making under ambiguity

The fourth condition under which participatory and co-constructive learning becomes substantively educative is that the classroom becomes a setting for collective sense-making – that the construction of understanding is not the parallel achievement of individuals working through the same material in isolation, but a shared accomplishment in which the engagement of each is conditioned by the engagement of others, and in which the resulting understanding is itself the property of the collective rather than of any of its members.

The most developed theoretical articulation of this condition is offered by Wegerif’s (2013) dialogic theory of education, which characterises education as “learning to learn, think and thrive in the context of working with multiple perspectives and ultimate uncertainty” (Wegerif, 2013, as discussed in Mercer et al., 2019). Wegerif frames this in terms of uncertainty; the framework takes up his dialogic argument for ambiguity, since what is at stake in dialogue is the plurality of defensible readings rather than missing information. The pedagogical premise is that meaning emerges in the gap between voices in dialogue – that this gap is not a deficit of mutual understanding but the irreducible source of the understanding that dialogue produces.

The classroom setting in which this premise is most directly enacted has been developed in the literature on the Community of Inquiry (see 6.2.1) and on dialogic education more broadly (Mercer et al., 2019). Where 6.2.1 addresses the methodological form, 6.3.4 addresses the participatory-structural condition under which the form becomes generative: that the participants engage one another not as competitors for the correct answer but as co-investigators of a question whose answer none of them holds in advance. It requires that the conditions for what Wegerif (2013) and Mercer et al. (2019) call dialogic space are sustained over time: the suspension of the reflex toward immediate evaluation, the willingness to hold multiple readings in parallel without forcing premature synthesis, and the discipline of continuing the inquiry past the point at which a plausible-enough answer would, in less demanding settings, end it.

The framework’s argument adds an analytical step that the dialogic literature has acknowledged but not always foregrounded: that collective sense-making under ambiguity produces something that individual sense-making cannot. The point is not merely that several minds working together can canvas more possibilities than one alone; it is that the

engagement among them generates an interpretive resource that is not reducible to the contributions of any of them. This is what distinguishes collective sense-making from cooperation in the resolution of well-defined problems. In the latter, the collective is an efficiency device; in the former, the collective is a constitutive condition of the engagement. The framework's concept of Ambiguity Competence presupposes this distinction: the receptive-epistemic core of the construct – interpretive (7.3.2), perspective (7.3.3), and reflexive competence (7.3.4) – is cultivated under conditions of genuine plurality, in which other minds are engaged not as means to one's own clarity but as constitutive sources of the understanding to which one contributes.

The educational warrant for this position is given its strongest contemporary formulation in Biesta's (2014) characterisation of education as a "beautiful risk". For Biesta, the risk is not the danger of failure but the constitutive feature that distinguishes education from production: educational settings cannot guarantee their outcomes, because their outcome is precisely the response of a free subject who could, by definition, respond otherwise. The implication for collective sense-making is direct: a setting that purports to engineer agreement misrepresents what the engagement is, and a setting that produces agreement only by suppressing the conditions of disagreement produces a result that is not the achievement of the collective but the suppression of its diversity. The challenge is to construct settings in which the engagement is sustained long enough for substantive understanding to emerge, while preserving the conditions of plurality on which the substantive character of that understanding depends.

The risk against which the framework guards in 6.3.4 is not the failure of collective sense-making but its premature success – the move toward synthesis that resolves disagreement before it has been adequately understood, the consensus that reproduces majority preferences in the form of shared insight, the dialogic harmony that achieves coherence by silencing the voices it cannot accommodate. The reflective phase of any setting designed for collective sense-making must therefore include the question of what the setting could and could not accommodate, what voices were and were not heard, and what understandings the setting produced that none of the participants individually held.

In the framework's terms, collective sense-making under ambiguity activates the receptive-epistemic core of Ambiguity Competence at exceptional density, and it activates the action-oriented complement (7.3.5, 7.3.6) under conditions in which the action is itself the act of contributing to a shared understanding whose final form one cannot determine alone. Together with the three preceding subsections, it specifies the conditions under which participatory and co-constructive learning becomes substantively educative: where learners are positioned as co-creators of meaning (6.3.1), where they negotiate ambiguity in social interaction whose epistemic conditions they can themselves examine (6.3.2), where democratic practice is lived rather than taught about (6.3.3), and where the construction of understanding is recognised as a collective achievement under irreducible ambiguity (6.3.4). The four conditions are not alternatives but analytically complementary aspects of the same architecture; their separation here serves analytical clarity rather than methodological prescription. Where any of the four is absent, the setting risks reproducing the form of participation without its educative substance – and where all four are sustained, participatory

and co-constructive learning becomes the methodological setting at which the framework's argument about Ambiguity Competence and democratic engagement is most fully realised.

7. The Integrated ACES Framework

7.1 Core Structure

The ACES Framework articulates the relationship between ambiguity, learning, and democratic competence as a four-tiered architecture. The framework distinguishes four analytical tiers: didactic-institutional conditions, state-level ambiguity processing, Ambiguity Competence, and Trait-AT. Ambiguity-rich situations are not treated as a separate tier but as the encounter through which didactic-institutional conditions become operative at the level of state-level processing. The four tiers are not parallel categories. The architecture is developmentally directional but recursively organised: conditions structure encounters, encounters generate state-level processing, competence develops through repeated processing and in turn qualifies subsequent processing, while recurrent qualified engagement may contribute to longer-term dispositional stabilisation. The four-tiered architecture of the framework can be summarised visually (see Figure 2). It extends the psychological dynamic between Trait-AT and State-AT (Figure 1) by introducing two pedagogically central elements: the didactic-institutional conditions that structure ambiguity-rich situations, and the construct of Ambiguity Competence as the mediating capacity through which state-level processing can become generative of trait-level disposition. The framework thereby specifies what an *educational* – as distinct from a merely psychological – account of ambiguity tolerance must include.

Didactic-institutional conditions comprise the structural and pedagogical features of educational settings that shape whether learners are exposed to ambiguity in productive ways. They include the openness of tasks and questions (see 6.1), the climate of psychological safety and error tolerance, the professional orientation of teachers, and the institutional culture of the school (see *Section 5*). These conditions do not, by themselves, develop competence; rather, they constitute the conditions of possibility under which ambiguity-rich learning situations can occur and be sustained.

State-level ambiguity processing denotes the situational activation of affective, cognitive, and epistemic responses when a learner encounters an ambiguous situation. State-AT is not a unified reaction but a multidimensional process: the learner registers the situation emotionally (does it feel threatening or stimulating?), engages with it cognitively (can multiple interpretations be entertained?), and orients toward it epistemically (is ambiguity treated as a deficiency to be eliminated or as a legitimate feature of the matter at hand?). State-AT is transient, situation-bound, and observable in real time.

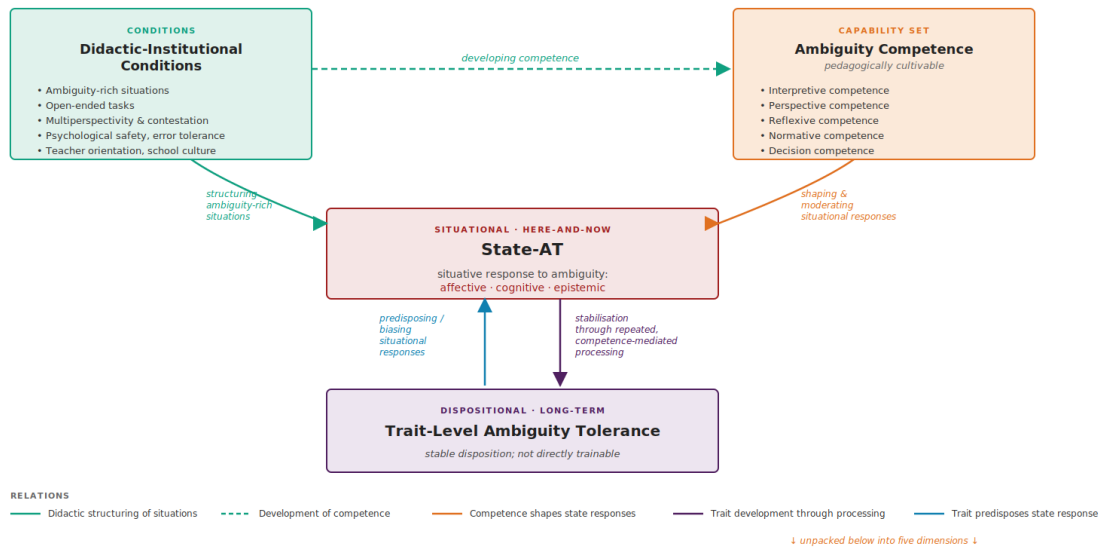
ACES FRAMEWORK

Visual Overview — Pedagogical Architecture & Five Dimensions of Ambiguity Competence



PART 1 — PEDAGOGICAL DEVELOPMENT ARCHITECTURE

Conditions enable; Competence moderates state-level processing; repeated processing stabilises into trait-level disposition.



PART 2 — AMBIGUITY COMPETENCE: FIVE DIMENSIONS (ZOOM-IN)

Two axes: functional (rows: receptive-epistemic vs. action-oriented) × typological (annotations: type-specific vs. type-transversal).

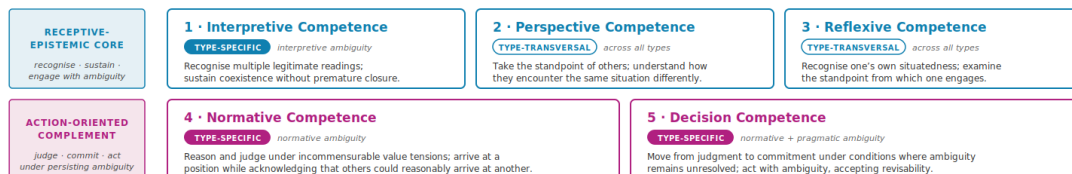


Figure 2. ACES Framework: Pedagogical Architecture and the Five Dimensions of Ambiguity Competence.

Part 1 depicts the four-tiered architecture: didactic-institutional conditions structure ambiguity-rich situations (the encounter linking the first two tiers rather than a tier of its own), which activate state-level processing; Ambiguity Competence, once developed, shapes and moderates this processing; and repeated, competence-mediated processing may stabilise over time into trait-level disposition. Part 2 unpacks Ambiguity Competence along two axes: a functional axis distinguishing the receptive-epistemic core (interpretive, perspective, reflexive) from the action-oriented complement (normative, decision), and a typological axis distinguishing type-specific from type-transversal dimensions. The five dimensions are developed in Section 7.3. Competence is thus both a result of repeated state-level engagement and a resource that shapes future engagement; the relations depicted are recursive rather than strictly linear.

Ambiguity Competence designates the pedagogically cultivable capacities that allow learners not merely to undergo ambiguous situations but to engage with them productively and to act under their conditions. Competence is the mediating layer of the framework: it is what state-level processing builds toward, and what, by qualifying that processing over time, may contribute to its stabilisation into trait-level disposition. Ambiguity Competence is articulated in five dimensions, structured into a receptive-epistemic core (interpretive, perspective, and reflexive competence) and an action-oriented complement (normative and decision competence). The internal structure of the construct is developed in Section 7.3.

Trait-level ambiguity tolerance describes the relatively stable disposition of an individual toward ambiguous situations. Building on conceptualisations of AT as a multidimensional construct, the framework distinguishes three components of Trait-AT: an affective disposition (a stable emotional orientation toward ambiguity), cognitive openness (a stable capacity to shift between perspectives and resist premature closure), and epistemic openness (a stable acceptance of the provisionality and fallibility of knowledge) (see 2.3.1; Figure 1). The framework hypothesises that repeated, competence-mediated state-level engagement can contribute to the gradual stabilisation or reshaping of Trait-AT; Trait-AT is not directly trainable, but it may be shaped by the conditions and competences that the framework specifies.

The framework's pedagogical thesis is that educational interventions cannot directly target traits but can systematically shape the conditions, situations, and competences through which traits develop. The directional logic of the four tiers can be summarised as follows:

Didactic-institutional conditions enable ambiguity-rich situations → these activate **state-level processing** → **competence-building** mediates the quality of that processing → and repeated, qualified processing may stabilise into **trait-level disposition**.

7.2 Process Logic

The four tiers of the framework describe a static architecture; the process logic describes how the architecture operates over time. Four analytically distinguishable process components can be identified: exposure, situational processing, competence-mediated modulation, and stabilisation.

Exposure to ambiguity is the entry point of the process. Where didactic-institutional conditions sustain openness rather than closure, learners are confronted with situations whose interpretation, evaluation, or resolution remains genuinely indeterminate: open-ended tasks, multiperspective discourse, controversial issues, aesthetic encounters, or wicked problems (see 6.2). Exposure alone is necessary but not sufficient; a learner can be exposed to ambiguity and still avoid, deflect, or foreclose it.

Situational processing is what happens when exposure is sustained rather than evaded. The learner engages affectively, cognitively, and epistemically with the ambiguous situation. This processing is not automatically productive: as 6.1.2 makes clear in the discussion of productive irritation, the same encounter can issue in deeper inquiry or in resistance and avoidance. Whether processing becomes productive depends on the didactic structuring of the situation and on the resources the learner brings to it.

Competence-mediated modulation is the phase in which Ambiguity Competence makes the decisive difference. Competences are not produced by exposure alone; they emerge through repeated engagement under supportive conditions and, once present, qualify subsequent state-level processing. A learner with developed interpretive competence will

engage with a contradictory text differently than a learner without it; a learner with developed normative competence will navigate a value conflict differently than one without it. Competence is therefore both a result of repeated state-level engagement and a resource that shapes future engagement. This is the recursive core of the framework: competence and state-level processing co-develop, mediated by didactic conditions.

Stabilisation describes the long-term consequence of recurrent, competence-mediated engagement with ambiguity. Over time, repeated activation of state-level affective, cognitive, and epistemic responses, when consistently structured by didactic conditions and qualified by competence, may gradually contribute to relatively stable dispositions: a generalised affective ease with ambiguity, a habitual cognitive openness, a settled epistemic openness. Trait-AT is not the goal of any single intervention; where it changes, this is expected to be the cumulative outcome of an educational trajectory.

The process logic articulated here is consistent with, and at specific points draws on, a substantial body of empirical research on how iterative learning cycles produce competence development under conditions of feedback. Three lines of work are particularly consequential. The review of feedback research by Hattie and Timperley (2007), which draws on meta-analytic evidence, shows that feedback is among the most consequential influences on learning – but only under specific conditions: feedback that addresses task, process, and self-regulatory levels, that engages learners in revision rather than simply communicating evaluation, and that operates across multiple iterations rather than as terminal judgment. The framework's competence-mediated modulation phase is consistent with this empirical pattern: competences are not produced by single exposures but emerge through iterative cycles in which feedback – from the situation, from peers, from teachers – shapes how learners engage with ambiguity over time. Black and Wiliam's (1998, 2009) work on formative assessment specifies the structural conditions under which such iterative cycles operate productively in classroom settings: assessment for learning rather than of learning, classroom dialogue that elicits and uses evidence of student understanding, peer and self-assessment that develops learners' own metacognitive capacities. These conditions are not external to the framework's process logic but constitutive of it: the situations 6.2 describes – philosophical inquiry, Visual Segment Analysis, dilemma simulations – are likely to operate productively only where the formative-assessment conditions Black and Wiliam identify are in place. More recent meta-analytic work by Wisniewski et al. (2020) refines the picture by distinguishing the informational function of feedback (which supports competence development) from its merely evaluative function (which can undermine it) – a distinction that bears on the framework's account of how state-level engagement either consolidates into competence or fails to. The framework's claim is therefore not that Ambiguity Competence develops through feedback in some general sense, but that it develops through the specific structural conditions of iterative, informationally rich, formatively oriented engagement that this research tradition has documented and refined.

The process logic clarifies a frequent confusion in discussions of AT in education: the claim that ambiguity tolerance can be “taught” is misleading if it suggests a direct didactic relation. What can be taught are competences; what can be staged are situations; what can be designed are conditions. Trait-AT emerges, where it does, as the stabilised result of these.

7.3 Ambiguity Competence

Sections 7.1 and 7.2 have specified the framework's four-tiered architecture and the process logic through which it operates over time. Both articulate Ambiguity Competence as the mediating layer at which state-level processing can become generative of trait-level disposition, but neither develops the internal structure of the construct itself. Section 7.3 does so. It is the substantive centre of the framework: where 7.1 establishes how Ambiguity Competence stands in relation to conditions, situations, and traits, and 7.2 establishes how its operation unfolds over time, 7.3 specifies what Ambiguity Competence is – which capacities it comprises, how they relate to one another, and how they become observable in empirical work.

The development proceeds in six steps. The structural overview (7.3.1) articulates the two analytical axes – functional and typological – along which the five dimensions are organised, and specifies the indicator architecture (performance and verbalisation) through which each dimension becomes empirically tractable. The five dimensions are then developed in turn: interpretive competence (7.3.2), perspective competence (7.3.3), and reflexive competence (7.3.4) constitute the receptive-epistemic core; normative competence (7.3.5) and decision competence (7.3.6) constitute the action-oriented complement. Each dimension is articulated through a standard format – definition, guiding question, positive and negative examples, performance indicators and verbalisation prompts – whose function is twofold: to fix the construct theoretically, and to render it accessible to the empirical work of WP2 and WP4. The architecture established in 7.3.1 is therefore not a preliminary to the substantive development that follows but the conceptual scaffolding within which each of the five dimensions is to be read. A seventh subsection (7.3.7) departs from this format: rather than articulating a further competence dimension, it extends the indicator architecture to the conditions that teachers and school leaders create and sustain.

7.3.1 Structural Overview

The construct of Ambiguity Competence comprises five dimensions, organised along two analytically distinct axes that together specify the architecture of the construct. The first axis is functional: it distinguishes the receptive-epistemic core – interpretive, perspective, and reflexive competence – which describes the capacities required to recognise, sustain, and engage with ambiguity as such, from the action-oriented complement – normative and decision competence – which describes the capacities required to form judgments and act under conditions of persistent ambiguity. The second axis is typological: it distinguishes capacities that engage with specific types of ambiguity from capacities that operate across types.

This internal structure embodies the framework's central pedagogical claim: a democratic education adequate to ambiguity must develop both sub-domains of the functional axis, and it accords the receptive-epistemic core a justificatory rather than necessarily temporal priority

over the action-oriented complement: defensible judgment and decision require adequate interpretation, perspective-taking, and reflexivity, even though these capacities may develop and operate recursively in practice. Receptive-epistemic competences without action-oriented complements risk collapsing into indecision and normative indifference; action-oriented competences without receptive-epistemic foundations risk premature closure and ill-grounded judgment. The two sub-domains presuppose each other: one cannot judge well what one has not interpreted carefully, and one cannot decide responsibly what one has not perspectivally and reflexively examined.

The typological axis cuts across this functional distinction. Drawing on the typology of ambiguity developed in 2.1.1 – interpretive, normative, and pragmatic ambiguity – three of the five dimensions are type-specific, addressing primarily one type of ambiguity (or, in the case of decision competence, a dimension shared by two types), while two are type-transversal, operating across all three types. Interpretive competence (7.3.2) addresses primarily interpretive ambiguity: it is the capacity to engage with the multiple legitimate readings that constitute ambiguity at the level of meaning-making. Normative competence (7.3.5) addresses primarily normative ambiguity: it is the capacity to reason and judge under conditions of incommensurable value tensions. Decision competence (7.3.6) addresses the action-implicating dimension shared by normative and pragmatic ambiguity: it concerns the move from judgment to commitment under conditions where the underlying ambiguity remains unresolved. Perspective competence (7.3.3) and reflexive competence (7.3.4), by contrast, do not engage with one type of ambiguity in particular but with the standpoints from which any type of ambiguity is encountered – one's own and those of others. They are therefore type-transversal: they operate wherever ambiguity is encountered, regardless of whether the ambiguity is interpretive, normative, or pragmatic in its primary register.

The two axes together articulate why the framework specifies five dimensions rather than three or seven. The receptive-epistemic core comprises one type-specific capacity (interpretive) and two type-transversal capacities (perspective, reflexive); the action-oriented complement comprises two type-specific capacities (normative, decision) – decision competence operating in the overlap between normative and pragmatic ambiguity. Pragmatic ambiguity has no type-specific receptive dimension of its own; its interactional demands – repair, clarification, and relational attunement – are to be captured empirically chiefly through perspective, reflexive, and decision competence. The architecture is therefore not arbitrary but follows from the joint analysis: each functional sub-domain requires both type-specific capacities (which engage with the substantive content of ambiguity in its different registers) and, across the construct as a whole, type-transversal capacities (which engage with the perspectival conditions under which any ambiguity is encountered). This has consequences for the framework's claim to transnational applicability (developed in 7.4): where the prevalent forms of ambiguity differ across educational and cultural systems – some systems foregrounding interpretive ambiguity through their curricular emphases, others foregrounding normative ambiguity through their political-educational traditions, others foregrounding pragmatic ambiguity through their interactional cultures – the type-transversal capacities (perspective, reflexive) provide the architecture's connective tissue, while the type-specific capacities (interpretive, normative, decision)

require pedagogical realisation that is sensitive to which types of ambiguity are most operative in which contexts.

The structure also clarifies the framework's relation to the Beutelsbacher Konsens and to comparable European frameworks of democratic competence (such as the Council of Europe's Reference Framework of Competences for Democratic Culture; Council of Europe, 2018a). Ambiguity Competence is not an alternative to existing competence frameworks but a specification of the cognitive, perspectival, and judgmental capacities that those frameworks presuppose without always operationalising. By articulating these capacities as a structured set of five dimensions with concrete indicators – dimensions located along both a functional and a typological axis – the framework offers a vocabulary that is at once theoretically grounded and empirically tractable.

The five dimensions are now developed in turn. Each is articulated through a standard format: a definition specifying the construct, a guiding question expressing its phenomenological core, a positive and a negative example illustrating its presence and absence in classroom settings, and two sets of indicators designed to support empirical work in WP2 and WP4. The functional and typological position of each dimension is indicated at the start of its development, locating it within the architecture established here.

The two forms of evidence correspond to two distinct epistemic accesses to the competence rather than to two specific data collection settings. Performance indicators describe what the competence looks like as situated conduct – what learners do when the competence is in operation, observable in classroom interaction, in structured task situations, in simulations, or in any other setting in which the competence becomes performatively visible.

Verbalisation indicators describe how learners articulate their engagement when prompted to make their reasoning explicit – the considerations they raise, the distinctions they draw, the qualifications they introduce – and are accessible through qualitative interviews, structured think-aloud protocols, retrospective reflection prompts, and comparable elicitation formats. The framework therefore distinguishes three elements: performance indicators; verbalisation prompts, which are the items listed under that heading for each dimension and serve to elicit articulations; and verbalisation indicators, that is, the features of a response that serve as coding criteria (for example, whether a learner explains why an opposing position is intelligible on its own terms). Coding rules and anchor examples for such responses remain to be developed (7.5).

The two sets are not redundant. They access different facets of the competence: performance captures the competence as it operates in concrete situations, often without explicit articulation by the learner; verbalisation captures the learner's reflective relationship to that operation, which may or may not coincide with the performance itself. The relation between the two is itself a substantive question – at times convergent (the performance is recognised and articulated by the learner), at times divergent (a competence is enacted without reflective access, or articulated without performative correlate). This distinction has methodological consequences for the empirical companion paper, addressed in 7.5; for present purposes, it is enough to note that performance indicators and verbalisation indicators are designed to be used together, and that their relation – within and across cases – is itself analytically informative.

DEFINITION

Ambiguity Competence designates the pedagogically cultivable capacities through which ambiguity can be engaged productively, without premature resolution and without indifference. It comprises five dimensions, organised into a receptive-epistemic core and an action-oriented complement:

Receptive-epistemic core (capacities required to recognise, sustain, and engage with ambiguity as such):

- **Interpretive competence** is the capacity to recognise multiple legitimate readings and sustain their coexistence.
- **Perspective competence** is the capacity to see one's view as one among many and reconstruct other views.
- **Reflexive competence** is the capacity to examine one's own interpretations and judgments as situated.

Action-oriented complement (capacities required to form judgments and act under conditions of persistent ambiguity):

- **Normative competence** is the capacity to navigate values in tension and arrive at a reasoned position.
- **Decision competence** is the capacity to act under persisting ambiguity and accept the consequences of choice.

7.3.2 Interpretive Competence

Receptive-epistemic core; type-specific (interpretive ambiguity)

Interpretive competence addresses the type of ambiguity that arises at the level of meaning-making: the multiple legitimate readings that an object – text, situation, sign, sequence of events – can sustain. It is a foundational capacity of the receptive-epistemic core because the recognition of interpretive multiplicity is a cognitive operation on which the framework's other dimensions build.

DEFINITION

Interpretive competence is the capacity to recognise multiple legitimate readings of a phenomenon, text, situation, or claim, to articulate the grounds on which each reading rests, and to sustain the coexistence of competing interpretations without collapsing them prematurely into a single resolution. It provides one important foundation for the receptive-epistemic core, and it is foundational wherever ambiguity first presents itself as interpretive plurality.

Guiding question: *What does it mean to read this carefully – and to read it more than once?*

Positive example: In a social studies lesson on a contested historical event, a student offers an interpretation grounded in primary sources, then, when a peer offers a different interpretation grounded in different sources, does not abandon her own reading but locates the disagreement in differing source bases and asks which sources the class has access to. She holds both interpretations as candidates and treats the question of which is better grounded as itself worth investigating.

Negative example: Confronted with a poem that admits of multiple readings, a student insists on identifying the meaning, asks the teacher repeatedly which interpretation is correct, and, when told that several are defensible, concludes that the poem is “just confusing” or that “anything goes”. The student treats interpretive plurality as evidence of arbitrariness rather than as a feature of the object.

Performance indicators:

- articulates more than one interpretation of a given text, image, or situation, and grounds each in observable evidence
- distinguishes between interpretations she finds plausible and interpretations she rejects, while acknowledging the latter as readings someone could hold
- identifies the textual, perceptual, or contextual grounds on which an interpretation rests
- resists the impulse to identify a single “correct” reading where the material does not warrant one
- treats interpretive plurality as a feature of the material rather than as a problem to be eliminated

Verbalisation prompts:

- When you read or look at something that seems to have several possible meanings, how do you decide which meaning to take seriously?
- Has it ever happened that you and a classmate read the same thing very differently? What did you do?
- Do you think there is always one correct interpretation, or can several interpretations be valid at the same time?

7.3.3 Perspective Competence

Receptive-epistemic core; type-transversal

Perspective competence does not address one type of ambiguity in particular but the standpoints from which any type of ambiguity is encountered: it operates wherever the recognition that “others see this differently” becomes pedagogically operative, whether the difference concerns the interpretation of a text, the weighting of values, or the framing of an interaction. This type-transversal character is what allows perspective competence to function as connective tissue across the framework’s other dimensions.

DEFINITION

Perspective competence is the capacity to recognise that one’s own viewpoint is one viewpoint among others, to reconstruct viewpoints that are not one’s own with sufficient accuracy and charity that those who hold them would recognise themselves in the reconstruction, and to engage with such viewpoints as positions to be understood on their own terms and as potentially legitimate, even where one disagrees. It moves beyond interpretive competence by extending the recognition of multiple readings from texts and phenomena to persons and positions.

Guiding question: *Who else could see this differently – and why would they, on their own terms?*

Positive example: In a discussion of a controversial policy issue, a student articulates not only her own position but also the position of someone who disagrees with her. She does so without caricature: she identifies what considerations would lead a reasonable person to that position, distinguishes the strongest version of the opposing argument from its weakest, and engages with the strongest version. When asked whether she has been persuaded, she says no, but adds that she now understands why someone might hold the other view.

Negative example: In the same discussion, a student treats the opposing view as obviously wrong, attributes it to ignorance, bad faith, or self-interest, and is unable to articulate it in terms that its proponents would recognise. When asked to reconstruct the opposing position, she offers a version so weakened that no one actually holding the view would identify with it. Disagreement is registered as a property of the disagreeing person rather than of the issue.

Performance indicators:

- reconstructs viewpoints that differ from her own in terms that their proponents would recognise
- distinguishes between strong and weak versions of opposing arguments and engages the strong version
- attributes disagreement to differing considerations, values, or experiences rather than primarily to deficiency in the disagreeing person
- recognises the situated character of her own viewpoint without thereby treating all viewpoints as equivalent
- engages with positions she rejects without dismissing those who hold them
- recognises when an utterance can be read in more than one way – as irony or as a serious claim, as a question or as a challenge – and checks the intended meaning before responding
- takes into account that conventions of directness, silence, and address differ, and does not read an unfamiliar convention as rudeness or disengagement

Verbalisation prompts:

- When someone in class disagrees with you about something important, how do you usually try to understand their position?
- Can you describe a viewpoint you disagree with in a way that someone who holds it would think is fair?
- Where do you think your own views on contested issues come from? Could someone with a different background reasonably see things differently?
- Has it happened that you understood something someone said differently from how it was meant? How did you find out?

7.3.4 Reflexive Competence

Receptive-epistemic core; type-transversal

Reflexive competence, like perspective competence, operates across all three types of ambiguity rather than being tied to one. Where perspective competence engages with the standpoints of others, reflexive competence turns the same recognition back on the subject of the engagement: my reading, my weighting of values, my conventions of interaction are themselves perspectival in ways I do not fully see. This reflexive turn is type-transversal because it applies to whatever ambiguity is encountered, regardless of register.

DEFINITION

Reflexive competence is the capacity to recognise one's own perceptions, interpretations, and judgments as situated and conditioned – by biography, language, social position, prior knowledge, and affective response – and to make this situatedness the object of ongoing examination rather than of denial or paralysis. It is the dimension that turns the interpretive and perspectival recognitions back on the subject of the recognition: not only that there are other readings and other perspectives, but that one's own reading and perspective are themselves situated.

A note on the relation between performance and verbalisation indicators in this dimension. The general distinction between the two indicator sets, articulated in 7.3.1, takes a particular form for reflexive competence. Where for the other dimensions performance and verbalisation address distinct facets of the competence – the situated enactment on the one hand, the reflective articulation on the other – reflexive competence is itself the capacity to take one's own thinking as an object of examination. Verbalisation, in this dimension, is not external to the competence but part of its operation: to articulate that one's reading is conditioned by one's biography, training, or affective response is itself the exercise of reflexive competence, not merely a report on its exercise. The performance indicators and verbalisation prompts below should therefore be read not as accessing two different facets of reflexive competence but as accessing the same competence under two different elicitation conditions: in unprompted situated conduct on the one hand, under deliberate reflective elicitation on the other. The convergence of the two – or, more revealingly, the cases in which a learner exhibits one but not the other – is itself a substantive finding about the structure of reflexive engagement.

Guiding question: *What in me is shaping how I see this – and what would it take to see otherwise?*

Positive example: A student engaged in the Visual Segment Analysis (see 6.2.4) notices that her gaze moved first to the central figure and only later to the background, while her partner's gaze moved in the reverse order. She does not conclude that one of them looked "correctly"; instead, she becomes interested in what about her looking – her training, her expectations, her affective response to the figure – produced that order. She recognises her perception as her perception without thereby invalidating it.

Negative example: In the same exercise, a student treats her perceptual sequence as simply "what was there to be seen" and her partner's different sequence as inattention or error. The possibility that perception itself is perspectival, shaped by who is looking and from where,

does not register. Reflexivity is short-circuited by the conviction that one is seeing things as they are.

Performance indicators:

- articulates how her own background, prior experience, or affective response is shaping her interpretation of a given situation
- distinguishes between what is the case and how she is seeing what is the case
- examines her own initial reactions before treating them as conclusions
- entertains the possibility that her interpretation could be conditioned in ways she does not immediately see
- engages with her own perspectivity without treating it as either a guarantee of truth or a disqualification
- notices when her reading of a remark, a gesture, or a silence depends on her own conventions of interaction, and holds this reading open

Verbalisation prompts:

- When you find yourself reacting strongly to something in class, do you think about why you are reacting that way? What does that look like for you?
- Do you think your way of seeing things is just “how things are”, or is it shaped by who you are and where you come from?
- Has it happened that you noticed your own interpretation of something was shaped by something about you – a prior experience, an assumption, a feeling? Can you describe such a moment?
- When someone in class reacts differently from what you expected – stays silent, laughs, answers indirectly – what do you think is going on? Could it mean something other than what you first assumed?

7.3.5 Normative Competence

Action-oriented complement; type-specific (normative ambiguity)

Normative competence addresses the type of ambiguity that arises at the level of values and commitments: the tensions among legitimate principles that further inquiry cannot eliminate and that characterise both ethical reflection and political deliberation. It is the first capacity of the action-oriented complement because it marks the transition from receiving and recognising ambiguity to taking a defensible position under it.

DEFINITION

Normative competence is the capacity to navigate situations in which several legitimate values, principles, or commitments stand in tension, to articulate the considerations on each side, to weigh them against criteria one can defend, and to arrive at a reasoned position without treating the underlying tension as eliminable. It marks the transition from the receptive-epistemic core to the action-oriented complement: where interpretive, perspective, and reflexive competence develop the capacity to recognise and sustain ambiguity, normative competence develops the capacity to take a position under it without falsely resolving it.

Normative competence is not the application of a fixed value hierarchy. It is the capacity to engage in normative reasoning under conditions where reasonable people, deploying defensible criteria, can arrive at different conclusions. It thereby occupies a position that is neither relativist (any position is as good as any other) nor dogmatic (only one position is defensible): it holds that positions can be more or less well-grounded, while acknowledging that grounding does not always issue in unique answers.

Guiding question: *Given that several defensible positions are in tension, what considerations carry weight for me – and can I defend that weighting?*

Positive example: In a discussion of an ethical dilemma involving a conflict between individual autonomy and collective welfare, a student articulates the values on each side, identifies what she takes to be the strongest considerations supporting each, and arrives at a position. She makes explicit which considerations she is giving more weight to and why; she acknowledges that someone weighting the considerations differently could arrive at a different position; and she remains open to revising her own weighting in light of further argument. Her position is neither arbitrary nor absolute.

Negative example: Two students respond to the same dilemma in opposite but structurally similar ways. The first declares that “everyone has their own values” and refuses to take a position, treating the dilemma as a matter of personal preference. The second declares that the answer is obvious and treats those who disagree as morally deficient. Both have failed normative competence – the first by treating ambiguity as a reason for indifference, the second by denying ambiguity in order to judge with certainty.

Performance indicators:

- articulates the values, principles, or considerations at stake in a situation of normative tension
- identifies how reasonable people, weighting considerations differently, could arrive at different positions
- arrives at her own position and articulates the grounds on which she does
- distinguishes between disagreements she takes to be matters of weighting and disagreements she takes to be matters of fact or argument
- holds her own position without treating opposing positions as merely equivalent to her own or those who hold them as deficient

Verbalisation prompts:

- When you have to take a position on a difficult issue where good arguments stand on more than one side, how do you decide what to think?
- Is there a difference, for you, between not knowing what to think about a difficult issue and thinking that no answer is better than any other? Can you describe the difference?
- Have you changed your mind about an important issue? What made you change it?

7.3.6 Decision Competence

Action-oriented complement; type-specific (normative and pragmatic ambiguity)

Decision competence operates in the overlap between normative and pragmatic ambiguity: it concerns the move from judgment to commitment under conditions where the underlying value tensions remain unresolved and where what is being done in the interaction admits more than one defensible reading. It completes the action-oriented complement because it specifies what it means not only to take a position but to act on the basis of that position when ambiguity persists.

DEFINITION

Decision competence is the capacity to act under conditions of persisting ambiguity, often compounded by uncertainty – to choose, commit, and accept the consequences of choice when the available information remains incomplete, the considerations remain in tension, and the ambiguity will not be resolved before action is required. It is the dimension that completes the construct: where normative competence develops the capacity to take a position, decision competence develops the capacity to take an action on the basis of that position, knowing that the position itself remains revisable.

Decision competence presupposes the four preceding dimensions but is not reducible to them. One can interpret carefully, take others' perspectives, reflect on one's own situatedness, and weigh considerations normatively, and still be unable to act. Conversely, one can act decisively without any of the preceding capacities – but such action is not what decision competence describes. Decision competence is acting with ambiguity rather than in spite of it: acting in a way that preserves rather than denies the conditions under which the action was taken.

Guiding question: *Given that I cannot wait until everything is clear, what can I commit to now in a way that I could defend later?*

Positive example: A student council faces a decision about an issue on which the relevant facts remain uncertain and the relevant values remain in tension. A student argues for a course of action while explicitly acknowledging the ambiguities – naming what is uncertain, what considerations she is weighting and why, and what she would want to revisit if new information emerged. She votes; she accepts that she may turn out to have been wrong; she remains willing to reconsider. Her decision does not pretend to a certainty it does not have.

Negative example: Two students respond to the same decision in opposite but structurally similar ways. The first insists that the decision cannot be made until “all the facts are in” and effectively defers indefinitely; the question of action is collapsed into the question of certainty, which cannot be attained. The second decides quickly and treats the ambiguities as obstacles to be brushed aside rather than as features of the situation; the decision is made against the ambiguity rather than with it. Both have failed decision competence – the first by treating ambiguity as an obstacle to acting at all, the second by treating it as something to be denied in order to act.

Performance indicators:

- arrives at a decision in situations where ambiguity persists and waiting is not an option
- articulates what remains uncertain at the moment of decision and what considerations the decision rests on
- accepts responsibility for the decision while acknowledging its revisable character
- distinguishes between the decision (which closes for the moment) and the underlying question (which may remain open)
- revisits decisions in light of new information or argument without treating revision as failure

Verbalisation prompts:

- When you have to make a decision while good reasons still speak for more than one option, how do you handle that?
- Has there been a situation where you had to act even though you weren't sure you were right? What did you do, and how did you feel about it afterwards?
- Do you think changing your mind about a decision you made is a sign of weakness or of strength? Why?

Interrelations among the Dimensions

The five dimensions are analytically distinguishable but empirically interwoven. The empirical interweaving operates along both axes established in 7.3.1. Along the functional axis, receptive-epistemic and action-oriented capacities typically interlock within a single engagement: interpretation, perspective-taking, and reflexive examination prepare the ground for normative judgment and decision under ambiguity. Along the typological axis, situations rarely instantiate one type of ambiguity in isolation: a controversial classroom discussion is simultaneously interpretive (what is the case, how is the issue framed?), normative (which values weigh more heavily?), and pragmatic (how do we hold this disagreement open in our talk?). In any such concrete situation, several dimensions therefore typically operate together: a student exercises interpretive competence in reading the relevant materials, perspective competence in engaging with opposing views, reflexive competence in examining her own response, normative competence in weighing the

considerations, and decision competence if action is required. The type-transversal capacities (perspective and reflexive competence) operate across all three ambiguity types and typically remain active throughout the engagement; the type-specific capacities (interpretive, normative, decision) come into focus where their corresponding ambiguity type is dominant in the situation. The framework does not claim that these dimensions can be developed independently of one another; it claims that they can be distinguished for purposes of analysis, observation, and pedagogical design.

The structural distinction between the receptive-epistemic core and the action-oriented complement, however, is not merely analytical. It has pedagogical consequences, but the order it implies is ideal-typical and justificatory rather than a developmental sequence: the framework does not propose a stage model in which receptive-epistemic competences must be acquired before action-oriented ones. The receptive-epistemic competences develop the capacity to engage with ambiguity as such; the action-oriented competences develop the capacity to operate under it. A pedagogy that develops only the first risks producing learners who can sustain plurality but cannot take responsibility within it; a pedagogy that develops only the second risks producing learners who decide and judge without the receptive resources that make decision and judgment defensible. The framework's pedagogical thesis is that democratic education must develop both, in their proper relation.

This is also where the framework addresses the concern, sometimes raised against pedagogies of openness, that they collapse into normative indifference (see 6.1.1). The framework's response is structural rather than rhetorical: openness without normative and decision competence would collapse into indifference, but the framework does not advocate openness without these complements. Non-closure in the receptive-epistemic core is the condition of possibility for genuine normative and decision competence, not a substitute for them. The typological architecture clarifies why: the type-transversal capacities of perspective and reflexive competence help to ensure that openness is not a withdrawal from substantive engagement but its precondition – they are not neutral with respect to the type-specific capacities they enable, but constitutive of the conditions under which interpretive, normative, and decision competence can operate well.

7.3.7 Conditions: Indicators for Teachers and School Leaders

The indicator architecture developed in 7.3.1 to 7.3.6 concerns learners. This subsection extends it to the conditions that teachers and school leaders create and sustain. The framework hypothesises that institutional and organisational conditions are causally relevant to (not merely correlated with) ambiguity-tolerant learning; this hypothesis requires condition-level indicators if it is to be empirically tested in WP2 and WP4. This subsection provides them in operational form. Because condition-level indicators are themselves exposed to the display-side risk described in Section 5 – an institution can articulate support for open, contested teaching without changing its practice – the indicators are formulated, as far as possible, in terms of observable structures, procedures, and allocations rather than declared orientations.

Guiding question (teachers): What conditions am I creating, and what conditions is the institution sustaining, that allow ambiguity to remain open long enough to become educative?

Performance indicators (teachers):

- Designs tasks whose openness is structural rather than rhetorical, that is, tasks that admit multiple defensible responses rather than a single intended answer.
- Sustains multiperspective discourse without resolving it prematurely, treating contestation as a pedagogical resource rather than a management problem.
- Establishes and maintains conditions of psychological safety and error tolerance as explicit features of the learning environment, not as incidental by-products of classroom climate.
- Allocates time and turn-taking so that competing readings are elaborated before any resolution is modelled.
- Adjusts instructional framing in response to learners' engagement, keeping the situation genuinely indeterminate for as long as the pedagogical purpose requires.

Verbalisation prompts (teachers):

- How do you distinguish, in your own planning, between tasks that are open because the answer is unknown and tasks that are open because multiple answers are legitimate? Does that distinction matter to you pedagogically?
- When contestation arises in your classroom, what determines whether you treat it as something to work through or something to settle?
- How do you create conditions in which learners feel safe enough to engage with ambiguity, and how do you know when those conditions are actually in place?
- In your experience, what does it look like when a school culture supports teachers in holding ambiguity open, and what does it look like when it does not?
- How do you decide when a learning situation has been held productively open for long enough, and when it is time to move toward some form of conclusion?

Guiding question (school leaders): What structural conditions am I instituting and protecting that make it possible for teachers in this school to hold ambiguity open as a pedagogical orientation?

Performance indicators (school leaders):

- Ensures that protected time for collegial inquiry, professional learning communities, and shared reflection on practice is formally scheduled and recurrent rather than residual.

- Establishes formal procedures for handling complaints about the treatment of controversial issues that protect contested discussion in the classroom rather than incentivising its avoidance.
- Adjusts internal evaluation, supervision, and accountability instruments to reward process-oriented teaching rather than only result-oriented teaching.
- Engages parents, school authorities, and the wider community in a continuing conversation about why ambiguity-tolerant teaching is part of the school's democratic mission.
- Recognises and protects teacher autonomy in the handling of ambiguous and contested subject matter, including under conditions of external political or parental pressure.

Verbalisation prompts (school leaders):

- What structural decisions in this school have you taken specifically to protect the conditions under which ambiguity-tolerant teaching can develop?
- When a parent or school authority objects to a teacher's handling of a contested issue, what does your defence of the teacher actually look like in practice?
- How do you know, beyond impressions, that your teachers have the institutional space they need to hold ambiguity open in their classrooms?
- What in your school culture works against ambiguity-tolerant teaching, and what are you doing about it?
- In your view, what is the single highest-leverage structural change this school could make to support ambiguity-tolerant teaching?

7.4 European and Transnational Application

The ACES Framework is developed for European educational contexts and is intended to support transnational cooperation across diverse educational systems. Two questions arise: in what sense is the framework genuinely transnational, given that it has been developed within particular intellectual traditions, and what does transnational application require?

Applicability across educational systems

The framework is articulated at a level of generality that allows for application across European educational systems while acknowledging that the systems themselves differ in significant respects: in their curricular structures, their teacher education traditions, their conceptions of democratic education, and their cultures of dealing with uncertainty. The framework's five competence dimensions, three trait components, and four-tiered architecture are intended not to be tied to any single national tradition and have been formulated to be recognisable to educators working in different systems. The empirical work

of WP2 (the comparative study and the National Context Notes) is designed precisely to test this recognisability and to refine the framework where the comparative analysis identifies gaps or distortions.

Adaptation to diverse cultural contexts

Cross-cultural research on AT and related constructs (see 2.5 and 4.4.1) indicates that the cultural variability of ambiguity tolerance is not a peripheral feature but a structural one: societies differ in their institutional and cultural relations to uncertainty, and these differences shape how ambiguity is experienced, addressed, and taught. The framework takes this seriously in two ways. First, it distinguishes the construct of Ambiguity Competence (which the framework articulates as a common vocabulary) from its pedagogical realisation (which necessarily varies with context). Second, it treats this distinction not as a limitation but as a structural feature: a framework adequate to European pluralism must articulate what can be shared without imposing a single pedagogical model.

Comparative perspective across partner countries

The partner systems differ in curricular organisation, traditions of civic and democratic education, institutional structures, and prevailing approaches to learner participation. These differences are not obstacles to a shared framework but resources for testing and refining it. The comparative work in WP2 and the pilot implementations in WP4 are designed to identify where the framework travels well, where it requires adaptation, and where genuine differences in pedagogical conception emerge that the framework should articulate rather than smooth over.

Plurality within classrooms

The adaptability discussed so far concerns variation between educational systems. A second form of plurality is not captured by this comparison: plurality within a single classroom. The framework's normative architecture inherits from the RFCD (Council of Europe, 2018a) the assumption of a shared value horizon – human rights, democracy, and the rule of law – within which contested positions can be treated as legitimate variations. Cross-system adaptability presupposes that this horizon holds in each system, even where it is weighted and instantiated differently. Within a single classroom, this presupposition is not always a safe starting point. In culturally and normatively heterogeneous classrooms, the degree to which a shared democratic value horizon can be presupposed may itself become an empirical question rather than a starting assumption – a question that concerns all learners, not particular groups. The empirical availability of a shared value horizon must, however, be distinguished from its normative status within the framework. Human rights, democracy, and the rule of law need not be empirically endorsed by all learners in order to function as normative boundaries of democratic education. Where learners contest this

horizon, the contestation itself becomes an object of pedagogical engagement; it does not thereby automatically constitute a legitimate variation within normative ambiguity. Settings of high linguistic, confessional, and cultural heterogeneity make it especially visible; examples include Greek reception classes (Τάξεις Υποδοχής) and intercultural schools (Διαπολιτισμικά Σχολεία), and comparable settings exist in all partner systems. Where the shared horizon cannot be presupposed, some of what the framework treats as normative ambiguity may take a different form: not plural readings within a common frame, but plurality about the frame itself. The framework does not resolve this question at its present stage. It names intra-classroom plurality as a structural challenge for its normative architecture and commits the project to its empirical exploration (7.5).

Contribution to European democratic education

The framework's contribution to European democratic education is twofold. Substantively, it articulates Ambiguity Competence as a foundational capacity for democratic participation in pluralistic societies – a capacity that is presupposed by, but not always operationalised in, existing competence frameworks. Methodologically, it offers a shared vocabulary and a structured architecture within which European partners can compare their pedagogical approaches, identify common challenges, and develop adaptable strategies. The framework is therefore not a curriculum to be implemented but a shared analytical resource for the cooperative development of pedagogical practice.

The European dimension of the framework is, in this sense, inseparable from its conceptual structure. A framework articulated at the level of competences and conditions, rather than at the level of methods and materials, is precisely a framework that can be shared across systems while leaving the systems themselves their distinctive character. This is the framework's response to the question that opens any transnational educational cooperation: what can be shared, and what must remain context-sensitive.

The transnational relevance of Ambiguity Competence extends beyond formal educational settings. Community-engaged and partnership-based approaches provide opportunities for learners to encounter diverse perspectives, values, and social realities across cultural and institutional boundaries, thereby creating additional contexts in which Ambiguity Competence can be developed and enacted.

7.5 Empirical Affordances and Open Methodological Questions

The framework articulated in 7.1 to 7.4 is theoretical in character: it specifies a conceptual architecture, a process logic, a multidimensional construct of Ambiguity Competence, and an account of transnational applicability. The present section makes the framework's empirical implications explicit. It does not develop the empirical instruments or research designs themselves – these will be the subject of a separate companion paper, to be developed on the basis of data collected within the project – but it identifies what the framework already

affords for empirical work, what it leaves open, and where the methodological work of the project will have to take its bearings.

The purpose of this section is twofold. First, it makes the framework's empirical scaffolding visible so that partner institutions can assess what is available for their own work in WP2 and WP4. Second, it formulates the open methodological questions transparently, so that the empirical companion paper does not appear, retrospectively, as a correction of the framework but as the principled extension that the framework anticipates.

The framework's empirical scaffolding articulates with several established research designs in educational measurement. The level-differentiated architecture developed in 7.1 corresponds to the multilevel structure routinely employed in school-based research, in which classroom-level and school-level conditions are modelled as nested contexts of individual-level competence development (Snijders & Bosker, 2012). The mediation hypothesis articulated in the process logic (see 7.2) corresponds to the longitudinal mediation designs that have become standard in competence research, in which proximal outcomes (here: state-level processing and competence indicators) are theorised as mediators between educational conditions and distal outcomes (here: trait-level dispositions). The performance/verbalisation distinction developed in 7.3.1 articulates with the broader literature on multi-method assessment in educational research, in which behavioural and reflective indicators are treated as complementary rather than as competing measures of a unified construct (Mislevy et al., 2003). These designs show how the framework's relations could be examined; they do not provide evidence for them. They are not presupposed by the framework's theoretical articulation but become operative when the framework is brought into empirical work.

What the framework already affords

The framework provides four resources for empirical work. The first is operationalised competence indicators. The five dimensions of Ambiguity Competence (7.3.2 to 7.3.6) are not articulated only in conceptual definitions but in two forms of evidence per dimension: performance indicators describing the competence as situated conduct, and verbalisation prompts eliciting the competence as reflectively articulated by the learner (see 7.3.1). These indicators and prompts are designed to support empirical work directly and provide a basis for coding categories; coding rules and anchor examples for responses to the prompts remain to be developed. The negative examples accompanying each dimension serve, in addition, as discriminant indicators: they specify what does not count as the competence in question and thereby help to distinguish genuine engagement from its surface mimics (false openness, normative indifference; see 3.4). A parallel indicator block for teachers and school leaders, extending the same performance/verbalisation architecture to the conditions tier, is developed in 7.3.7.

The second is a level-differentiated measurement architecture. The framework's distinction between Trait-AT, State-AT, Ambiguity Competence, and didactic-institutional conditions (7.1) implies a corresponding differentiation of measurement approaches. Trait-AT, as a relatively stable disposition, is appropriately measured with established self-report

instruments such as MSTAT-II (McLain, 2009) and assessed at intervals long enough to register cumulative change. State-AT, as situational activation, requires situation-bound methods that capture affective, cognitive, and epistemic responses in real time. Ambiguity Competence, as the mediating capacity, is approached through the performance and verbalisation indicators developed in 7.3, which are designed to be neutral with respect to specific data collection methods and can be used in classroom observation, structured task situations, qualitative interviews, and think-aloud protocols alike. Didactic-institutional conditions, as the structural enabling factors, require their own instruments at the level of classroom and school (further specified below). The framework thereby guards against the conflation – common in earlier AT research – of trait-level dispositions with state-level responses or with educational outcomes.

The third is a diagnostic vocabulary for state-level processing. The mechanisms developed in 3.1 to 3.3 (affective, cognitive, epistemic) and the behavioural patterns in 3.4 (engagement, foreclosure, false openness, normative indifference) are not only conceptual categories but candidate coding schemes. They allow observers and analysts to differentiate situations in which ambiguity is processed productively from those in which it is foreclosed, and to identify which mechanism is the locus of foreclosure when it occurs. This affords a level of analytic precision that purely outcome-oriented research designs are not designed to reach.

The fourth is a theory of change. The process logic developed in 7.2 hypothesises that changes in Trait-AT, where they occur, result cumulatively from repeated, competence-mediated state-level engagement under supportive didactic conditions. In empirical terms, didactic-institutional conditions function as antecedents that structure exposure and state-level processing, and they may additionally moderate individual relations in the chain; Ambiguity Competence and qualified state-level processing are hypothesised mediators; Trait-AT is the distal outcome. This mediational representation is, however, a first empirical approximation of a recursive relation: since competence both results from and qualifies state-level processing (7.1, 7.2), longitudinal designs will need to model reciprocal rather than strictly serial paths. The framework thereby specifies the variables, the relationships among them, and the temporal logic that empirical designs must respect – above all the implication that short-term interventions should not be expected to produce robust and durable trait-level change, and that the appropriate proximal outcomes of educational interventions are competence development and qualified state-level processing.

Open methodological questions

Four questions remain open at the level at which the framework currently operates. They are the questions at which the empirical work of the project will have to take its bearings.

The first concerns the empirical capture of state-level processing. State-AT is, by its definition, transient and situation-bound: it is what happens when a learner encounters an ambiguous situation – how the situation is registered affectively, parsed cognitively, and framed epistemically. The framework establishes its theoretical structure but does not, by itself, settle the methods through which it becomes empirically tractable. Several

methodological pathways are available – stimulated recall on the basis of video-recorded classroom sequences, experience sampling administered immediately after ambiguity-rich learning situations, in-vivo behavioural coding informed by the patterns articulated in 3.4, and think-aloud protocols during the engagement with ambiguous material – and each carries its own affordances and limitations.

Within the project, we anticipate combining two of these pathways. Experience sampling, administered through brief item sets immediately following ambiguity-rich learning sequences, is well suited to the affective and epistemic registration of ambiguity (3.1, 3.3): it captures how learners registered the situation while the encounter remains temporally proximal and before substantial retrospective reconstruction is likely to occur, although this assumption itself requires examination; and it does so under naturalistic classroom conditions that preserve the situational character of State-AT. Think-aloud protocols, administered during the engagement with structured ambiguous materials, are correspondingly suited to the cognitive operations developed in 3.2 – the recognition of multiplicity, the parallel maintenance of competing readings, the resistance to premature closure – which are not reliably accessible through retrospective self-report and require articulation in the moment of engagement. Think-aloud data are, however, not free of reactivity: verbalising thoughts generally leaves task performance intact, but instructions to explain or justify one's thinking can alter the processing that is to be captured (Fox et al., 2011). Protocols should therefore be designed accordingly. The two methods thus address different mechanism-level facets of state-level processing and together complement each other in capturing the construct.

The combination also articulates well with the indicator architecture developed in 7.3. Experience sampling, as a brief retrospective elicitation, draws primarily on verbalisation indicators – on how learners articulate their immediate registration of the situation. Think-aloud protocols draw on both indicator sets: the protocol itself is a performance (the cognitive operations are visible as they unfold), and the verbal articulation accompanying it is a verbalisation in the strict sense. The performance/verbalisation distinction developed in 7.3.1 thereby provides the analytic vocabulary in which the data from both methods can be coded and compared, and in which their convergences and divergences can be analytically interpreted rather than treated as measurement noise.

The combination is, at this stage, a principled methodological orientation rather than a finalised design. The empirical companion paper will specify item selection for the experience sampling, the prompt structure and material selection for the think-aloud protocols, and the strategy for relating their results to the competence indicators developed in 7.3. What the framework establishes here is the rationale: state-level processing cannot be inferred from trait-level measures, nor read off from competence-level indicators alone; methods specific to its situational character are required, and the two named pathways are the project's working selection.

The second concerns the relationship between performance indicators and verbalisation indicators. As articulated in 7.3.1, each dimension of Ambiguity Competence is operationalised through two forms of evidence accessing distinct epistemic facets: situated performance on the one hand, reflective articulation on the other. The two are designed to

be used in conjunction, but the framework does not yet specify how their results are to be related when they diverge. Three interpretive options are possible. The two sets may be treated as triangulating evidence toward a single underlying competence, with divergence interpreted as measurement imprecision to be reduced. They may be treated as complementary indicators of distinct facets of the competence, with divergence interpreted as substantive information about the relation between performance and reflection. They may be treated as evidentially distinct claims that must be reported separately, with no underlying construct presupposed. Each option carries different methodological commitments and different validity claims. The choice among them is a matter for the empirical companion paper, but it bears directly on what the project can claim on the basis of its data – particularly for reflexive competence, where, as 7.3.4 notes, performance and verbalisation are not external to one another in the same way as in the other four dimensions.

The third concerns the operationalisation of didactic-institutional conditions. The framework treats classroom climate, professional orientation, school culture, collaborative structures, and assessment regimes (5.1 to 5.5) as enabling conditions for ambiguity-rich learning – not in themselves, but insofar as they are structured to keep ambiguity open rather than to resolve it. The framework provides condition-level indicators for teachers and school leaders (7.3.7), but these have not yet been related to established instruments or tested for their role in competence development. Established instruments are available – Edmondson’s (1999) widely used Team Psychological Safety Scale, originally developed for organisational research and discussed for educational settings (Wanless, 2016), and scales for teacher epistemic beliefs developed in the wake of Hofer and Pintrich’s (1997) framework (notably Schraw et al., 2002, and the domain-specific adaptations reviewed in Greene et al., 2016) – but the framework does not yet integrate them with its own indicators. Without such integration, the comparative work in WP2 and the pilot implementations in WP4 can document that competence development took place in settings with the relevant conditions but cannot show that competence development depended on those conditions in the sense the framework’s process logic requires. Closing this gap is, in our view, the most consequential of the four open questions: it determines whether the framework’s central pedagogical claim – that didactic-institutional conditions are not merely correlated with but causally relevant to ambiguity-tolerant learning – becomes empirically testable within the project.

The fourth concerns cross-cultural comparability. The framework’s commitment to transnational applicability (7.4) generates a methodological question that warrants explicit acknowledgement. If ambiguity tolerance is, as the framework recognises (2.5, 4.4), culturally variable in its expression and its institutional embedding, then the indicators developed in 7.3 cannot be assumed to function equivalently across the partner systems. What is observable as interpretive competence in one partner system may take a different surface form in another, and what counts as decision competence under one tradition of democratic education may be inflected differently under another. The methodological literature names this the question of measurement invariance in quantitative research (Davidov et al., 2014; Vandenberg & Lance, 2000) and etic/emic differentiation in qualitative research (Berry, 1989; Pike, 1967); both traditions converge on the requirement that comparability across contexts cannot be presupposed but must be tested.

The framework does not resolve this question – it could not, since the relevant tests are themselves empirical – but it commits the project to addressing it. The comparative work in WP2, in particular the National Context Notes, is the natural site for this methodological work: not as a peripheral concern, but as a substantive contribution of the project to the cross-cultural literature on ambiguity tolerance. The framework’s distinction between the construct of Ambiguity Competence (as a common European vocabulary) and its pedagogical realisation (as necessarily context-sensitive; see 7.4) is the conceptual structure within which this empirical work can locate itself: differences across systems can be analysed as legitimate variation in the realisation of shared competences, as evidence of construct non-equivalence requiring framework refinement, or as both. Discriminating among these possibilities is itself a methodological achievement that the empirical companion paper will have to deliver.

Comparability has a second, less visible side. As 7.4 sets out, plurality is not only a matter of variation between systems but also of variation within classrooms. The project therefore commits to exploring, through WP2, how the framework’s normative categories function where a shared value horizon cannot be presupposed. The Greek case provides the primary site for this exploration: the WP2 sample seeks to include reception classes and intercultural schools, and the vignette interviews, school leader interviews, and focus groups are designed to show where the categories of normative ambiguity and normative competence (7.3.5) hold and where they reach their limits. Whether these findings call for a revision of the framework’s normative foundation will be decided in a later version of the framework, on the basis of this evidence.

The framework as a working theoretical model

The four affordances and the four open questions, taken together, characterise the framework’s current empirical status. It is a working theoretical model: stable enough to guide empirical design, sufficiently operationalised to support indicator-based research, and sufficiently articulated internally to specify the variables and relationships that empirical work must address – but not yet a finished empirical instrument. The project’s empirical work is therefore not the application of a settled framework to data, but the principled extension of an articulated framework into the methodological registers it calls for. Adjustments to the framework in light of empirical findings are anticipated; they will be documented in subsequent versions, and they will be the substantive contribution that the framework’s theoretical articulation makes possible.

8. Conclusion

The ACES Framework has developed an integrated theoretical account of ambiguity tolerance for democratic education. Its central claim is that productive engagement with ambiguity depends not only on a relatively stable personal disposition but on cultivable competences that develop through the structured interplay of educational conditions,

situations, and learner engagement, and that may, over time, contribute to more stable dispositions.

The framework's first contribution is conceptual. By distinguishing Trait-AT, State-AT, Ambiguity Competence, and didactic-institutional conditions as analytically distinct layers (Sections 2, 3, 5, 7), the framework addresses a recurrent conflation in the literature that has treated ambiguity tolerance alternately as personality variable, as situational response, and as educational outcome without specifying how the three relate. The four-tiered architecture developed in 7.1 and the process logic articulated in 7.2 make this relation explicit: conditions enable situations, situations activate state-level processing, competence mediates the quality of that processing, and repeated competence-mediated processing may, over time, contribute to trait-level disposition. The architecture is directional and recursive, but not deterministic: it specifies the levers available to pedagogical practice without conflating them with their long-term outcomes.

The framework's second contribution is the specification of Ambiguity Competence as a five-dimensional construct organised along functional and typological axes (7.3). The functional axis distinguishes the receptive-epistemic core (interpretive, perspective, reflexive) from the action-oriented complement (normative, decision); the typological axis distinguishes capacities that engage with specific types of ambiguity from capacities that operate across types. This double articulation is substantive rather than taxonomic: democratic education must develop both sub-domains, according the receptive-epistemic core a justificatory rather than temporal priority (7.3.1). The indicators and prompts developed for each dimension provide a basis for its empirical operationalisation.

The framework's third contribution is institutional. Section 5 has located the conditions for ambiguity-tolerant learning within a systems-theoretical analysis of school organisation that distinguishes the formal side, the cultural side, and the display side of educational institutions. The implication is consequential: ambiguity-tolerant cultures cannot be installed by directive, by mission statement, or by isolated workshops on teacher disposition; they are shaped through the interaction of formal structures, professional orientations, and informal organisational practices, among which formal structures are a comparatively addressable site of intervention. The five conditions developed in 5.1 to 5.5 – classroom climate, professional orientation, school culture and leadership, collaborative structures, and assessment regimes – are accordingly not properties to be acquired but configurations to be designed, and the framework's pedagogical thesis is inseparable from its commitment to this institutional realism. Institutional change and the learner-level process logic of 7.2 share a temporal structure rather than a mechanism: both are cumulative, partially indeterminate, and not short-cutable.

The framework's fourth contribution is transnational. Developed for European educational contexts and addressed to a partner consortium spanning substantively different pedagogical traditions, the framework articulates Ambiguity Competence at a level of generality that allows for cross-system recognisability while leaving the systems themselves their distinctive character (7.4). The distinction between Ambiguity Competence as a shared vocabulary and its context-sensitive pedagogical realisation is a structural feature of the framework rather than a concession to diversity. WP2 and WP4 are designed to test where

the framework travels well and where it requires refinement, including the cross-cultural comparability of its indicators (7.5).

Three broader implications follow. First, for educational policy: the framework's analysis suggests that interventions targeting teacher dispositions or classroom climate alone are important but insufficient on their own – they form part of the conditions within which competence develops but do not by themselves produce it – and mission statements, as Section 5 shows, may even substitute for structural change. Formal structures constitute one particularly addressable class of levers, alongside professional learning and interactional practice. Policy that takes this seriously will target assessment regimes, time allocations, evaluation procedures, and the institutional configuration of collegial work, and will accept that cultural change follows structural change only gradually and not mechanically. Second, for teacher education: the framework's account of teacher epistemic framing (3.3.1, 5.2) implies that the cultivation of ambiguity-tolerant pedagogy is not primarily a matter of method-training but of the structured development of a professional orientation in which the inhabitation of not-knowing is recognised as a legitimate component of expertise. Third, for democratic education more broadly: the framework's claim that Ambiguity Competence is a foundational capacity for democratic participation – presupposed by, but not always operationalised in, existing competence frameworks – locates the project's contribution within, rather than alongside, the European democratic-competence literature. The framework is not an alternative to the Beutelsbacher Konsens or to the Council of Europe's Reference Framework of Competences for Democratic Culture (Council of Europe, 2018a); it is a specification of the cognitive, perspectival, and judgmental capacities those frameworks presuppose.

The framework's current status is that of a working theoretical model (7.5): stable enough to guide empirical design and to provide a basis for indicator-based research, but not yet a finished empirical instrument. The four open methodological questions identified in 7.5 – the empirical capture of state-level processing, the relation between performance and verbalisation indicators, the operationalisation of didactic-institutional conditions, and the cross-cultural comparability of the indicators – are not deficits to be corrected before the framework can be applied but the agenda of its empirical extension. An empirical companion paper, based on data collected within the project, will address them.

Ambiguity, on the framework's analysis, is not an obstacle to democratic education but the medium through which it operates. Where educational settings systematically foreclose ambiguity – through assessment formats that reward unambiguous transmission, through classroom climates that penalise the articulation of uncertainty, through institutional cultures that treat not-knowing as a deficit – they do not merely fail to cultivate Ambiguity Competence; they may impede its development, with potentially wider consequences for the democratic participation of those who pass through such settings. The ACES Framework offers, in response, neither a curriculum to be implemented nor a method to be applied, but a shared analytical resource for the cooperative development of pedagogical practice across European educational systems – a resource whose substantive value will be tested in the empirical work that the present articulation makes possible.

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