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Wicked problems: inescapable wickedity

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Wicked problems: inescapable wickedity

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The article explores the concept of wicked problems and proposes a reinvigorated application of this concept for wider educational use. This recommendation stems from the contributions of a number of scholars who frame some of the most contentious and recalcitrant educational issues as wicked problems. The present authors build upon these previous explorations of wickedity and initially apply it to literacy learning. They then discuss the relevance for wicked responses and wicked actions for the wider educational community (e.g. parents, teachers, policy-makers, teacher educators and educational researchers). The authors conclude with three proposals for understanding and addressing wickedity: (a) promoting careful observation and continuous curiosity, (b) increasing conversations with diverse stakeholders and (c) engaging in collective and distributed sense-making.

Keywords: wicked problems; wicked responses; wickedity

Introduction

Wicked problems have been studied in diverse social arenas ranging from children and youth services (Devaney and Spratt 2009), to engineering design (Coyne 2005; DeGrace and Stahl 1990), to health care delivery (Blackman et al. 2006) and to public policy (Briggs 2007). However, a few educational scholars have also explored wicked problems in kindergarten to grade 12 (K-12) settings (e.g. Barrett 2012) and higher education (e.g. Krause 2012). As former teachers and current teacher educators and researchers, the authors of this paper hold a long-term interest in how conceptions of educational issues influence educational decision-making (Jordan, Kleinsasser, and Roe 2014a). Previous inquiries into qualities of teaching, roles of uncertainty and stances towards educational problem solving (simple, complicated and complex) naturally led the authors to wickedity (Jordan, Kleinsasser, and Roe 2014b; Roe 2012). An initial consideration of wickedity indicated that this topic warrants a broader understanding and a much broader inclusion in current educational decision-making, hence this more pointed inquiry into the framework, focusing on the authors' long-standing intellectual conversations about the classifications of educational problems (Jordan, Kleinsasser, and Roe 2014b) on wickedity. This personal probing of wickedity emboldens the authors to encourage various stakeholders (e.g. parents, teachers, policy-makers, teacher educators and education researchers) to position their dilemmas as wicked. With this end in mind, the paper first provides an overview of the existing scholarship that invokes the concept of

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wicked problems. It then considers their application in educational research, tap a specific context from literacy education, and conclude with three proposals for responding to wicked problems.

Situating wicked problems

Historically, the structure and content of many school curriculum and standards are based on eighteenth-century beliefs and intuitions. Scientists and philosophers such as Newton, and Laplace believed that given complete information about the present, one could make accurate predictions of the future (Laplace 1951; Newton 1999). There is a long history in Western culture of longing for Newton's single vision (Blake 1802), a single best way, and/or a simple solution with a clear right path. Some educational stakeholders cling to this way of seeking solutions to educational problems. They seem to seek perfect outcomes that will be 'right' instead of seeking solutions that fit a specific, particular time and place being considered. New and revisited models scatter the landscape, touted as '*the* answer,' '*the* fix,' '*the* way.' Charter schools, home schooling, individualisation and 'flipped classrooms' represent but a few of the current popular approaches touted as fixes (e.g. Neuman and Celano 2012; Ravitch 2010). Fixes are grounded in the idea of a stable and certain world. However, as Taylor (2001, 3) stresses, 'Stability, security, and equilibrium … are but momentary eddies in an endlessly complex and turbulent flux … the condition of complexity is as irreducible as it is inescapable.' Eisenberg (2006, 271) adds, 'What we experience instead is a world of contradiction and confusion, wherein rampant subjectivity and diversity make plural that which was once self-evident and certain, leaving us with a multiplicity of truths, reasons, and realities.' The world is full of wicked problems.

Defining wicked problems

Rittel and Webber (1973) coined the term 'wicked problems' to distinguish the kinds of difficulties that typify design and social science arenas from those in the hard sciences. They define 'wicked' as 'akin to that of "malignant" (in contrast to "benign") or "vicious" (like a circle) or "tricky" (like a leprechaun) or "aggressive" (like a lion, in contrast to the docility of a lamb)' (Rittel and Webber 1973, 160). The properties of a wicked problem may take on different hues and meanings when classifying a specific situation. Rittel and Webber's overarching general concern was that the social professions were being misled by the hope that traditional scientific approaches could resolve social issues. Specifically, they took exception to the idea that with enough data from sufficient sources, clear answers could unfold. This concern led to their proposal of 10 properties (see Appendix 1) that provide a basis for continuous and pervasive challenges that plague the social sciences, including education.

The 10 wicked properties are neither linear nor mutually exclusive, yet wicked problems are unique because they are context-dependent. Solutions to wicked problems cannot be judged as true or false, only as good-or-bad (property 3) depending on a context and understandings within that context. The results that accompany solutions applied to a social setting irreversibly impact that setting, for good or ill, and the fallout may not be known for some time. The essential social nature of wicked problems makes them intractable. As Rittel and Webber (1973, 169) argued,

'diverse values are held by different groups of individuals – that what satisfies one may be abhorrent to another, that what comprises problem-solution for one is problem-generation for another … The choice of explanation determines the nature of the problem's resolution.' (See property 9).

It is improbable, if not impossible, to solve a wicked problem for ever and all time. Rittel and Webber (1973, 165 and 162) give several reasons for this that include every, 'wicked problem can be considered to be a symptom of another problem' (property 8) and wicked problems have 'no stopping rule' (property 2). Rittel and Webber's (1973) characterisation of wicked problems helps create a path to select, examine and interrogate a wicked problem.

Wicked to wickedity: education issues and beyond

A combined consideration of Rittel and Webber's (1973) characterisation of wicked problems creates a path to select, examine and interrogate a wicked problem. A next step becomes branching out to identify, read and consider the work of educational scholars who applied this characterisation to issues of interest within the educational community, composed of the range of stakeholders previously noted and the places where issues arise within and outside of the USA. The goal is better to understand the potential of accepting wicked problems as a framework for responding to dilemmas within education.

Wicked problems are dynamic (Borko, Whitcomb, and Liston 2009), characterised by changing requirements and solutions that are difficult to recognise because of complex interdependencies (Connally and Stansfield 2006). Three articles specifically interrogate challenging (and persistent) issues within K-12 education and teacher preparation and variously consider how educational issues could be cast as wicked problems (i.e. Barrett 2012; Bore and Wright 2009; Southgate, Reynolds, and Howley 2013). Southgate, Reynolds, and Howley in particular provide tantalising interests and curiosities regarding insights gained about responding to educational dilemmas by casting them as wicked problems. While they each provide evidence of the three premises (Rittel and Webber 1973) of wicked problems (goal formulation, problem definition and responding to social context), they also provide insights about the challenges of who formulates goals, defines problems and responds to social contexts.

Bore and Wright (2009) turned the lens of wicked problems on teacher preparation, focusing specifically on policy formation, implementation and service provision. They warned how various silo mentality models (e.g. academic, professional and political) seek to rely upon their idiosyncratic technical languages and practices making it quite difficult to communicate with each other, let alone ameliorate the challenges pervading education worldwide. Barrett (2012) also considered the challenges of numerous stakeholders' perspectives and applied the conceptual framework of wicked problems to the challenges of educating music teachers. She argued that many dilemmas within music teacher education are not so 'tidy and contained' (4). Her illustrative list of such wicked problems, which might be applied to more general teacher preparation settings, included, among others, designing flexible, fair and fitting systems for music teacher evaluation; aligning musical practices and programmes to realise the aims of social justice; diversifying the music teaching force; responding with clarity to conflicting and competing policy claims about the benefits of music; fostering productive collaborations between schools and universities and

within schools of music; and preparing new music teachers for an uncertain future (see Barrett 2012, 4–5). Southgate, Reynolds, and Howley (2013) further endorsed the challenge of numerous stakeholders in their examination of how professional educational experiences (i.e. school- and community-based field placements or clinical experiences) serve as an example of a wicked problem and considered the often clashing practical, theoretical and political perspectives that usually inhibit consensus regarding what professional experience(s) should be.

Yet another challenge is one of context. As Rittel and Webber (1973, 168) cogently admitted in their initial discussion of wicked problems, 'We do not even have a theory that tells us how to find out what might be considered a societally best state.' More globally, they ponder,

> We have come to realize that the concept of the social product is not very meaningful, possibly there is no aggregate measure for the welfare of a highly diversified society, if this measure is claimed to be objective and non-partisan. Social science has simply been unable to uncover a social-welfare function that would suggest which decisions would contribute to a societally best state. (Rittel and Webber 1973, 168)

A contextually best state is what educators seemingly yearn for yet rarely if ever attain. Bore and Wright (2009, 246) review social complexity's context and alert the importance and significance of 'The only way to know what a complex system will do is to observe it (Plsek and Greenhalgh 2001).' Observations by Barrett (2012) and Southgate, Reynolds and Howley (2013) seem to further highlight that a focus on context needs to be considered alongside/with the various stakeholders and silo mentality models that exist.

A further plausible dilemma is in the manner of some responses to educational problems. Bore and Wright (2009) contend that problems in schools specifically, and education generally, rely too heavily on technical rational solutions that tend to avoid reflective practices and lack processes of problem meaning and sense-making. These authors provide evidence that legitimising technical rational solutions more often than not ignore ontological perspectives required for the critical process of problem definition. They call for teacher preparation practices that reflect an awareness of other disciplinary domains and recognition of their significance. Barrett (2012, 5) warned that repeated objective data gathering and analysis that results in lists of possible strategies for actions offer little relief from 'the ongoing demands of responding, reacting, and reflecting on policy issues and persistent calls for reform in teacher education that sometimes shape-shift into something else entirely.' While Southgate, Reynolds and Southgate warn (2013, 19–20), 'Those that use the conceptual lens of the wicked problem agree that professionals should not abdicate responsibility for solving and resolving them, rather they should be more cognizant of the social complexity and ethical features of the process.'

Multiple interpretations in numerous contexts for many social problems arise because framing a complex social problem is subjective. Wicked problems have many stakeholders/silos in their particular contexts with their own views on problems and (potential) solutions (Munneke et al. 2007). Thus, wicked problems are seemingly characterised further by contradictory requirements (Connally and Stansfield 2006; DeGrace and Stahl 1990). Because multiple values are at stake and stakeholders do not agree about their relative importance or meaning, 'wicked problems have no right or wrong solutions that can be tested and revised' (Munneke et al. 2007, 1075). In short, wicked problems, driven by persons in a social context

from which they arise, remain intractable and the actions offered to rectify them remain uncertain, ambiguous and subjective (Barrett 2012).

Through these various empirical and theoretical texts we begin to see an educational 'wicked problem' as amorphous, contextually social and infused with uncertainty, ambiguity and contradictions. Such properties further clarify, if not challenge the properties of wicked problems while offering even further understanding into what (educational) wicked problems are or can be. What seems to become clearer across the few educational discussions that apply the concept of wicked problems is that people and groups within varying contexts deal with different, if not competing views. That is, people's decision-making are highly influenced by the beliefs and the contexts that individuals and groups of individuals have about experiences in their world(s). These varied beliefs, accompanied by rationales and supporting warrant, guide interpretation(s) of situations and events (Kahneman 2011; Lehrer 2009; March 1994). Paraphrasing Rittel and Webber (1973), educational wicked problems are ill-defined, and they rely upon elusive political judgement for resolution. Moreover, invoking Rittel and Webber's ideas, Bore and Wright (2009, 245) succinctly state, 'social problems are never solved, they are simply resolved over and over again.'

In keeping with Rittel and Webber's (1973) evaluation that the framing of social dilemmas is of critical importance in how they can be resolved, the current paper turns the wicked lens to problems associated to a wider educational field: literacy learning. The initial objective is to seek to illustrate how the concept of wicked problems can be applied to a particularly interesting educational issue. The paper then addresses steps that educational stakeholders might take to respond and act toward wicked problems of literacy learning and beyond.

Wicked issues from literacy

Many issues haunt the literacy learning community. While not currently framed as wicked, doing so might invoke different approaches for thinking and acting on them. For example, a major concern centres on the literacy achievement of youth within and beyond the USA. The persistent and troublesome gaps between the guidance offered by empirical and theoretical scholarship and teachers' classroom practices and the concomitant achievement gaps between students from various socio-economic, linguistic and ethnic sections of society tend to grab the most attention. In the USA, current approaches to targeting these gaps typically involve improving literacy standards and, in turn, altering the approaches for evaluating teachers and students (e.g. Common Core State Standards 2012; Valli et al. 2008). This concern and the steps taken to address it exhibit the properties that classify a problem as wicked: a lack of a clear and consistent presentation of the problem (Appendix, property 1), an absence of a definitive solution that accounts for every instance of these problems (Appendix, properties 2, 3, and 6), and the unintended and intended outcomes that make these actions highly consequential. A deeper look at the directions of attempts to address literacy achievement further frames this problem as wicked.

Historically, the types of decisions that teachers make provided a basis for specifying expectations for teachers and then creating checklists linked to them to judge teacher quality (e.g. Stern and Shavelson 1983). That previous line of thinking accepted the continuing use of a rather linear process and assumed a didactic collection of things that teachers must achieve. This, then, turned into aligning things that

students must achieve with these specified teacher actions. Vestiges of this thinking remain today as many teachers work under mandates to use scripted programmes that supposedly align with changing standards (Hargreaves and Fullan 2012). A process that should involve professional judgement and input from a range of stakeholders thus morphs into a top-down directive for teachers to follow (rather passively). The hope for the success of this approach rests on teachers' commitment to the standards as exhibited by their fealty to implementation. Students would then acquire a prescribed set of standards offered by a responsible and capable teacher, and read and write 'happily ever after.' However, as Jackson (2013, 27) attests in commenting on standards, assessments and teacher evaluations, 'While each of these issues warrants attention in the landscape of education policy, they are not effective drives toward significantly changing the conditions for students across the country.' Afflerbach (2012) adds that this approach leaves students' strengths and needs outside a teacher's consideration and too often shuts out any attention to affective properties that also contribute to students' reading achievement. Numerous facets play a role in this big problem. Casting it as a wicked problem (see Appendix) alerts educators to the limitations of any vision that narrowly directs the approach to solve it. Individual pieces can trigger forward progress, but the packaging of standards, the codification of teaching practices and the assessment of students based on a single-test score fall well short of accommodating different teachers and the range of students in their highly varied teaching and learning environments (Romainville 2002). Achieving high levels of literacy for all students is a wicked problem and, as such, does not lend itself to a well-described, definitive solution.

Current ramifications of this attention to standards, evaluation and assessment highlight the substitution of hopeful results with less positive outcomes. Promoting progressions toward expertise (e.g. Jacobson 2001) and a sound attempt to respond to unique and dynamic situations (in keeping with property 6 of a wicked problem) dissipate. Instead, student assessment results can lead to a limiting of teacher's pedagogical options and a decrease in society's range of know-how (Barboza 2010; Madaus, Russel, and Higgins 2009). A categorical sorting of students and teachers often backfires (Arbuthnot 2012; Gielen, Dochy, and Deirick 2003; Valencia and Villarreal 2004) as more students, and teachers, walk away from formal schooling, either physically or emotionally (e.g. Alexander 2010; Barton 2005). Statisticians quickly remind those who think that the type of clear causality that is perhaps possible in the sciences simply does not occur in more social settings (e.g. Berliner 2002; Bracey 2006). According to Henig (2012, 6 and 9), 'One of the important contributions that political science can offer is the insight that data usage may be determined as much by the systems in which the data present themselves to key stakeholders as they are by the data themselves' and cautions education reformers about the possibility of 'data-as-weaponry.' Variables arise and fade depending upon a shifting landscape and ever-changing context. Standards, assessments and teacher evaluations remain essentially unique and unveil broader social and macro-level influences (Bore and Wright 2009). Wickedity arises and wins.

One teacher's experience with more than 20 years of classroom experience in a large urban district in the Northwest provides a stark example of the wider vagaries of the imposition of literacy standards, assessments and teacher evaluations when their wicked properties are cast aside. Vicki (not her real name) has always received excellent annual evaluations, positive comments from parents and indications of solid literacy growth from her students. This year her district switched to a new

teacher evaluation system. This system includes 60 elements across four domains on which her performance will be judged. According to the information provided on the Marzano's website (http://www.marzanoevaluation.com/), it offers a direct causal chain between these teaching practices and student achievement. However, a closer look at this important claim reveals the same problem that occurs with many teacher evaluation tools: pieces of its combined elements have substantiated causal links to achievement, but the packaging of the 60 elements does not hold the same level of empirical warrant. If only teaching and learning were, well, simple. To further add to this teacher's concerns, she learned of this new system at the teacher in-service days held just prior to the beginning of the new school year. Her principal cautioned the staff that most likely they would not meet these standards. Direct concerns for students, at least at this point, were not discussed. Vicki's example typifies the wider documentation of these concerns and the attempts to solve (as opposed to resolve) them (e.g. Zavadsky 2012).

Mandated shifts in teachers' practices will most likely change teachers' behaviour with the overall and important goal of improving students' literacy achievement. After all, teachers risk a heavy price for not attending to them. However, attempts to insert a simple response to a complex and (what the previous explanations suggest) a wicked problem will most likely fall short. As discovered by StubbornStiles (2013, np), 'when you take something complex and strip it down to its most basic essence, a remarkable thing happens. It becomes complex again.' To reiterate, the example of one teacher in one district with 60 elements of teacher performance standards typifies many educational environments' attempts to strip the complexity of standards, teacher evaluation and student achievement down to a teacher evaluation tool. It seems likely, such tools, too, will become complex again.

The argument here is that issues related to raising standards of literacy are usefully conceptualised as wicked problems with irreducible complexities and ambiguities that must be addressed but cannot be completely eliminated. Yet, current educational policy initiatives arising across the western world seem rife with ideological fundamentalism that belies wickedity by masking contradictory conceptions of quality educational practice and disregarding contextual considerations and ethical and professional judgement. Accompanying these trends are co-evolutionary dynamics of surveillance and control (Davies 2003; Sachs 2003), perfomativity (Ball 2003; Lyotard 1984), and counter-resistance through strategic manoeuvring (Tuinamuana 2011; Webb 2006) that undermine trust and wicked responses to educational challenges.

Researchers and others who care about deep-seeded educational challenges do not currently label these problems as wicked. Some, however, do acknowledge the multidimensional aspects they entail and the accompanying disappointment when well-reasoned actions fail. Neuman and Celano (2012, 18) offer an enlightening example from their attempts to alleviate the disparities between children of poverty and those with more financial and social advantages. They root their decade long work with children growing up in poverty in Philadelphia neighbourhoods from an 'environmental perspective' and propose that 'any policy or initiative must be based on a theory of action – *a causal connection* (emphasis added) between the roots of the problem and the course toward solution.' Their attempts to hold allegiance to this premise continually lead to the introduction of new findings that swamp an initial action plan. Their processes and findings offer fodder for anyone who cares about educational equality to ponder and those who embrace wickedity. Neuman

and Celano ([2012](#), 132 and 131) consistently discount 'single-shot solutions to complicated problems' while acknowledging the possibility that 'children can learn and thrive when they receive a quality education.' This discounting of a simple response and the hopefulness linked to a specified goal (a rigorous curriculum put forward by quality teaching) still leave unanswered the important question, 'How?' Neuman and Celano ([2012](#), 120) identify a 'confluence of wrong things – poverty, racism, lack of education, barriers to spatial mobility' that thwart attempts towards finding solutions. A wicked problem exists, and a wicked problem demands a response appropriate for this wickedity.

Wicked responses

Educational decision-makers who articulate problems as wicked need wicked responses and wicked actions. Such a stance is slightly different from previous authors' discussions of educational issues as wicked (e.g. Barrett [2012](#); Bore and Wright [2009](#); Southgate, Reynolds, and Howley [2013](#)). Framing educational issues as wicked problems suggests that decision-makers require more tentative and contextually driven wicked responses and wicked actions. Such framing particularly requires the development of dispositions such as negotiation and meaning-making for continual reinterpreting (receptivity to shifts in understanding), resolutioning (receptivity to shifts in actions) and resolving (receptivity to open-endedness rather than closure). Dispositions and approaches that honour wickedity's complexity eschew once and for all problem solving that seeks agreed upon single-pronged solutions. Educational stakeholders who accept the challenge of meeting wicked problems head on with wicked responses and wicked actions would not accept wicked problems as defeatist. They would, however, need to accept a shift in thinking. A return to the previously cited literacy example affords an example of what this reformulated thinking might entail.

Rittel and Webber ([1973](#)) suggest that any question related to a potentially wicked problem should not be about a conclusive truth, but instead an inquiry phrased as 'Is this the right thing to do?' Labelling any literacy problem as wicked does not set aside a need to do something about it. In fact, the goal simply shifts from finding truth to improving the identified need. Changes in decision-making are in order. First, a need to recognise the complex canvas of the problem exists (Bore and Wright [2009](#)). In addition, a commitment to transdisciplinary thinking assumes paramount importance. In this new decision-making world, the many stakeholders worldwide (e.g. teachers, parents, politicians, teacher educators and researchers) who form various literacy communities need to do more than stay within the strict boundaries of literacy. An attention to the learning sciences, for example, could further highlight prime areas of importance. Schank ([2011](#)) promotes more attention to students' interests, preferences and backgrounds; the building of wide and legitimately grounded cases to contribute to learning and decisions; and an ability to sort data by its applicability and helpfulness for a question at hand. These big ideas, and others from fields beyond the learning sciences, hold the possibility for application to the wicked problems of literacy education. Further, acquiring empirical data, and especially establishing causal claims, needs to be met with great caution. The placement of 'science as theoretical anarchism' loses ground to an attempt to 're-solve' an issue by tapping a broader range of factors when examining and directing things like standards, teacher evaluation and student achievement. Finally, this literacy

community could benefit from the message promoted by US President Barak Obama in his 2013 inaugural address where he replaced a hope for a solution applicable for all time to a solution holding immediate and practical value based on a current level of informed understanding. This would lessen a tendency towards a static solution and an expectation of fealty to it with the understanding that a proposed solution is but a moment in time that will undergo shifts and reconsideration. Wicked problems are symptoms of other problems. The need continually to reassess and work towards paths of promise rather than a promised path or a definitive solution remains.

Wicked problems extend beyond the realm of literacy learning to many other educational goals and hopes. They benefit from a different type of problem-solving orientation applicable across educational landscapes. Three inclusions for a problem-solving process for addressing the various facets of wicked problems emerge from this inquiry: (a) careful observation and continued curiosity, (b) conversations with various stakeholders and (c) collective and distributive sense-making.

Promote careful observation and continual curiosity

Wicked problems require acute observation and continual curiosity. The dynamic nature of wicked problems and their sensitivity to contextual change infuse the continuous potential to alter the nature of a wicked problem. Careful and curious observation becomes critical for recognising the complexity of a situation and seeing more aspects of its unfolding. Sustained observations and curiosity focus on noticing more aspects of a situation by paying careful and curious attention to actions and interactions. Nonetheless, several issues make such observation challenging.

The vigilance needed to sustain careful and curious observation is hard to come by in the face of a seemingly human proclivity that normalises routines and ignores outliers. A tendency exists simply to adopt a model that has worked elsewhere, whether a classroom across the hall, a school down the street, or a system in Finland. With little or no evidence, a 'right' model is selected and teachers, students, parents and community members are then asked to implement it (Winfield 2012). This trajectory appears particularly common when feedback slowly emerges or outcomes are poorly explained (March, Sproull, and Tamuz 1991). Once a decision or interpretation is made, looking for alternative solutions or interpretations ceases while decision-makers tend to be overconfident in their judgements (Kahneman 2011; Kahneman, Slovic, and Tversky 1982; Langer 1997). In addition, humans have a tendency to look for confirming evidence, the so-called confirmation bias (Madaus, Russell, and Higgins 2009). Interacting with others who hold to the same agreement reinforces this tendency. Individuals tend to get worn down by novel or threatening outcomes and come to perceive them as normal (Eisenberg 2006; Perrow 1984; Weick 2006). Moreover, perception is limited by an individual's prior experience. This makes it difficult to experience things not experienced before, to notice aspects of a situation not noticed before and to respond to unintended consequences. Hence, more than likely those dealing with educational dilemmas (as with all humans) tend to look only for outcomes they expect to result from their actions. Social pressures, too, inhibit careful and curious observation. Allen, Strathern and Baldwin (2006, 35) offer this reminder: 'Individuals with the best of intentions can quickly generate and act on false information when they are promoted and rewarded for performance and pressured into getting results rather than seeking the "truth"'.

Wicked problems demand continued scrutiny captured by constant curiosity. A curious disposition weakens and neutralises the tendencies noted in the previous paragraph and encourages ambivalence, questioning, and lively exchanges with colleagues. Weick (2006, 58) might refer to such action as to 'think in a more mindful, less automatic manner,' using multiple tools, obtaining diverse perspectives on a situation, and remaining mindful of unintended consequences. Engaging in careful and curious observations requires developing dispositions that challenge emotions and embrace equivocality that can be seen as more ethical and effective than false certainty (e.g. Sellnow, Seeger, and Ulmer 2002).

Observation and curiosity are enhanced by getting better at what March, Sproull and Tamuz (1991, 1) call 'learning from samples of one.' These authors assert that a meagre experience can be elaborated. For example, organisations (or people) can attend to more aspects of each unique occurrence, note short-term and long-term outcomes of the decision-making processes, and avoid outcome expectations from early success that inhibit learning from long-term consequences of actions. March and colleagues suggest focusing intensively on critical incidents by attending to contradictory interpretations of multiple observers with conflicting interests or cultural differences in order to learn different lessons from the same experience. Imagination becomes a key resource in interpreting experience in more ways, generating alternative interpretations and reducing confirmatory bias of experience. Southgate, Reynolds and Howley (2013) encourage teacher educators to invest attention to systematic research on the outcomes of the function, forms, and impacts of professional experience. These strategies are effective if they are used to increase the carefulness of one's observations, to experience history more richly and to develop curiosities that enlighten and expand, rather than narrow and mitigate.

Visually mapping multiple stakeholder information and beliefs may help identify a way through such a jungle by including multiple interpretations of wicked problems (see also Conklin 2006). To accomplish this, Barrett (2012) proposed comparing multiple perspectives from a variety of stakeholders for divergence and consensus. She considers this a potentially powerful way to align collective efforts. Recently, McCandless (2010) extolled the value of data visualisation for coping with information overload or data glut. He argued that good data visualisations bring together information from disparate reports in ways that illuminate the patterns and connections and organises information so that it tells a story or allows us to focus only on the information that is important. However, a strong desire for alignment with regard to data concerning wicked problems may not be completely possible due to the multiple interpretations that accompany their intractable nature. Just as wicked problems have no definitive formulations, wicked responses and actions have no definitive formulations. In paraphrasing Rittel and Webber (1973), to find a wicked response is thus the same thing as finding a wicked problem. A response cannot be created until the problem has been clearly interrogated and identified. Furthermore, every wicked response can (and probably should) be considered a symptom of another needed response.

An ability to move forward and take action on wicked problems may depend on framing social issues. Simply stated, some issues are too small to recognise and others too large to confront. Weick (1984) suggests that many social problems remain unsolved because innovative action is stalled when people define social issues as massive serious problems. This definition tends to overwhelm cognitive and affective limitations, induce stress and decrease creative thinking. Recasting a wicked

response into smaller dilemmas can highlight unnoticed pieces and moderate negative consequences, improve diagnosis and encourage innovation. This could possibly suggest that wicked responses are unique and have few, if any, stopping rules. Developing dispositions of careful observations and continual curiosity help create potential wicked responses and wicked actions that attend to wicked problems.

Have more conversations with diverse stakeholders

This continual interrogation of wicked problems underscored a very simple fact: no substitute exists for respectful, deep, rich, constant and sometimes contentious dialogue. Thus, an important disposition to develop in creating wicked responses is supporting and nurturing conversation, dialogue and debate. Engaging in dialogue with diverse others that includes topics from observations and curiosities often includes tension, argumentation and discomfort. However, sustaining differences of opinion may be beneficial for problem solving (Jordan and Babrow 2013), while too much social politeness and face-saving can inhibit sustained conversation (Dodson et al. 1997) and learning (Schallert et al. 2009; Yang et al. 2006). These authors advocated conversation among diverse stakeholders as a necessary element in addressing wicked problems. Just how stakeholders are identified and included in discussions of wicked problems, wicked responses and wicked actions needs further careful and considered attention. Nonetheless, Southgate, Reynolds and Howley (2013) consider it imperative for all stakeholders to engage in an argumentative process and develop, encourage and facilitate critical discussion among diverse stakeholders. This is but a beginning.

Too many current approaches to solving educational problems typically begin with the creation of a panel of experts who hold a variety of roles and a range of ideas but tend to come from similar domain silos (Cook-Sather 2002; Fullan 2011; Johnson 2010; Hokka and Etelapelto 2013). The conversation is more exclusive than inclusive and a panel's goal is often predicated on the belief that a single solution exists (see the previous discussion of a literacy wicked problem). However, as Barrett (2012) asserts, wicked problems demand multiple perspectives and many angles in order to minimise the influence of contextual shifts. Thus, expert panels would be enriched by involving contributors who bring diverse and relevant interests, knowledge, and experience to the panel's collective decision-making. This varied composition allows a crossover between parallel literatures and increases the likelihood of a broader societal and macro-level approach to action plans. Bore and Wright (2009) advocate for this expansive input that moves wicked problems beyond a recommendation for reflection and the micro level, street level, bureaucratic response that it usually spawns. Page (2007) offers further support, arguing that for many difficult problems a diverse set of moderately capable stakeholders can outperform an individual with high-level ability or even a group of like-minded experts. This is especially likely when the set of possible solutions is large, the problem is difficult, and the problem solvers are clever. When a diverse group of individuals interact together to solve a problem, it sets in motion 'a process of innovation in which improvements build on improvements' (Page 2007, 340). Weick (2002) offers some further qualities that enhance dispositions that support wicked responses. He posits that stakeholders need to 'have a direction, look closely, update often and converse candidly … they need to talk in order to discover what they

think and they need to feel in order to discover what it all means' (Weick 2002, S9). Thus, continual dialogue and involvement among diverse and numerous stakeholders need to be intentionally sought after as a persistent disposition in creating wicked responses and wicked actions.

Engage in collective and distributed sense-making

Wicked responses cannot be identified as true or false since wicked problems are not completely definable. Neither can tests of so-called solutions to wicked problems definitively identify whether they worked or did not work, immediately or in an anticipated future. Therefore, wicked responses should not be considered a matter of deciding right courses of action; rather wicked responses and wicked actions benefit from constant, collective and distributed sense-making.

As posited by the scholars referenced in this consideration of wickedity, making sense does not occur once and for all; rather the sense-making that informs interpretations and subsequent actions to address wicked problems is constant and situational. For Rittel and Webber (1973), no amount of study can make a wicked problem go away. As Bore and Wright (2009, 254) added, 'Only by re-solving the problem repeatedly, in each context, might we begin to gain, and re-gain repeatedly, an understanding of wicked problems in the social domain and an avoidance of the stresses and misery occasioned by inappropriately providing tame solutions to wicked problems.' The current exemption requests from various states to the *No Child Left Behind* (NCLB) legislation offers a possible place to start in considering how sense-making may occur within educational environments worldwide (Kober and Riddle 2012; Pinder 2008). However, a caveat is in order: it is neither an easy nor simple task to discuss, develop, present, approve and finally implement exemptions. Nonetheless, these exemptions offer another viable avenue for inquiring into a dilemma that situates a prevailing educational issue as a plausible wicked problem and provides fertile ground for wicked responses and wicked actions. The educational landscapes in Great Britain the past few decades (e.g. Hargreaves and Fullan 2012) and other countries with their various challenges worldwide also afford fertile ground for wicked problems, wicked responses and wicked actions.

Wicked responses and actions demand interactive, relational and distributed sense-making that might begin to include 'ongoing revisions and updates and fleshing out of diagnoses' (Weick, personal correspondence) and 'coordination of action over alignment of cognitions, mutual respect over agreement, trust over empathy, diversity over homogeneity, loose over tight coupling, and strategic communication over unrestricted candour' (Weick 2005, 27 and 59). The disposition of sense-making offers plausible wicked responses and wicked actions, especially when stakeholders together carefully observe and discuss the enduring curiosities of wicked problems.

So it begins and so it continues

As we consider our past roles as teachers and our current responsibilities as teacher educators and researchers, this inquiry suggests the wisdom in reformulating educational problems that grip our souls from big concerns to wicked problems. Rittel and Webber (1973) and other writers support the definition of educational issues as wicked problems which, in turn, furthers a quest to understand wickedity.

An application of these understandings to literacy learning fosters the relevance for wicked responses and wicked actions and proffers that such responses and actions may hold interest to wider and equally wicked educational issues.

This inquiry also strengthens the authors' commitment to move beyond simple and formulaic responses (i.e. answers) for complex (i.e. wicked) problems to a broader, collaborative and more integrated approach that allows opportunities to invoke wicked responses and wicked actions for wicked problems. Great potential arises from a realisation that wicked problems attended to today by wicked responses and wicked actions must again be resolved in the days to come and that the formulation of wicked problems in one context will hold wicked responses and wicked actions when considered in another. This shift in outlook drives shifts in dispositions that create wicked responses and wicked actions that enjoin, rather than tame, wicked problems. We invite educational stakeholders to join this quest to reconsider, resolve and ultimately regain a confidence in dealing with the inescapable wickedity of problems, responses and actions.

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Appendix 1.   Ten properties of a wicked problem

(Rittel and Webber 1973)

(1)   There is no definitive formulation of a wicked problem.

(2)   Wicked problems have no stopping rule.

(3)   Solutions to wicked problems are not true-or-false, but good-or-bad.

(4)   There is no immediate and no ultimate test of a solution to a wicked problem.

(5)   Every solution to a wicked problem is a 'one-shot operation'; because there is no opportunity to learn by trial-and-error, every attempt counts significantly.

(6)   Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.

(7)   Every wicked problem is essentially unique.

(8)   Every wicked problem can be considered to be a symptom of another problem.

(9)   The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.

(10)   The planner has no right to be wrong.