

IS ENGAGING IN EVIDENCE-INFORMED PRACTICE IN EDUCATION RATIONAL? WHAT ACCOUNTS FOR DISCREPANCIES IN TEACHERS' ATTITUDES TOWARDS EVIDENCE USE AND ACTUAL INSTANCES OF EVIDENCE USE IN SCHOOLS?

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Abstract

Whilst beneficial, the consistent and regular use of evidence to improve teaching and learning in schools is proving difficult to achieve in practice. This paper attempts to shed new light on this issue by examining the applicability of a model of rational behaviour as it relates to the notion of evidence-informed practice (EIP). Specifically, exploring the question: 'if EIP is

rational behavior, why aren't all teachers engaged in it?', we examine whether the beliefs and perspectives of teachers in relation to EIP, align with their evidence-use behaviours. We then assess what factors (if any) prevent teachers/schools who wish to engage in EIP from doing so. To examine beliefs, instances of, and barriers to evidence use, we employ a *Gradient Boosted Tree* predictive model to analyse data from a survey of 696 practitioners in 79 schools. Our findings suggest that, should they wish to increase EIP within their schools, school leaders need to: 1) promote the vision for evidence-use (i.e. actively encourage its use); 2) illustrate how research and evidence can be effectively employed to enhance aspects of teaching and learning; and 3) establish effective learning environments, in which learning conversations around the use of evidence, can flourish. Simultaneously we caution that evidence use will never be fully or meaningfully realised unless school leaders prioritise EIP as a school commitment. Simultaneously, it is unlikely that such prioritisation will occur until EIP forms part of any education system's accountability regime.

1: OBJECTIVES

The use of research evidence by teachers is currently experiencing global policy and practice interest, with many governments now touting the importance of research-informed efforts at improvement. Yet, while beneficial, the consistent and regular use of evidence to improve teaching and learning in schools is proving difficult to achieve in practice (Bryk *et al.*, 2011; Taylor, 2013; Nelson *et al.*, 2015). This paper attempts to shed new light on this issue by examining the applicability of a model of rational behaviour ('Optimal Rationality': see Brown, 2014) as it relates to the notion of evidence-informed practice (EIP). Specifically, exploring the question: 'if EIP is rational behaviour, why aren't all teachers engaged in it?', we examine whether the beliefs and perspectives of teachers in relation to EIP, align with their evidence-use behaviours. We then assess what factors (if any) prevent teachers/schools

who wish to engage in EIP from doing so. To examine beliefs, instances of and barriers to evidence-use, we employ a *Gradient Boosted Tree* predictive model to analyse data from a survey of 696 practitioners in 79 schools. We conclude the paper by examining the policy levers available to school leaders should they wish to increase both support for evidence-informed change within schools, and boost instances of evidence-informed practice by teachers. We also explore the vital role that education accountability regimes have in ensuring that the *optimal rational* position of EIP can materialize in practice.

2: PERSPECTIVES

2.1: EVIDENCE-INFORMED PRACTICE

Although a number of definitions of evidence-informed practice (EIP) abound, for the purposes of this paper we adopt that provided by England's Department for Education, who suggest EIP may be thought of as: "a combination of practitioner expertise and knowledge of the best external research, and evaluation based evidence" (www.education.gov.uk, 2014)ⁱ. This definition serves to position this paper in relation to a number of the controversies and debate surrounding evidence-use (e.g. see Hargreaves, 1996; Maclure, 2005; Biesta, 2007). For example, it (hopefully) illustrates that we are proponents of bottom-up evidence informed expert judgment rather than evidence-based, top down direction. Correspondingly within this paper we focus on the substantial benefits associated with practitioners using researchⁱⁱ to enhance their practice, rather than re-hash critique well reported elsewhere (e.g. references above and Brown 2013; Brown, 2014).

That EIP is can have positive benefits for both teachers and pupils has its roots in a growing evidence base. For example correlational data reported by both Cordingley (2013) and Mincu

(2014) suggests that where research is used as part of high quality initial teacher education and ongoing professional development, it is associated with higher teacher, school and system performance (similar relationships are reported in Sebba *et al.*, 2012; Godfrey; 2014a; 2014b). CUREE (2010), meanwhile, lists a range of positive teacher outcomes that emerge from EIP including both improvements in pedagogic knowledge and skills, and greater teacher confidence. Furthermore, the experience of ‘research-engaged’ schools that take a strategic and concerted approach in this area appear to be positive, with studies suggesting that research engagement can shift school behaviours from a superficial ‘hints and tips’ model of improvement to a learning culture in which staff work together to understand what appears to work, when and why (Handscomb and MacBeath, 2003; Godfrey, 2014b; Greany, 2015).

For a number of reasons, however, many schools have found it difficult to become ‘research-engaged’: with teachers often lacking the skills, resource or the motivation to use evidence to innovate their practice (e.g. Hargreaves, 1996; Goldacre, 2013; EEF, 2014). On one hand responsibility for this difficulty lies with educational academics, who can fail to make their research accessible to teachers; not only in terms of where it is published and the language typically employed, but also in terms of identifying how their research can make a difference (Hargreaves, 1996; Cain, 2015). But this is not universally the case and bodies such as the What Works Clearinghouseⁱⁱⁱ and the Education Endowment Foundation (EEF) have aimed to make ‘what seems to be effective’ accessible (one only has to look at the EEF’s *toolkit*,^{iv} for an example of such efforts). Correspondingly, part of the difficulty also lies with schools. Teachers, for instance, are often not allocated adequate time to explore and share what research exists regarding a particular issue. Or they can find themselves, as a result of the timetabling process, unable to work collaboratively with others to identify and trial ways to

address issues of teaching and learning (Godfrey, 2014a). Other activities are also often prioritized over research-informed professional development, which, as a result, can find itself falling down the pecking order of things that need to be attended to (Galdin O'Shea, 2015; Roberts, 2015).

2.3: EIP AND EXTERNAL ACCOUNTABILITY

The ways in which teachers and school leaders think about and engage with evidence will also be deeply influenced by context (Cartwright, 2013; Moss, 2013; Cain, 2015); and it is apparent that in many countries there are now two competing EIP agendas at work. On the one hand, there is a move to hold teachers and schools more externally accountable for the education they provide, with engagement in EIP essentially acting as one aspect of teacher and school effectiveness. This approach is generally associated with top-down (government or district-driven) external high-stakes accountability and testing. On the other hand, there is a focus on using evidence as part of a process of practitioner enquiry and innovation, an approach generally associated with bottom-up (teacher-driven), internal (teacher or school) processes, undertaken in relation to a wide range of sources of evidence (Earl, 2015: pp. 148). This idea of competing agendas is exemplified in England where, for instance, the education policy of the UK's current Conservative government, elected in 2015, is ostensibly geared towards a more teacher driven approach, described as the 'self-improving school-led school system'. In the self-improving system, evidence-use is positioned as being front and centre, with Greany (2014) suggesting that the core characteristics of 'self-improvement', include: 1) teachers and schools being responsible for their own improvement; and 2) teachers and schools being required to learn from each other and from research so that effective practice spreads. Greany (2014) also notes in relation to the self-improving school system, the role of Teaching Schools; outstanding schools that are designated to co-ordinate initial and

continuing professional development, school to school support and Research and Development across an alliance of partner schools (known as Teaching School alliances).

As the level of more centralized support for schools is rolled back to free up ‘self-improvement’, however, a number of challenges for such bottom-up EIP have begun to emerge. Perhaps the most pertinent of these is external high-stakes accountability. This is illustrated, first and foremost, by the threat hanging over Teaching Schools of the removal of their Teaching School designation if they lose their ‘outstanding’ Ofsted grade. This risk can thus serve to hamper the extent to which those schools, specifically tasked to engage in EIP, wish to take risks in experimenting (in any bottom-up way) with new practices that are informed by evidence. What’s more as Godfrey (2014a: 4: our emphasis) argues, in England, the focus on accountability and the power afforded to Ofsted has also led to a disproportionate pressure on school leaders to: “account for their pupil’s academic achievements and to find *quick fixes* where standards are lower than national benchmarks”. Related is the pressure on schools to adopt externally driven improvement strategies preferred by accountability bodies, as can be seen in educational policy in the US (Finnigan *et al.*, 2015): in other words, to adopt top down EIP mandates. Likewise, external accountability can also lead to headteachers gearing their schools’ structures, procedures and practices towards addressing accountability requirements in an instrumental way: for example, teaching and learning practices are often designed to ensure they produce exactly the outcomes required by Ofsted (Supovitz, 2015). In both situations, the resulting approaches are unlikely to deliver EIP in the ways we have envisaged above: i.e. in bottom up ways that ensure research-evidence is combined with practitioner judgement in order to provide contextually relevant approaches to improving teaching and learning. Moreover, when combined, the difficulties associated with bringing bottom-up EIP to fruition and the interplay between bottom-up

evidence-use and accountability also point to the need for effective school leadership if EIP, in the form envisaged in section 2.1, is to become a reality.

2.4 SCHOOL LEADERSHIP AND EIP

Brown and Greany (forthcoming) note that school leaders can act either as a barrier or a gateway to school research-use. This position stems from the myriad of ways school leaders are able to influence the operation and performance of schools, including the teaching and learning that occurs within them. In themselves these qualities can be divided into the ‘transformational’ aspects of school leadership and ‘pedagogic’ or learning centred leadership (Day and Sammons, 2013). The former is described as a process based on increasing the commitment of those in a school to organizational goals, vision and direction (Bush and Glover, 2003) and has been shown to have positive impact in relation to the introduction of new initiatives or the remodelling or restructuring of school activity (e.g. Leithwood, 1994). The latter is seen to relate to the efforts of head teachers in improving teaching in their school and their focus on the relationships between teachers, as well as the behaviour of teachers vis –a-vis their work with students (e.g. Timperley and Robertson, 2011).

True research-engagement within and across schools requires school leaders to address both the ‘transformational’ and ‘learning centred’ aspects of becoming research and evidence engaged, and Brown and Greany (forthcoming) argue that to do so requires school leaders to focus on and address four distinct but overlapping and interdependent factors. These are: 1) ensuring there is teacher capacity (i.e. ability) to engage in and with research and data (Goldacre, 2013); 2) ensuring school cultures are attuned to evidence-use (i.e. school leaders attempt to make research-use a cultural norm within their school) (Stoll and Fink, 1996; Leithwood *et al.*, 2006; Brown, 2015); 3) school leaders promoting the use of research as part

of an effective learning environment (Datnow *et al.*, 2013; Brown, 2015); and 4) the existence of effective structures, system and resource that facilitate research-use and the sharing of best practice (Daly, 2010; Datnow *et al.*, 2013; Goldacre, 2013; Micklewright *et al.*, 2014). We return to these in Section 3.

2.5 EVIDENCE USE AS RATIONAL ENDEAVOUR

It is also important to recognize that the pursuit of EIP is (in theory at least) steeped in notions of rationality. That is, the *a priori* position of those who promote EIP appears broadly to be: 1) evidence-informed practice is beneficial – as noted above, evidence suggests EIP, when undertaken with a clear focus on addressing school improvement priorities, can make a positive difference in terms of teacher and pupil outcomes (Sebba *et al.*, 2012; Mincu, 2014; Cordingley, 2013; Godfrey, 2014a); 2) because the aim of teachers and schools is to improve pupil outcomes, engaging in EIP must represent desirable behaviour; 3) it is normal and so rational to pursue desirable outcomes (Tan, 2014); 4) *ergo*, all teachers should pursue EIP (the unstated argument being that if teachers’ practice is not evidence-informed then such teachers by definition are acting irrationally: e.g. see Brown, 2014). EIP is thus intertwined or imbued with the notion of rationality: because EIP has beneficial outcomes, engaging in EIP ‘makes sense’. This position is nicely encapsulated by Hammersley (2001: pp. 1-2), who notes that: “the central claim of the evidence-based [movement] is that research can make a very important contribution to improving the current state of [teaching] practice.

[Correspondingly], who would argue that practice should not be based on evidence? So [the general conclusion is] that opposition to it can only be irrational”.

But this position also leads to a fundamental question, namely that ‘if the pursuit of EIP represents a rational decision on the part of schools, why aren’t all teachers engaged in it?’

Answering this question now becomes the focus of this paper and we begin by examining the mode of rationality currently underpinning EIP. We then explore whether the connecting research-to-practice movement might be better served by considering an alternative form of rational behaviour; and one that, we argue, helps explain why the rather patchy realization of EIP, rather than its universal implementation, is currently a global phenomenon (e.g. see Bryk *et al.*, 2011; Gough *et al.*, 2011).

2.6 RATIONAL CHOICE THEORY

We argue that the ‘EIP is beneficial so it should be pursued’ argument sits mainly within a model of rational behaviour known as Rational Choice Theory (RCT), an approach developed by economist Gary Becker in order to understand and so predict human behaviour. The underlying premise of RCT is that people establish the most effective way to reach a given goal in any particular situation (Tan, 2014). More specifically, RCT argues that individuals will attempt to maximize their benefits (utility) and minimize their costs, subject to any constraints on this maximization (Green, 2002); a process that will involve both information seeking and problem solving. It is noted by Tan (2014) that RCT is widely employed to explain social behaviour because: 1) it is considered to be fairly or approximately accurate, in that it works in many cases to explain examples of behaviour; and importantly, 2) RCT, with its simplicity and easy to understand underlying premise (and so its applicability) is hard to replace. As Sen notes: “there is little hope of finding an alternative assumption structure that will be as simple and usable as the traditional assumptions of self-interest maximization” (1990: 206).

In theory, approaches to improving teaching activity are suitable for analysis via the lens of RCT. School leaders and teachers are faced daily with problems which can broadly be

summarised as “how do I ensure all children under my care learn to the best of their ability?” Or to put it another way, “how can I teach as effectively as possible?” (Daly, 2010; Roberts, 2015). There are also resource constraints that may impact on this effectiveness (including time and budget: Roberts, 2015). Correspondingly, teachers are presented with the impetus to continually maximise their effectiveness whilst facing the necessity of doing so in ways that achieve large impacts given the input available (Daly, 2010). The benefits of engaging in EIP are set out in section 2.1 above but, are summarised by Oxman *et al.* (2009), who suggest EIP increases the chance that teaching and learning activity will be more effective, equitable and efficient in terms of its value for money. Moreover, the EEF’s toolkit^v provides detailed information on evidence-informed interventions as well as the cost of implementing them, based on a class of 25 pupils (and outlines costs of both resource and/or training). From examining the toolkit it can be seen that effective evidence informed approaches are not necessarily expensive: for example ‘feedback’ which, if implemented effectively, can lead to pupils gaining eight months progress over the course of a year (compared a similar performing group), at a cost of some £80 per pupil. This cost effectiveness is also the same for approaches such ‘meta-cognition’ and ‘self regulation’.^{vi} More generally, the EEF also promote, on their website, the message that “educational research can help schools get the maximum 'educational bang for their buck'” (website reference).^{vii} As such, the axioms of RCT would seem to suggest that EIP should represent a preferred approach because engaging in EIP can provide an effective way to improving teaching at a relatively low cost.

But for RCT to operate meaningfully, as well as there being benefits to EIP that might occur in actuality, also important are teachers knowledge of such benefits. We suggest that such knowledge does exist: an interim report by Nelson *et al.*, (2015) for instance, suggests that of 300 teachers (in England) surveyed, 69 percent agreed or strongly agreed with the normative

statement that “information from research plays an important role in informing [their] teaching practice”. Likewise 81 percent disagreed or strongly disagreed with the statement “I do not believe that using information from research will help to improve pupil outcomes”. Similarly in case studies of 15 schools in England, developed by Caldwell *et al.*, (2015) all school leaders appeared aware of the benefits of engaging in EIP. In terms of EIP being an efficient approach to school improvement, England’s National Audit Office indicate that 64 percent of school leaders in England have seen the EEF’s toolkit (NAO, 2015), with an implied assumption that they therefore also have an understanding of the effectiveness and the cost of using particular evidence informed approaches.

While popular, however, RCT is also subject to substantive critique – in particular, from empirical studies which suggest that individuals do not behave in ways that regularly and consistently maximize their utility. For instance, people often make do with ‘good enough’ solutions as opposed to optimal ones; they use short cuts and rules of thumb rather than seek out all information required to achieve maximal utility from any given decision; and people can rely on intuition or perception rather than analyse the data relating to their decisions (Kahneman, 2003; Tan, 2014). Also vital is the suggestion that individuals often only possess bounded will power: individuals may engage in ways that are totally inconsistent with what will serve them best in the long term (Jolls *et al.*, 1998). Similarly people act with bounded self-interest: that is, they act and care about others, so sacrifice or limit the maximization of their personal own interests (Jolls *et al.*, 1998; Tan, 2014). The activity of teaching may also prove to be too complex to fit within the RCT approach: for example, Hammersley (2001) argues that teaching takes place within a multifaceted, contextually situated environment, with multiple goals and potentially even multiple sets of values in play. What’s more Hammersley (2001) suggests there can also be disagreements about what improvement or

progress comprises. As such, given the problem we pose earlier: that EIP may be regarded as beneficial, that teachers and school leaders would seem to know it is beneficial and yet EIP is not universally adopted, we ask whether there is an alternative approach to considering the rationality of evidence-use, that might help explain the current situation of high awareness/low take-up of EIP, as well as provide guidance on how a rational (and so ‘most effective’) situation might be reached.

2.7 OPTIMAL RATIONALITY

One alternative to RCT is that of *optimal rationality* (Brown, 2014) a conception of rationality grounded in philosophy rather than economics, and that originates from a rejection of the Kantian universal moral imperative, combined with a repositioning of Aristotelian reasoning. Specifically, optimal rationality (OR) suggests that our analysis of what rationality is or comprises should focus two things: 1) what individuals actually do in order to achieve goals (their *practical rational* acts); and 2) people’s understanding of the broader ramifications of their actions (in the *cultural rational* environment). There are three key aspects of OR that spotlight its relevance to EIP and these are now explored in detail. First is that OR examines people’s behaviour, both in terms of the timescales involved and with regards to who might be affected by particular actions. In other words, OR argues that we should conceptualise and judge whether an act is rational according to both *when* the implications of actions are likely to materialise and in terms of *who* they might effect. According to OR, the effects of actions are therefore likely to range, on one hand, from being fully *universal* to being fully *individual*, and on another from focusing on the *short-term* to centring on the *long term*. This is important because with (as noted above) accountability regimes encouraging short term ‘wins’, this may focus teachers’ attention towards particularly narrow rational acts and away from pursuing actions that could bear fruit and be

of benefit to many for much longer in the future (in many ways this is akin to a consumption vs. investment analogy).

Second, and building on point one above, OR argues that, whether in terms of when or who, in all cases behaviour is rational when it is concerned with maximizing ‘wellbeing’. This does not mean however the type of welfare maximization postulated by RCT; instead OR suggests that *practical rational* acts represent those things that individuals ‘know’ are ‘needed’ at a given point in time. As As Brown states:

...if I am thirsty, it is clearly rational for me to reach for water; but equally, I am suggesting that it is rational for me to kick a chair in anger if I think it will make me feel better, or to fix a white russian if I want an alcohol buzz. Our day to day actions, our acts of *practical rationality*, thus represent the actual courses we take in life and are as much driven by emotion, feeling, snap decision making, expertise (in a Flyvbjergian sense) and unconscious desire or motive as any conscious decision we may think through in detail (2014: 147: authors emphasis).

Third, relates to the need to incorporate concepts designed to explain society’s role in instilling values or norms into individuals, in order to provide a wider *context* within which actions play out and are contextualized. Within OR, these serve to guide the *cultural rational* position; i.e. these represent the things that producers, society, groups within society, or perhaps even more localized cultures such as schools or government departments, deem as vital to the wider wellbeing and so seek to embed and enforce. Again points two and three serve to highlight a potential tension between teachers being incentivized to achieve short

term benefits and the benefits from approaches favoured by central educational policy-makers, (e.g. EIP) which may not be instantly achieved.

Within OR, consideration is also required of how the two modes of cultural and practical rationality interrelate or affect behaviour. It is clear, for example, that an individual may consider and act in accordance with either one or both at a given point in time. It is not unreasonable (and therefore it is not irrational), for instance, that social actors will seek to pursue an entirely practical path (which will likely amount to individuals focusing on the welfare of the short term self: for example knee jerk responses to the demands of accountability). An approach that is not only rational but also optimal however (and which gives OR its name) is that, on aggregate, there is balance or alignment between the *cultural* and the *practical*. This is because at a point of balance, when an individual or sub-group pursues their desires, they do so in ways congruent with approaches that also benefit either society or themselves in the long-term. This notion of balance and so *optimality* thus requires individuals or groups to act as often as possible in ways sympathetic the cultural rational position, but simultaneously, it requires society to provide incentives to do so. For example by setting in place disincentives to dissuade people from pursuing their whims too often (or to excessive levels) and/or to the detriment of others; or by educating individuals so that they seek balance themselves.

2.8 EVIDENCE-INFORMED PRACTICE AS OPTIMAL RATIONAL ACT

Returning to the act of EIP as rational act, and revising it in line with the notion of optimal rational behaviour provides an alternative analysis of how we might conceive of rational evidence-use behaviour. Specifically, that:

- The discourse of cultural rationality seems to be currently in favour of EIP: this is evident, firstly, in the direction of travel of recent educational policy in England and elsewhere (which focuses strongly on promoting/requiring teachers to better engage with evidence: Stoll, 2015; Brown, 2015). It is also evident from recent announcements by organizations such as the EEF, who recently launched a £1.5m fund to improve the use of research in schools (EEF 2014). In addition it can be considered apparent from the rise of bottom up/teacher led initiatives, such as the emerging network of ‘Teachmeets’^{viii} and ‘ResearchED’^{ix} conferences (Galdin O’Shea, 2015) designed to help teachers connect more effectively with research. Finally we suggest that the cultural rational position is also reflected in a recent content analysis of the websites and school policy documents of 100 Teaching Schools (Caldwell *et al.*, 2015), which shows how the majority claim both to be promoting evidence-use as well as having mechanisms in place to ensure the engagement by teachers in and with evidence. To be entirely sure of the cultural rational position however, we also have to examine the beliefs and perspectives of those working in schools in relation to evidence-use.
- As well as examining beliefs, we need to also assess actual behaviours in relation to evidence use i.e. – the practical rational position of teachers in relation to evidence-use. In other words, irrespective of what teachers say they believe or would like, what are teachers actually doing?
- Optimal rationality can only exist when there is parity between cultural and practical rationalities. Correspondingly, we assume engagement in EIP and the benefits that accrue as a result are maximized when cultural and practical rationalities align. To judge whether we are at this position or ascertain how we might become so means then that we have to ascertain whether there is a gap between beliefs and behaviours.

If such a gap exists we must then assess what is causing it and make suggestions or recommendations for how this gap might be closed and the policy levers that might result in an optimal rational EIP outcome.

3: DATA SOURCES

To test the model of optimal rationality as relates to evidence-use, the authors of this paper set out to explore: 1) the beliefs of teachers in relation to using evidence to enhance practice; 2) their self-reported behaviours in relation to EIP; and 3) contextual factors that might influence 1) and 2), including an examination of the level of accountability ‘scrutiny’ schools and teachers may be under. In addition, recalling the importance and role of school leaders in facilitating EIP (see section 2.4), we also sought to examine where school leaders should be focusing their efforts in order to facilitate evidence-use within their schools (i.e. how might they align points 1) and 2) in order to achieve a cultural rational position).

To do so we analysed the findings of a survey focused on practitioners’ beliefs and behaviours in relation to EIP, as well as the four factors outlined above regarded as being vital to facilitate evidence-use (to recap, these were: 1) teacher capacity to engage in and with research; 2) school cultures being attuned to evidence-use; 3) school leaders promoting research-use within an effective learning environment; 4) and the existence of effective structures, system and resource that facilitate research-use). We also asked additional questions to examine key overarching factors such as trust and the strength of interpersonal relationships within schools, which have been shown to effect evidence-use (e.g. see Bryk and Schneider, 2002; Brown *et al.*, 2016). The design of the survey was undertaken in conjunction with Professor Alan Daly, University of California, San Diego, who is experienced in examining the movement of evidence within and between schools in

Californian school districts (e.g. see Daly, 2010; Finnigan and Daly, 2012). Before it was distributed, the survey was also piloted with teachers from the primary sector (not involved in the project) in order to test ‘face’ and ‘construct’ validity. Feedback from the pilot was then incorporated into the final questionnaire. The final survey questions for this aspect of the survey are set out in table 1, below:

Table 1: Baseline survey questionnaire employed

Factor	Survey questions	Shorthand reference	Cause or Effect
Capacity to engage both in and with research evidence	1. Information from research plays an important role in informing my teaching practice	R-practice	<i>Effect</i>
	2. I have found information from research-useful in applying new approaches in the classroom	R-approaches	<i>Effect</i>
	3. This school has a formal process for evaluating programs or practices	Evaluation	Cause
School cultures that are attuned to evidence use (i.e. make research-use	4. I do not support implementing a school-wide change without research to support it	R-support	<i>Effect</i>

a cultural norm)	5. My school encourages me to use research findings to improve my practice	Encouragement	Cause
	6. Research and evidence is used to inform staff here about potential improvement strategies	R-strategies	Cause
	7. People in this school are eager to share information about what does and doesn't work	Sharing	Cause
Schools promoting the use of research as part of an effective learning environment	8. This school frequently discusses underlying assumptions that might affect key decisions	Key assumptions	Cause
	9. Staff at my school use research and evidence to stimulate conversation/dialogue around an issue	R-conversation	Cause
	10. In this school, people value new ideas	New Ideas	Cause
	11. This school experiments with new ways of working	Experimentation	Cause
The existence of	12. In the last year, I have	R-discussion	<i>Effect</i>

effective structures, system and resource to facilitate research-use and the sharing of best practice.	discussed relevant research findings with my colleagues		
	13. This school has forums for sharing information among staff	Forums	Cause
	14. In this school time is made available for education/training activities for school staff	Training	Cause
Other factors associated with school culture, such as trust and the strength of interpersonal relationships	15. Even in difficult situations, staff in this school can depend on each other	Depend	Cause
	16. Staff in this school trust each other	Overall trust	Cause
	17. When senior in this school tell you something you can believe it	SL Trust	Cause
	18. When /middle leadership in this school tell you something you can believe it	ML trust	Cause
	19. When teachers in this school tell you something you can believe it	Teacher trust	Cause

	20. Staff in this school respect each other	Respect	Cause
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Each question in table 1 employed a five point Likert scale which ranged from ‘Strongly Agree’ to ‘Strongly Disagree’. The survey itself was developed using *survey monkey* and distributed electronically to 79 primary schools via their headteacher. The survey period lasted from 2 October to 19 October 2014. In total we achieved 797 responses to the survey from 79 schools, representing a response rate of some 65%. Of these, 696 were analysed, with these 696 representing those who had joined the school before September 2014, since it was reasoned that three to five weeks into a school term wouldn’t provide sufficient time for teachers new to a school to reflect on its longer-term research-use activity. Table 2 provides the overall demographics of the participating teachers from the 79 schools. As can be seen, of the 696 teachers surveyed, 84% are female; approximately 42% serve as a subject leader (e.g., math lead or coordinator; and about 19% hold a formal and senior leadership position (e.g., headteacher). On average, the teachers had less than four years of experience working in their current position. In terms of school level data, on average schools had 18 teachers and 320 pupils. Their Ofsted rating on average was ‘Good’

Table 2: Sample Demographics

	Percent or mean	Standard Deviation
Teacher level		
Years in current position	4.1	3.6
Gender (female)	88%	
Serve as a subject leader	42%	
Hold a formal senior leadership role	19%	
School level		
Number of teachers	18.38	8.79
Number of students (based on	320	194

data for 43 schools)		
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4: METHODS

As well as looking at behaviours and beliefs, our aim in analyzing the data was to ascertain the effectiveness of potential school policy levers for the enactment of EIP. To begin with the variables represented by the survey questions were divided into *cause* and *effect* type variables; the latter representing teacher's own experiences in relation to evidence informed practice, while former refer to the external factors that potentially influence these experiences. Which variables were deemed as cause and effect are set out in the last column in Table 1, above. Overall, four survey questions were determined as representing *effect* variables: i.e. they represent actions or beliefs likely to result from (i.e. be caused by) the presence of other factors. For example, the presence of teachers discussing research findings is assumed to indicate that research-related discussion is encouraged and/or time is made available for it to take place, and so on. In summary, the four *effect* variables are regarded as:

- Q1: Information from research plays an important role in informing my teaching practice (*R-practice*)
- Q2: I have found information from research-useful in applying new approaches in the classroom (*R-approaches*)
- Q4: I do not support implementing a school-wide change without research to support it (*R-support*)
- Q12: In the last year, I have discussed relevant research findings with my colleagues (*R-discussion*)

From the above, it can also be seen that of these four questions, Q1, 2 and 12 represent practical rational acts: i.e. they indicate that teachers are using evidence or are engaging with

it. Q4 meanwhile represents the existence of cultural rationality within a school. That is, it represents whether teachers believe in EIP and the use of evidence to drive school improvement. The remaining 16 variables were thus deemed as influencing (causing) changes in these four effect variables.

We began our analysis with a simple exploration of the data; analyzing distributions of total individual teacher responses to the four effect questions. These are set out in Table 3, below:

Table 3: Responses to the effect variable questions (n=696)

	<i>R- practice</i>	<i>R- approache s</i>	<i>R- Support</i>	<i>R- discussion</i>
Strongly agree	20%	26%	13%	25%
Agree	56%	60%	37%	57%
Neither agree or disagree	21%	13%	38%	11%
Disagree	3%	2%	12%	6%
Strongly disagree	1%	0%	1%	1%

To examine the relationships between the *cause* and *effect* variables we also employed a data mining approach. Here, we began by transforming all of the Likert scale points into numerical integers, with values ranging from -2 ('strongly disagree') to +2 ('strongly agree') with the neutral response represented as zero. Because Likert scale values are ordinal in nature, we then employed nonparametric statistical methods for data analysis and modelling (rather than standard parametric techniques such as Student t-test which assumes a normal distribution of data) (Field and Hole, 2003; Agresti, 2010). For the effect variables, we measured their pairwise associations using a nonparametric method: Kendall's τ rank correlation coefficient. As shown in Figure 1, the correlation between the normative variable *R-support*, which reflects teachers' (cultural rational) beliefs about the general use of evidence within their school, and the three other (practical rational) behavioural effect variables (*R-practice*, *R-approaches*, *R-discussion*) is quite low (< 0.30); with the discrepancy between *R-support* and *R-practice* significant according to the nonparametric Wilcoxon signed-rank test (p -value $1^{-25} \lll 0.01$). This suggests that there is a gap between supporting the idea of evidence informed practice and its enactment; and so correspondingly, low levels of optimal rational behaviour.

Figure 1: Correlation between the effect variables

R-support	0.29	0.23	0.22
	R-practice	0.69	0.55
		R-approaches	0.56

What is interesting, however, is that basic analysis of the survey data (in Table 3) highlights that 50 percent of respondents ‘agreed’ or ‘strongly agreed’ with *R-support* (survey question 4): ‘I do not support implementing a school-wide change without research to support it’ (with 38 percent neither agreeing/disagreeing and 12 percent disagreeing and strongly disagreeing). A higher percentage (76 percent) ‘agreed’ or ‘strongly agreed’ with *R-practice* (survey question 1): ‘information from research plays an important role in informing my teaching practice’. This finding adds interesting additional insight to that provided by the literature engaged with earlier (Nelson *et al.*, 2015; Caldwell *et al.*, 2015). This is because it suggests that the discrepancy between beliefs and practice detailed in Figure 1 is not necessarily caused because practitioners believe in using evidence but encountering difficulties in implementing it (e.g. such as those described in 2.1); rather that it results because research-use does not appear to exist as a school-level cultural norm. Correspondingly, research-use, when it does occur, seems to materialize primarily as an individual endeavour undertaken by some teachers within their classrooms.

In itself, the data may also therefore be indicative of one the major issues for knowledge mobilisation in a self-improving system: school accountability (e.g. Godfrey, 2014a; Greany, 2015). That is, as noted above, the argument that England’s accountability regime is flattening the very freedom and autonomy that the self-improving school system is designed to encourage: these figures perhaps highlighting that schools are looking to second guess

what they think (England’s school inspectorate) Ofsted wants to see rather than any wholesale and freely determined engagement with the evidence base (Finnigan *et al.*, 2015; Greany, 2015). To test this argument we also examined the relationship (as a correlation) between individual, whole school-level ‘average’ responses to the *R-support*, *R-practice*, *R-approach* and *R-discussion* questions, and the Ofsted grade for individual schools using a nonparametric statistic: Spearman’s ρ rank correlation coefficient. This is set out in Figure 2, where it can be seen that Ofsted grade has significant negative correlations with *R-practice*, *R-approach* and *R-discussion*, but almost zero correlation with *R-support*. This analysis suggests that, although the well-rated schools (those at Ofsted grade 1 - *outstanding* and grade 2 - *good*) are more likely to engage practical rational acts such as EIP, than poorly-rated schools (i.e. those at Ofsted grade 3 – *requires improvement* and grade 4 - *inadequate*), well rated schools are not better in terms of their cultural rational position: that is, the extent to which they agree with *R-support*.

Figure 2: Correlation between the effect variables and school OfSTED grade

R- support	0.25	0.38	0.23	-0.054
	R- practice	0.69	0.61	-0.17
		R- approaches	0.71	-0.21
			R- discussion	-0.17
				Ofsted

	Grade
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Corresponding distribution data is provided in Tables 4 and 5. Here, Table 4 provides the range of Ofsted grades of the schools surveyed. Table 5 provides the average scores for each question for each school: the responses in Table 5 thus provide the percentage of schools whose average fits within the range in question.

Table 4: Distribution of Ofsted grades (n=79).

OfSTED Grade	
Outstanding	25%
Good	65%
Requires improvement	4%
Inadequate	0%
Missing	6%
Total	100%

Table 5: Distribution of average whole school responses to the *R-support*, *R-practice*, *R-approach* and *R-discussion* questions (n=79).

Response range	<i>R-practice</i>	<i>R-approaches</i>	<i>R-support</i>	<i>R-discussion</i>

>1.5	1%	6%	0%	6%
> 0.5 – 1.5	90%	89%	47%	81%
>-0.5 – 0.5	6%	3%	51%	10%
<-0.5	1%	1%	1%	1%
Missing	1%	1%	1%	1%
Total	100%	100%	100%	100%

In order to help ascertain how the optimal rational position might be realised, we next examined how best support for EIP can be increased. Specifically, we sought to ascertain which of the *cause* variables outlined in table 1, school leaders could focus on in order to positively influence *R-support*. To do so (and because our Likert data was ordinal in nature) we employed the Decision Tree learning algorithm, CART (Brieman *et al.*, 1984) to analyse our data; we were also able to enhance the prediction accuracy of our model by using the *Gradient Boosted Tree* (GBT) approach. This meant we were able to employ an ensemble of Decision Trees rather than just one (Hastie, 2009; Seni and Elder, 2010). It is also clear, from an optimal rational position, that the most desirable position for schools to be in is when practitioners both fundamentally believe in and engage in evidence informed practice. To examine potential policy levers in this area, we repeated the approach used above, to build a predictive model for respondents who ‘agreed’ or ‘strongly agreed’) with the *R-support* question in order to examine how their subsequent responses to the *R-practice* question were contingent on their perceptions of the influencing external environment (as represented by their responses to the cause factor questions). The results for both models are discussed in section 5, below.

5: RESULTS

Data for each of the two predictive models is set out in tables 6 and 7. For each cause variable the *Gradient Boosted Tree* (GBT) predictive model indicates an importance score. This score indicates how useful a *cause* variable is within the model for the purpose of making predictions about the *effect* variable. Specifically, the relative rank of a variable employed as a decision node in a tree can be used to assess the relative importance of that variable with respect to the predictability of the *effect* variable. Looking first at Table 6, it can be seen that while a number of factors do influence support, they are concentrated in three groups. The cause variables with by far the highest levels of importance when predicting a positive response to *R-support* are: *Encouragement* (0.221) ('My school encourages me to use research findings to improve my practice'), *R-conversations* (0.149) ('Staff at my school use research and evidence to stimulate conversation/dialogue around an issue') and *R-strategies* (0.113) ('Research and evidence is used to inform staff here about potential improvement strategies'). Following these variables, it is apparent that the level of trust teachers have in senior and middle leaders within their school as well as the overall trust within their school also matters, but the importance of these variables within the model is much less. Finally comes school leaders making time for training around evidence-use ('In this school time is made available for education/training activities for school staff') and the receptiveness of teaching staff to new ideas ('In this school, people value new ideas'), again however the importance of these variables is relatively low.

As can be seen in Table 7, for those schools where there is already agreement or strong agreement with the *R-support* question ('I do not support implementing a school-wide change without research to support it'), the three most important features, or *cause* variables, for then

improving *R-practice* are once again: *R-strategies* (0.318), *R-conversations* (0.270) and *Encouragement* (0.164); although the order of the importance and their relative values changes, with *Encouragement* and *R-strategies* swapping places. In other words, for schools where leaders have engendered support for evidence-informed change more generally, our model suggests that approaches for then increasing practice should comprise a continuation of:

- School leaders engaging in ‘learning-centred’ leadership activity, such as showcasing or demonstrating how research and evidence can form key aspects of school improvement strategies;
- School leaders ensuring staff engage with research as part of their ongoing learning communities activity, such as when engaging in discussion in relation to teaching and learning; and
- The continued active encouragement by school leaders for teachers to engage in evidence-use.

Although much lower in terms of their importance (with scores in the range of 0.05), it is clear that teachers having trust in their school leadership too will continue to influence whether teachers engage in the (potentially risky) activity of experimenting with evidence informed practice.

Table 6: The importance of cause variables for ‘R-practice’

Table 6: The importance of cause variables for ‘R-supprt’

Cluster	Cause	Importance for r-
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		support
1: wider professional community culture within the school	Sharing	0.018
	Depend	0.032
	Overall trust	0.042
	SL Trust	0.059
	ML trust	0.046
	Teacher trust	0.045
	Respect	0.054
2: the promotion of research use within an effective learning environment	Encouragement	0.221
	R-strategies	0.113
	R-conversation	0.149
3 systems and culture which facilitate the development and testing new ideas and the mobilisation of resulting knowledge	Evaluation	0.033
	Key assumptions	0.036
	New Ideas	0.043
	Experimentation	0.037
	Forums	0.030
	Training	0.040

Table 7: The importance of cause variables for ‘R-practice’

Cluster	Cause	Importance for r- practice
1: wider professional	Sharing	0.012

community culture within the school	Depend	0.025
	Overall trust	0.035
	SL Trust	0.052
	ML trust	0.049
	Teacher trust	0.007
	Respect	0.012
2: the promotion of research use within an effective learning environment	Encouragement	0.164
	R-strategies	0.318
	R-conversation	0.270
3 systems and culture which facilitate the development and testing new ideas and the mobilisation of resulting knowledge	Evaluation	0.007
	Key assumptions	0.003
	New Ideas	0.014
	Experimentation	0.013
	Forums	0.009
	Training	0.006

It should be noted that the results outlined above do come with a number of caveats in relation to how they should be interpreted. First, the 79 schools surveyed are all primary schools, so no inference can be made between this analysis and England's 3,200+ secondary schools. Second, it is likely that the schools involved are more predisposed to research engagement than the majority of England's primary schools: of the schools involved in the survey, 20 were in a formal Teaching School Alliance and a further 20 in a similar relationship (but had not applied or were in the process of applying to be Teaching School Alliance). Finally, the distribution of Ofsted grades within the sample is positively skewed: of those schools surveyed, 90 percent are outstanding or good, this corresponds to 82 percent of

primary schools nationally (Ofsted, 2014). Conversely, while only four percent of the sample were rated ‘requires improvement’, this compares to 16 percent of all primary schools (with two percent ‘inadequate’) (*ibid*). Nonetheless, despite these caveats, our analysis does provide useful insights as to how the optimal rational position of EIP might be achieved, and these are now discussed in our conclusion to the paper.

6: CONCLUSION

The aim of this paper was to examine the applicability of a model of rational behaviour (proposed in Brown, 2014) as it relates to the notion of evidence-informed practice (EIP). In particular, we sought to explore whether the beliefs and perspectives of teachers in relation to EIP align with their evidence-use behaviours, an outcome that we argue, represents a situation of optimal rationality: one in which there are higher levels of evidence-use, and so more benefits accruing from evidence-use. Our initial assumption was that beliefs and perspectives would be stronger than actual behaviours. In other words, from our analysis of the literature in section 2.1, we assumed that the realization of EIP represented a hard to achieve aspirational goal. Based on this initial hypothesis, we also assumed that a further aim would be to then assess what factors (if any) were working to prevent teachers/schools who wish to engage in EIP from doing so. In analysing the discrepancies between beliefs and behaviour, however, a far more interesting picture emerged, namely that more practitioners engaged in EIP than supported it as a whole-school policy. To us this indicated that the discrepancy between beliefs and practice detailed in Figure 1 is not caused because practitioners believe in using evidence but struggle to implement it; rather it results because research-use does not exist as a school-level (or indeed system level) cultural norm.

At the same time, however, our analysis explored EIP beliefs and behaviours solely through a

quantitative approach. While successful in that we have been able to collect and analyse a significantly robust data set with a high degree of confidence, what our approach did not give us was a rich and contextually situated understanding of the issues facing teachers and schools in relation to using and engaging with evidence, nor the interplay between school actors and policy (e.g. see Ball, 2007). Deeper qualitative investigation, we suggest, would provide a richer understanding in this area and would serve to augment our initial work. For instance it would enable us to meaningfully explore the tentative hypotheses that emerge from marrying our analysis to extant literature on the effects of high stakes accountability on teacher and school leader behaviour. In particular, the idea that this lack of ‘gung-ho’ buy-in may be caused by the dominance of England’s accountability regime in an education system where other forms of school improvement support have been reduced or removed. This position, for instance seems to cohere with recent analyses of Canadian school performance undertaken by Anderson (2015: 8) where it is suggested that that high stakes accountability tends to lead to school leaders - irrespective of differences in jurisdiction, previous performance or attainment, or the contexts or characteristics of their community – to aim for similar (externally mandated) school improvement goals as well as seek to achieve these through similar (externally mandated) school improvement processes. It has also been suggested that this pursuit of the same goals via the same means can occur even if such processes are neither the most effective nor or the best suited to a given context (e.g. see Finnigan and Daly, 2012). Correspondingly we argue that the correlations set out in Figure 2 provide the basis for further study to investigate whether schools are perhaps expressing a wish to retain the freedom to second guess (England’s school inspectorate) Ofsted wants to see or are conforming to the norms set by accountability frameworks rather than adopt a riskier strategy of engaging wholesale in EIP (Greany, 2015; Supovitz, 2015).

Nonetheless our analysis as it stands does have a number of implications for the model of rationality set out in section 2.7, as well as the self improving school system. In particular it highlights that EIP, as a cultural rational position, cannot be achieved without the direct support and buy-in of school leaders (who, via transformative approaches to leadership are able to steer school cultures: e.g. see Bush and Glover, 2003; Day and Sammons, 2013 and section 2.4). Since such support appears to be low (see percentage of respondents agreeing/strongly agreeing with *R-support*) it seems to imply that schools and practitioners (particularly those in ‘successful schools’) are happy to engage in optimal behaviour when it suits them to do so, but not to fully subscribe to the cultural rational position underpinning it. Potentially this is because, in education, other aspects of the cultural rational position are determined to a significant extent by a rapidly changing external discourse (e.g. by changes in education policy or Ofsted requirements for what counts as an ‘outstanding school’: see Godfrey, 2014a). What’s more, because they often account for ‘higher stakes’ (i.e. they lead to greater reward or punishment), these other aspects of cultural rationality tend to be given a higher weight or priority by school leaders (see Chapman, 2015). This potentially requires teachers and, in particular, school leaders, to have a certain level of rational pragmatism: engage in short term practical rational behaviour, but to not get too bound up or aligned with this one specific aspect of cultural rationality, as doing so will make it difficult to shift behaviours as the policy paradigm itself moves (to an extent reflecting Glatter, 2012). As a result, our analysis also highlights that the optimal rational position, as relates to evidence-use, can often be fragile: it might be achieved in some schools in the short term, but without full buy-in from school leaders (which provides an indication of security – i.e. it ‘tells’ teachers that it is OK to buy into the optimal position whole heartedly) EIP will never be fully grounded as an integral ‘way of life’ for schools and teachers. This analysis thus points to Ofsted buying into and making evidence-use part of its inspection criteria if EIP is to be

realized in any meaningful way as an optimal rational outcome for schools.

Should Ofsted decide to take up this mantle, however, our analysis does provide useful indicators as to where school leaders should be concentrating their efforts in order to effectively embed EIP within their schools. Specifically, that school leaders should be: 1) promoting the vision for evidence-use (i.e. using transformative leadership to encourage its use: see Bush and Glover, 2003); 2) engaging in actions strategies that illustrate how research and evidence can be effectively employed to enhance aspects of teaching and learning. For example by engaging in acts such as ‘modelling’, ‘monitoring’ and ‘mentoring and coaching’ (Southworth, 2009); and 3) establishing effective learning environments in which learning conversations around the use of evidence can flourish (*R-conversation*) (e.g. see Stoll *et al.*, 2006). Considering *R-Support* and *R-Practice* together, in terms of the aspects of leadership above, it can be seen that to begin the process of making evidence-use a cultural norm within schools, leaders are required to engage primarily in ‘transformational’ modes of leadership. To embed it however, they must switch focus and in engage in more ‘pedagogic’ or learning-centred leadership aspects. This also flags the importance, more generally, of school leaders having the capacity to engage in both modes of leadership (Bush, 2015).

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ⁱ See: <http://www.education.gov.uk/childrenandyoungpeople/families/b00203759/evidence-based-practice>, accessed on 10 January 2014.

ⁱⁱ Following Author 1 (2014) our definition of evidence is as follows: 1) use of formal research produced by researchers; 2) practitioner enquiry such as action research; and 3) the interpretation of routinely collected data. More specifically we are taking the notions of formal research and practitioner enquiry (1 and 2) to comprise the collection of data that has been gathered via a process of research, that has been interpreted and that subsequently has or could be used to address a particular issue facing practitioners. Routinely collected data (3) would include that already captured by systems within schools such as pupil assessment data. As with previous work, we use the terms research and evidence interchangeably throughout and treat them as synonymous. Where we refer to 'data' specifically, this means un-interpreted data. A detailed explanation of our reasoning here can be found in Author 1 (2013).

ⁱⁱⁱ See: <http://ies.ed.gov/ncee/wwc/>

iv See: <http://educationendowmentfoundation.org.uk/toolkit/>

v See: <https://educationendowmentfoundation.org.uk/toolkit/toolkit-a-z/about-the-toolkit/>

vi See: <https://educationendowmentfoundation.org.uk/toolkit/toolkit-a-z/>

vii See: <https://educationendowmentfoundation.org.uk/toolkit/toolkit-a-z/about-the-toolkit/>

viii See: <http://www.teachmeethants.co.uk/sample-page/>

ix See: <http://www.workingoutwhatworks.com>