Learning to learn: improving attainment, closing the gap at Key Stage 3

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ABSTRACT

In 2010, a comprehensive secondary school in the south of England implemented a whole-school approach to 'learning to learn' (L2L). Drawing on a range of evidence-based practices, a team of teachers worked collaboratively to design and deliver a taught L2L curriculum to all students throughout Key Stage 3. In total, the first cohort of students ($n = 118$) received more than 400 taught lessons throughout years $7-9$. The impact of L2L on student attainment at Sea View was evaluated over those 3 years, using the pre-L2L cohort as a matched control group ($n = 148$). By the end of year 9, a significantly higher proportion of L2L students were either hitting or exceeding their target grades, compared with the control group. There was also a significant closing of the attainment gap between students eligible for the pupil premium and their peers (2%, vs. 25% in the control group). Key features of the L2L approach at Sea View are considered in terms of similarities and differences with other L2L approaches. Conclusions are drawn that the success of this approach lies in the combination of multiple effective practices. Recommendations for further research and development of the field are proposed.

Introduction

This paper reports the findings of an interventional, evidence-based, whole-school approach to learning to learn (L2L) which was implemented at a comprehensive secondary school in the south of England which we will call 'Sea View', from 2010 to 2014. In this section, we will begin by reviewing research on L2L and then explain how it informed the design of this interventional case study.

Previous research on L2L

In 2011 the Sutton Trust and the Education Endowment Foundation (EEF) published a Teaching and Learning Toolkit, with a view to helping schools decide which strategies are most effective at improving educational outcomes for students from disadvantaged backgrounds (Higgins, Kokotsaki, & Coe, 2011). Regularly updated ever since, the Toolkit

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provides schools with a ranking as to the effectiveness of different strategies. It has been well received by the teaching profession, and the majority of schools in the UK now use it to inform strategic planning (Sutton-EEF, 2015).

Ranked first in this league table of educational effectiveness are 'meta-cognition and self-regulation', which are described as having 'high impact for low cost, based on extensive evidence' (Sutton-EEF website, 2015). As the Toolkit explains: 'Meta-cognition (sometimes known as "learning to learn") and self-regulation approaches aim to help learners think about their own learning more explicitly … The evidence indicates that teaching these strategies can be particularly effective for low achieving and older pupils' (Sutton-EEF website, 2015). The educational value of developing students' metacognitive and self-regulatory abilities is also supported by the results of a number of interventions showing large effect sizes on learning and study skills, and a range of academic attainments (e.g. see Dignath, Buettner, & Langfeldt, 2008; Whitebread, 2013).

Table 1 offers a summary of educational programmes which have been based on such research. These programmes vary in focus and scale; however, it is also clear that they overlap in significant ways. For example, it could be said that initiatives such as 'learning to think' and 'thinking about thinking' centre around metacognition, whereas 'learning about learning', 'learning how to learn' and 'thinking together' involve broader notions of meta-learning and self-regulation. Watkins (2001) describes meta-cognition as 'awareness of thinking processes, and "executive control" of such processes', while 'meta-learning (making sense of one's experience of learning) … covers a much wider range of issues than metacognition, including goals, feelings, social relations and context of learning' (Watkins, 2001, p. 1). Underscoring the distinction, Watkins asserts: 'metacognition is a defining characteristic of our species: meta-learning is its dynamic epitome' (Watkins, 2001, p. 7).

Defining 'learning to learn'

Defining 'learning to learn' is not a straightforward matter. Stringher (2014) suggests that the problem stems in part from the fact that L2L 'is not strictly a scientific concept, but rather involves politics' (p. 9). It has been described as a 'multidimensional entity whose meaning varies according to the meaning given to the word learning' (Candy, 1990, pp. 34−35). To take one influential example, the European Education Council Framework

Table 1. Examples of educational initiatives oriented toward metacognition.

Educational initiative	Example citations
Learning about learning	Säljö (1979)
Learning to learn	Hounsell (1979), Nisbet and Shucksmith (1984), Higgins et al. (2007), Wall et al. (2010)
Learning how to learn	Novak and Gowin (1984), James et al. (2006)
Learning to study	Gibbs (1986)
Learning to think	Perkins, Goodrich, Tishman, and Mirman (1994)
Thinking about thinking	Collins and Mangieri (1992)
Thinking together	Mercer and Littleton (2007)
Building learning power	Claxton (2002), Claxtoon et al. (2011)
Learning to learn: the L2 approach	Smith, Lovatt, and Turner (2009)

of Key Competences (European Education Council, 2006) defines L2L as a 'competence', rooted in broad conceptions of meta-learning:

> Learning to learn is the ability to pursue and persist in learning, to organise one's own learning … This competence includes awareness of one's own learning process and needs, identifying available opportunities, and the ability to overcome obstacles in order to learn successfully.
>
> (Education Council, 2006, p. 10)

In reviewing how the theory and practice of L2L has evolved over time, Claxton (2004) identifies four successive phases summarised in Table 2. Claxton suggests that 'there have, over the last 20 years or so, been three generations of response [to the challenge of "learning to learn"], each more challenging than the last … we are now ready to make a step change into a Fourth Generation approach to helping young people become better learners. Each of these generations is still with us: they overlap and linger, rather than replacing each other in a series of neat revolutions. But there are strong signs that the 3rd generation is rapidly metamorphosing …' (Claxton, 2004, p. 1).

The features of fourth generation L2L echo Hattie's description of effective teaching in his 2009 synthesis of over 800 meta-analyses, *Visible Learning*, in which he concluded: 'The remarkable feature of the evidence is that the biggest effects on student learning occur when teachers become learners of their own teaching, and when students become their own teachers. When students become their own teachers they exhibit the self-regulatory attributes that seem most desirable for learners (self-monitoring, self-evaluation, self-assessment, self-teaching). Thus, it is visible teaching and learning by teachers and students that makes the difference' (Hattie, 2009, p. 22).

Reflecting on how conceptions of L2L evolved throughout the Campaign for Learning (CfL)'s L2L project, Wall (2012) reports that 'over time, the idea that the fourth generation was an end point proved to be over-simplified … undoubtedly some of the schools have moved up and down the generations depending on the forces operating on them and the needs of the learners …' (Wall, 2012, pp. 285−286). In contrast, the L2L team at Sea View set out to develop a curriculum which drew together features from each generation of practice. For example, the primary aim of the L2L initiative was to help students develop the proactive learning skills and dispositions required to boost their academic attainment across the curriculum, an aim that was regularly communicated to the

Table 2. Four generations of learning to learn.

Generation	Characteristics
G1	• Focus on raising attainment, the outcomes of schooling • 'Good teaching' was about content and knowledge acquisition
G2	• Focus on study skills − hints and tips for retaining and recalling for tests • 'Good teaching' as before, plus delivering these techniques
G3	• Focus on social and emotional factors (e.g. self-esteem) • Characteristic ways of learning (e.g. learning styles, 'brain-based learning') • Concerned with the 'how' of teaching
G4	• Focus on how students can be helped to help themselves; 'habits of mind' • Transparency − students encouraged to reflect on the processes of learning • Teachers engaged in becoming better learners, e.g. through action research • Developmental and cumulative − concerned with the 'how' of learning

Source: Adapted from Claxton (2004).

students (G1); there was a sustained focus on the development and practice of organisational study skills (G2); there was an explicit focus on the students' social and emotional development (G3); and there were multiple strategies in place to encourage students to regularly reflect on the 'how' of learning (G4). Other aspects of Claxton's four generations were intentionally omitted from the Sea View curriculum – for example, the team were keen to distance the L2L programme from notions of 'characteristic ways of working', often referred to as 'learning styles' (G3). Also, unlike the competence-based curricula (CBCs) described by Downey, Byrne, and Souza (2013a, 2013b) and Byrne, Downey, and Souza (2013a, 2013b), there was very little delivery of content knowledge by teachers in the Sea View curriculum (G1).

L2L curricula

Despite the compelling research literature around metacognition, attempts to translate research findings into educational programmes which consistently improve outcomes for young people have often fallen short of fulfilling their promise. In the UK, a number of large-scale initiatives – such as the CfL's *Learning to Learn* project (e.g. see Wall et al., 2010); the Teaching and Learning Research Programme *Learning How to Learn* initiative (James et al., 2006); *Building Learning Power* (Claxton et al., 2011); and the Royal Society of Arts (RSA) *Opening Minds* programme (e.g. see Aynsley, Brown, & Sebba, 2012) – have not consistently led to gains in subject learning.

Such equivocal findings have led some commentators to conclude that L2L has been an educational cul-de-sac, as can be seen in Bennett's (2013, p. 161) assertion: 'Learning to Learn. It isn't even a thing. We've been hoaxed … The hipsters are selling snake oil on this one, whether they know it or not'. Taking an alternative perspective, it is the authors' contention that there may be a number of reasons as to why such large-scale initiatives have not consistently led to academic gains, and that there remain some avenues worthy of further investigation. To provide a detailed critique of the L2L literature to date is beyond the scope of this paper, but there are key issues around interpretation, implementation and scale. Evaluations of the L2L initiatives cited above include many examples of good practice – often where a coherent, whole-school approach has been established – with some evidence of academic gains. However the interpretation and implementation of L2L is often inconsistent, both within and across participating schools, and so the net effect in large-scale evaluations – often involving upwards of 30 schools – is one of no discernible change. But rather than concluding from this that those seeking to develop educational programmes which systematically foster metacognition and self-regulation should abandon all hope, perhaps instead we might learn from instances where L2L has been interpreted and implemented effectively, and seek to develop and disseminate these practices more widely, and with greater consistency. Another potential area for improvement is that in many cases, the interpretation and implementation of L2L has not been generated and thus 'owned' by staff, but introduced by senior leaders using pre-ordained, bought-in frameworks. As a RAND Corporation report on school-based interventions concludes, '(w)hether a particular program "works" in a specific population may rest on whether sufficient background work has been done in that population and whether the population itself is invested in the implementation of the intervention' (Jaycox et al., 2006, p. 338). Dignath et al. (2008) also comment that metacognition and self-regulation

interventions typically show the highest effect sizes when they are implemented by their designers.

In this paper we present the findings from a 3-year interim evaluation of a whole-school, evidence-based approach to L2L, which was designed and driven by a small group of committed teachers working within a single school. In the summer of 2010, a team of five teachers was appointed to the L2L team, following a competitive selection process. Included in this team was one of the authors (Mannion), who worked at Sea View from 2006 to 2014, with the intervention running from 2010 to 2014. As a consequence of the interview process, each member of the team had expressed a clear commitment to the theory and practice of L2L before the project had begun. This marks a key distinction between the Sea View approach, and the description of teachers of similar 'competence-based curricula' at other schools as a combination of volunteers and 'sceptical conscripts' (Downey et al., 2013b, p. 378). In particular, the team at Sea View were united in expressing their advocacy for L2L as an expression of their identification with learning-centred approaches to teaching and learning (focused on processes, or the 'how' of learning), as opposed to performance-centred approaches (focused on content, or the 'what' of learning; e.g. see Soderstrom & Bjork, 2013, 2015; Watkins, 2001, 2010). This same group of teachers was also influential in determining the content and delivery of the whole-school continuing professional development (CPD) programme; this too was a key feature of the unique approach developed at Sea View, and a critical factor in ensuring that the skills and dispositions developed through the L2L curriculum were able to meaningfully transfer to other subject areas throughout the school, leading to enhanced academic performance across the curriculum.

The L2L curriculum at Sea View

When the study began in September 2010, Sea View was an average sized comprehensive (i.e. non-selective) secondary school in the south of England. The intake at the school was predominantly White British, with around 10% of students from minority ethnic backgrounds. The proportion of students eligible for the pupil premium (PP) (i.e. socially disadvantaged students) was well above the national average. The proportion of students with a Statement of Special Educational Needs was around double the national average.

In September 2010, Sea View initiated an innovative L2L taught curriculum, with a range of measures designed to transfer and embed learning-centred practices throughout the whole school. In 2010–2011, this involved all year 7 students in five consecutive lessons a week, in mixed ability classes (year 7 is normally the first year of secondary school in England, and is often the focus of L2L initiatives). Designed and delivered by a dedicated team of teachers, the L2L curriculum set out to close the gap between the attainment of PP students and those from more privileged backgrounds at Key Stage 3 (KS3), while raising the attainment of all students. Interim evaluations throughout the first year found wide-ranging support for the L2L programme. Data relating to students' attainment across the curriculum suggested that the first L2L cohort had performed better than expected against their target grades, compared with the previous year group (matched control). This was also reflected in the students' attitude to learning scores. In 2011–2012 the decision was taken to expand the L2L curriculum into year 8 for three lessons a week, and in 2012–2013 the curriculum expanded again into year 9, for five lessons a fortnight.

Table 3. Components of the L2L programme at Sea View, with examples of supporting literature.

Component of the L2L programme		Examples of supporting literature
Y7, 8	Project-based learning	Barron and Darling-Hammond (2008), Hung (2008)
Y7, 8	Group work/collaborative learning	Howe (2009, 2010), Slavin (2010), Laughlin, Hatch, Silver, and Boh (2006)
Y7, 8, 9	Explicit teaching and development of oral communication skills	Barnes (1976, 2008), Mercer and Littleton (2007), Littleton and Mercer (2013), Topping and Trickey (2007a, 2007b), Gorard et al. (2015)
Y7	Reflective learning journals	Whitebread and Pino Pasternak (2010)
Y8	Personal effectiveness course (similar to ASDAN CoPE)	Harrison, James, and Last (2012)
Y9	Thinking and reasoning skills (taught course)	Halpern (1998), Moseley et al. (2005)
Whole school	Weekly CPD sessions for all teachers, including action research	Waeytens et al. (2002), Perkins and Salomon (1989)
Whole school	Shared language of learning	Claxton et al. (2011), Dweck (2006)

In total, students in the first L2L cohort ($n = 118$) participated in more than 400 lessons of L2L throughout years $7-9$. As a consequence the pre-L2L control group ($n = 148$), who had comparable prior attainment to the L2L cohort at entry, had more than 400 additional subject-based lessons throughout KS3, compared with L2L cohort 1.

As can be seen in Table 3, the L2L curriculum at Sea View formed part of a whole-school approach to the development of teaching and learning, which aimed to ensure that the skills and dispositions developed through the L2L curriculum were able to transfer meaningfully to other subject areas. The issue of transfer has often been the Achilles heel of L2L initiatives, since it is well understood that skills tend to remain rooted in the contexts in which they were developed (e.g. see Simons, 1987; Willingham, 2007). While transfer can and does happen, to varying degrees, it certainly does not always happen automatically, and thus requires careful planning and monitoring.

Before describing how the L2L team at Sea View tackled the issue of transfer, we shall briefly outline some of the key features of, and rationale for, each of the components outlined in Table 3.

Project-based learning (years 7 and 8, two lessons a week)

Throughout years 7 and 8, all students completed one project per half-term. These alternated between Individual (I) and Group work (G) projects. While the projects were organised within predetermined themes (see below), students were able to exercise a significant degree of autonomy over the content and format of the projects. In year 7 the projects were as follows:

HT1:   Identity project (Who am I?) (I)
HT2:   Christmas market stall (G)
HT3:   Individual research (I)
HT4:   Group research (G)
HT5:   Debating/public speaking (I and G)
HT6:   Summer fayre (G)

The rationale for project-based learning was primarily to enable students to develop the skills of self-regulation (e.g. co-constructing success criteria; setting short-, medium- and long-term goals; identifying useful strategies; monitoring and evaluating progress toward meeting goals; overcoming obstacles to learning; seeking, providing; receiving and acting on feedback; presentational skills; peer and self assessment). Progress in projects was often the focus of the reflective learning journal (RLJ) sessions (see below).

Group work/collaborative learning (years 7, 8; ongoing)

Throughout year 7 in particular, students were repeatedly reminded that one of the main aims of the L2L curriculum was so that they could develop the ability to work effectively with anyone, in a group of any size. Thus, at the start of the year students worked with talk partners or small groups of their choosing. However in paired and group tasks later in the year, the teachers chose the groups. Overcoming the challenges of working with others was something the students often wrote about in their RLJs. Where conflicts arose, teachers would use an embedded 'restorative justice' approach, enabling students to repair damaged working relationships within lessons.

Focus on oracy (years 7, 8; weekly philosophical enquiries; embedded 'exploratory talk')

As well as the usual components of an L2L programme, such as activities through which students undertake 'structured reflections' about their learning, the curriculum at Sea View also included a focus on 'oracy' − helping students develop their ability to use talk for reasoning and collaborative learning − which is linked to metacognition, and which has been shown to be linked to improved cross-curricular attainment (Mercer, 2014; Mercer & Littleton, 2007).

Throughout years 7 and 8, students were taught explicitly about exploratory talk as the preferred mode of classroom interactions. Ground rules for group talk were co-constructed with each group, displayed and revisited regularly. In year 7 there were also structured opportunities for students to practise and develop their speaking and listening skills. For example each week there was one lesson of philosophical enquiry, using a methodology derived from the SAPERE Philosophy for Children (P4C) approach, and one of the half-termly projects focused on developing the students' debating and public speaking skills.

Reflective learning journals (year 7, fortnightly)

Once a fortnight, students in year 7 had one lesson dedicated to reflection. These lessons would often begin with a meditation or a guided visualisation, to open up a physical and temporal space within which students could reflect on their learning. Following this there would be a period of silent writing, in which students would respond to prompt questions about their learning. The focus of reflective writing would vary from one fortnight to the next in response to recent events, but would typically include questions such as (1) how do you learn in L2L lessons − i.e. what do you actually *do* in order to learn in L2L?; (2) how do you learn in *[insert subject area]*?; (3) what obstacles stand in the way of you learning more effectively in *[insert subject area]*?; (4) what strategies have you tried? which might

be worth trying in future?; (5) how can your learning in L2L help you learn more effectively in *[insert subject area]*?; (6) who do you know that learns well in *[insert subject area]*? What things do they do that enable them to learn effectively in *[insert subject area]*? − and so on. RLJs were marked fortnightly using a 'dialogue marking' approach, providing L2L teachers with regular opportunities to identify obstacles and co-construct strategies for developing students' self-regulatory learning behaviours.

Personal effectiveness (year 8)

In year 8, students followed a thematic approach to personal, social, health, citizenship and economic education, with individual and group projects on themes such as diversity and discrimination; sexual health; drugs education; enterprise; and community campaigning. These projects required students to produce a portfolio of evidence (similar to the ASDAN personal effectiveness courses) that they had met agreed success criteria. The rationale here was primarily to develop students' organisational skills; while some students were adept at organising their folders and filing evidence against standards, many found it incredibly difficult to organise their work in this way. Here, there was much focus on students learning organisational skills from one another.

Thinking and reasoning skills (year 9)

In year 9, students had five lessons a fortnight of thinking and reasoning skills, following a structured Level 2 course (OCR examination board). However students did not sit the formal assessments. The rationale here was to provide all students with a formal training in the language of critical thinking and reasoning, and to provide them with opportunities to engage these skills in debates and discussions, as well as in extended pieces of writing.

Weekly CPD sessions for all teachers (1 h/week), including action research

When the L2L programme first began, the school's CPD programme was based around half-termly meetings of teaching and learning communities. However in the third year of the programme, this changed so that all teachers and support staff would meet for an hour each week. These sessions rotated around three key strands; (1) taught workshops, in which all staff explored an aspect of learning-centred practice (e.g. growth mindset; assessment for learning; differentiation through scaffolded questioning); (2) team sessions, in which colleagues worked collaboratively in departments to embed these ideas into their practice; and (3) an action research component, whereby all teachers and support staff undertook a systematic inquiry into a chosen aspect of their practice, working in triads and using a coaching methodology.

Two key features of the L2L programme at Sea View

Two features in particular distinguish the Sea View L2L curriculum from many other, similar approaches. First, it combined a taught curriculum throughout KS3, with a focus on embedding learning-centred practices in all school subjects. And second, there were multiple explicit strategies for promoting and managing transfer, to ensure that students

were enabled to apply the metacognitive skills and dispositions developed to their study of all subject areas. We expand in detail upon both of these features below.

A combined approach to whole-school L2L: taught and embedded

Throughout the last 40 years, there have been contrasting views as to how L2L should be implemented in schools (e.g. see Hounsell, 1979). Early attempts tended to fall into one of two categories: those that sought to embed the principles of metacognition within existing programmes of study (e.g. Elton, Hodgson, & O'Connell, 1979; Entwhistle, 1979; Helweg-Larsen, 1977), and those that sought to teach and develop metacognitive strategies explicitly, as a separate course (e.g. Da Costa, 1979; Hills, 1979). Evidence as to the efficacy of L2L being taught explicitly is equivocal. For example, Biggs and Rihn (1984) found in favour, while Ramsden, Beswick, and Bowden (1986) did not. It would therefore appear that contextual factors have a significant bearing on the efficacy of taught L2L courses.

Waeytens, Lens, and Vandenberghe (2002) suggest that by the turn of the century, the matter had been laid to rest: 'Nowadays, the educational community agrees that "learning to learn" cannot be taught in a separate course but has to be embedded in regular courses … For many researchers, the discussion about the implementation of "learning to learn" ends with a plea for an embedded approach' (Waeytens et al., 2002, p. 307). However, the authors also report that most teachers have only a 'narrow' interpretation of L2L (defined as 'limited to mere tips and advice in order to prepare [for] examinations or tests' (Waeytens et al., 2002, p. 313) as opposed to a 'broad' conception (in which the aim is to 'develop attitudes and skills which are important outside the school and classroom context' (Waeytens et al., 2002, p. 316). Furthermore, almost all the teachers with a 'narrow' conception of L2L reported 'not having enough time' to pursue it in their classes. In contrast, 'for the majority of [teachers with a broad conception of L2L], it is not a problem to find time to teach students how to learn. These teachers "make time for it"' (Waeytens et al., 2002, p. 316).

If it is the case that most teachers do not buy into the broad conception of L2L – and that those with a narrow conception of L2L do not make time for it in their lessons – then one can hardly expect a 'plea for an embedded approach' to be sufficient as a systematic strategy for improving student outcomes. Taking a pragmatic standpoint therefore, the team at Sea View adopted a combined approach, whereby a broad conception of L2L was both taught explicitly (in a course designed and delivered by the L2L team) and embedded in subject areas throughout the curriculum. This two-tiered approach was augmented by whole-school measures designed to promote the transfer of skills and dispositions developed in the L2L curriculum, to all curriculum areas.

As far as the authors are aware, this is the first example of such an approach to L2L to enter the literature. Typically, schools in the UK have adopted either an embedded approach in year 7 only (often using the RSA's Opening Minds competence framework to deliver traditional subject content through cross-curricular projects), or have taught discrete courses – also typically in year 7. For example, in a recent suite of articles comparing CBCs (Downey et al., 2013a, 2013b; Byrne et al., 2013a, 2013b) the four UK secondary schools included in the study were selected on the basis that they had committed a significant proportion of their year 7 curriculum time to the CBC. In three of the case schools, the curriculum materials had been 'bought in'). However it is not clear whether any of the schools attempted to establish a whole-school approach to competence-based learning

throughout all subject areas; nor is there any mention of explicit strategies for promoting transfer. As such, the approach adopted to L2L by these four schools could be characterised as 'taught only'. Other approaches to L2L have consisted of individual teachers, or groups of teachers, carrying out action research case studies, as with the CfL L2L project (Wall et al., 2010). While some of the case studies featured in the CfL project may have featured both taught and embedded components, the nature of a large project that comprised many case studies is such that it resembles a mosaic of L2L practice, rather than representing whole-school approaches with clear strategies for transfer across different subject areas.

Looking further afield, one account of L2L initiatives in Hungary reported that 'the problems which hinder meaningful conceptual learning that results in well-understood transferable knowledge are manifold' (Csapó, 2007, p. 207). In Spain, the system-wide Law of General Organization of the Educational System (LOGSE) curriculum sought to 'incorporate [the principles of L2L] in all areas of knowledge, *rather than* creating a curricular space of their own, apart from other subjects' (Moreno & Martín, 2007, pp. 176−177; emphasis added). As such, here we see an embedded approach *in the absence of* a taught component, such as that advocated by Waeytens et al. Although the LOGSE reform was passed in 1990, the authors report that 'now the curriculum recognises many of the characteristics of the concept of L2L' (Moreno & Martín, 2007, p. 176). Following LOGSE, in 2006 Spain passed the Ley Orgánica de Educación (Organic Law of Education), a CBC which includes L2L as a key competence. While the authors note that such an explicit recognition of L2L marks 'an important advance', they conclude that in the absence of explicit strategies for the development and transfer of autonomous learning skills and dispositions, 'this meagre emphasis on the steps of curriculum development is one of the reasons why Spanish students do not use autonomous learning strategies to a very great extent' (Moreno & Martín, 2007, p. 178).

Perhaps because of the lack of approaches which have sought to teach, embed and transfer the theory and practice of L2L at a whole-school level, evidence as to the efficacy of L2L for improving academic outcomes, from a range of small-, medium- and large-scale projects, has to date been equivocal. In each of these projects pockets of good practice have been identified, and valuable insights gained. But in the absence of a whole-school approach to transfer, the net effect has been one of no discernible change.

A managed approach to transfer

The central importance of transfer in the learning of knowledge and skills has been recognised in the psychological literature for over a century. One idea that has prevailed in the literature is the conservative notion that transfer will occur if and only if 'identical elements' are shared between tasks (e.g. Thorndike, 1913; cited in Brown & Kane, 1988). While Thorndike later recanted his position (Thorndike & Gates, 1929), this notion of transfer as something that does not happen unless the surface features of two tasks are self-evidently similar persists to this day (e.g. Gentner & Toupin, 1986; Holyoak, Junn, & Billman, 1984; Willingham, 2002). The existence of negative transfer − whereby people transfer knowledge or strategies to situations where it is inappropriate to do so (e.g. McNeil, 2008; Ross, 1987; Schwartz, Chase, & Bransford, 2012) − has further problematised the

notion of transfer as a desirable or achievable educational goal. Such reservations have thus featured in arguments against the explicit teaching of L2L, since students 'do not connect what they learn in such a course to their daily way of studying other courses' (Simon, 1987, cited in Waeytens et al., 2002).

However an alternative narrative also exists within the literature on transfer, which suggests that meaningful, deep level transfer − i.e. that based on deeper conceptual or analogous principles − is achievable when certain conditions are met. It has long been known that around 10% of adults routinely transfer on laboratory problems, without aid (e.g. Gick & Holyoak, 1983), and Fox (1983) reported that teachers' perceptions of their own roles often featured transfer theory, in which knowledge is viewed as a commodity to be transferred to students' minds (alongside shaping, growing and travelling theories of teaching and learning). Glaser (1984) emphasised the importance of domain-specific knowledge in the development of higher order thinking skills including transfer, and Perkins and Salomon (1989) identified two mechanisms through which such transfer of knowledge and skills could take place: low road transfer (in which a skill is practised to 'near automaticity'), and high road transfer (in which transfer relies on the deliberate mindful abstraction of an underlying principle).

In a seminal study, Brown and Kane (1988) reported that children as young as 5 were able to transfer learning following single exposure to a problem. Furthermore, this transfer was dependent not on surface features of related tasks, but on deeper underlying analogous principles. This effect was augmented by asking the children to explain; however by age 4, the children's own explanations were more powerful predictors of task completion than those provided by adults. Findings such as these have led to 'transfer' featuring increasingly prominently in curricular models for the teaching of higher order thinking skills (e.g. Fogarty, 1992; Fogarty & McTighue, 1993, cited in Hoskins & Deakin Crick, 2010). Pintrich and de Groot (1990) identified the importance of motivation in transfer, summed up in the slogan that children need the 'will' as well as the 'skill' − a notion also advocated by Derry et al. (1995) in recognising the importance of 'authentic', real-world teaching materials in promoting transfer. In reviewing more than 50 study skills interventions, Hattie, Biggs, and Purdie (1996) recognised the explicit transfer of strategies across key areas of a curriculum as a key feature of successful interventions − a notion also seen in Halpern's (1998) emphasis on 'transfer across domains' as a key feature in the teaching of critical thinking. The success of the 'Cognitive Acceleration' science and mathematics programmes was also widely viewed in terms of the evidence that these programmes led to transfer across subject domains, resulting in enhanced examination results in English (for example Adey & Shayer, 1993, 1994; Shayer, 1999).

Around the turn of the century, transfer started being viewed not only in terms of subject learning, but also in terms of education as a preparation for future learning (the notion of lifelong learning − e.g. Bransford & Schwartz, 1999) as well as in terms of the students' current lives beyond the school gates (so-called lifewide learning, or intercontextuality; e.g. see Engle, 2006; Hipkins & Cowie, 2014).

The importance of self-regulation in promoting such transfer for the future became increasingly recognised around this period (e.g. Schunk & Ertmer, 2000), while Watkins (2001) defined effective transfer as requiring: (1) requisite skills, (2) choosing to use the skills, (3) recognising when a particular skill is appropriate in new situations, and (4)

Table 4. Key recent developments in transfer, and how they informed the Sea View L2L approach.

Key developments in transfer	Example citations	Relevance to L2L at Sea View
The importance of language; language attributes are not cognitively separate, but transfer readily and are interactive	Baker (2006), Mercer (2014)	• Whole-school language of learning, co-constructed with students • Whole-school emphasis on exploratory talk
Intercontextuality; framing different learning contexts so that students come to see both the similarities and differences between them	Engle (2006)	• Plenaries for transfer • Reflective learning journals
The importance of dispositions. The critical role of teachers asking regular questions, to prompt transfer thinking	Claxton (2007)	• Whole-school language of learning • Plenaries for transfer • Reflective learning journals
'Emerging evidence indicates that cognitive, intrapersonal, and interpersonal competencies can be taught and learned in ways that promote transfer'.	Pellegrino and Hilton (2012)	• Interpersonal: embedded approach to restorative justice • Intrapersonal: meditation, reflective learning journals, • Cognitive: philosophy for children, exploratory talk, thinking and reasoning skills
The applicability of knowledge is neglected in schools. Identification of three themes: • The importance of the perspective/stance of the learner • The neglected role of motivation • The existence of specific, validated techniques: teaching for transfer	Goldstone and Day (2012)	• Rationale for the overarching focus on whole-school transfer — especially the whole-school CPD programme, whereby all teachers engaged in taught workshops on evidence-based teaching and learning methods, and carried out action research projects as a method for trialing and developing learning-centred pedagogy
The importance of 'expansive framing' in promoting transfer	Engle, Lam, Meyer, and Nix (2012)	• Plenaries for transfer
Three bridges for transfer: detect, elect, connect. The importance of motivation and disposition	Perkins and Salomon (2012)	• Plenaries for transfer • Reflective learning journals
Learning by mapping across situations	Reed (2012)	• Curriculum mapping among middle leaders to coordinate whole-school provision, with a view to promoting transfer
The importance of motivation and disposition in transfer — students need the 'will' as well as the 'skill'	Pintrich and de Groot (1990), Perkins and Salomon (2012), Belenky and Nokes-Malach (2012)	• Plenaries for transfer • Reflective learning journals • Identity project • Student autonomy within projects
The importance of 'noticing'	Lobato, Rhodehamel, and Hohensee (2012), Brown and Ryan (2003)	• Meditation • Reflective learning journals • Plenaries for transfer
Transfer as synonymous with L2L: 'the question of how teachers might design learning experiences with transfer in mind is essentially the same question as how to design for L2L (pp. 297–298)	Hipkins and Cowie (2014)	• Plenaries for transfer, reflective learning journals

metacognitive awareness, monitoring and checking progress. Such definitions enabled the identification of roles and routines teachers can use to promote metacognition and transfer (e.g. Leat & Lin, 2003).

Since the turn of the century, a number of further significant advances have been made in terms of the theory and practice of learning transfer. A selection of key recent developments which feature in the planning of the Sea View L2L curriculum is summarised in Table 4.

Transfer at Sea View

To ensure that skills and dispositions developed through the L2L curriculum were able to transfer meaningfully to other subject areas, the team at Sea View devised a whole-school language of learning. This framework is shown in Figure 1, in a 'learner's brain' diagram which featured in every classroom as a large coloured poster, as well as in students' planners. This framework was designed in such a way as to enable students to use the school's core attributes (e.g. teamwork, creativity, determination) to focus on the specific processes that drive learning (e.g. teamwork might include 'share ideas', 'consider others', 'work toward agreement'). The clear message to students was that through practice and feedback, they can 'get better' at any of these processes – thus becoming more successful learners. This framework was met favourably by students and teachers throughout the school, as well as by Ofsted, who noted that students 'can talk about how, as well as what, they are learning. Lessons in "learning to learn" are helping them to do this. They enjoy explaining, for example, which "learning muscles" they are using … They are expected to apply their skills across subjects …' (in order to maintain the school's anonymity, the Ofsted report cannot be included in the references).

This shared language of learning – and the expectation that students and teachers throughout the school would use this language regularly, as a framework for discussing the 'how' of learning – was instrumental in ensuring that skills and dispositions developed through the taught L2L curriculum were able to transfer meaningfully to other areas, enabling students to access higher grades across the curriculum.
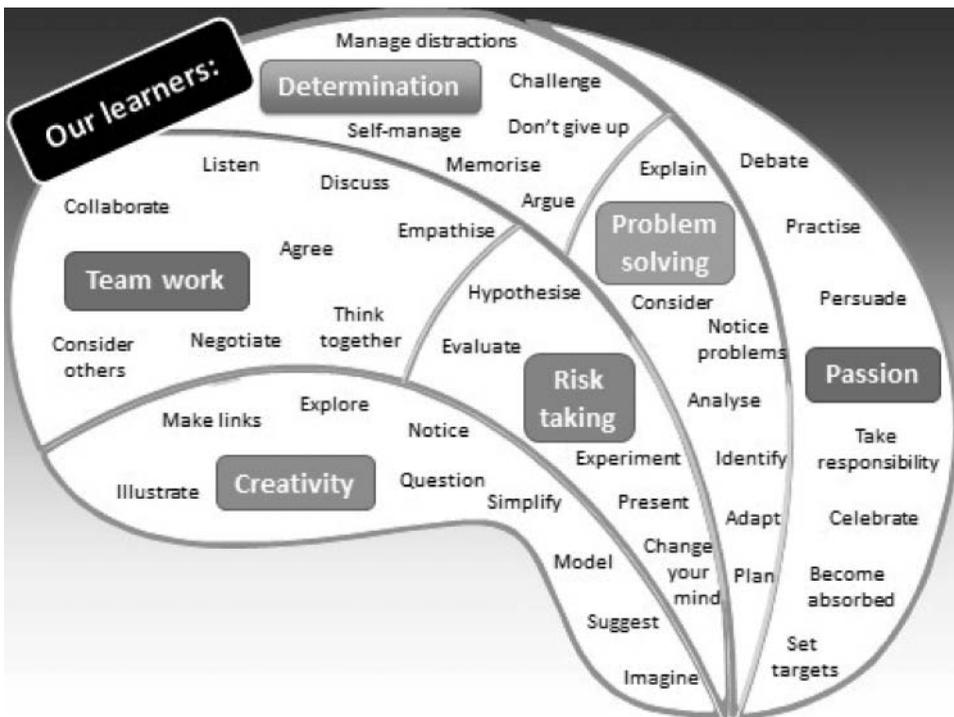

Figure 1. The whole-school language of learning at Sea View (third iteration).

Plenaries for transfer

Throughout the taught L2L curriculum in years 7–9, there was an ongoing effort to encourage students (1) to reflect on their increasing knowledge and understanding of themselves as learners, and of learning itself; and (2) to apply this knowledge and understanding to other subject areas, or to aspects of their life beyond the school gates. Typically, these 'plenaries for transfer' would simply take the form of a single question, followed by think/pair/share – e.g.: 'How might "sharing ideas" help us to learn better in maths?' The L2L team found that students soon became adept at making such connections, even where the similarities between tasks (e.g. between planning an allotment and doing algebra) appeared tenuous at first glance.

Method

As reported above, the L2L curriculum at Sea View was designed and delivered by a team of teachers who already worked at the school, including the first author. The findings of this case study presented here comprise a 3-year longitudinal evaluation, using a combination of pre- and post-intervention measures, as follows.

Baseline comparisons

Demographic data relating to the L2L (treatment) and pre-L2L (control) cohorts are shown in Table 5. Further to this, baseline comparisons were carried out, comparing Key Stage 2 (KS2) Standard Attainment Test (SAT) data at entry (English, maths and science) for the pre-L2L cohort (control group) and L2L cohort 1 (treatment group). As can be seen in Figure 2, the two cohorts had almost identical average SAT scores at KS2, with slightly higher English scores and slightly lower scores in maths and science in the treatment group, compared with the control. The difference in English scores at entry (average 3.79 in the control group, vs. 3.97 in the treatment group) was statistically significant, albeit only just ($P = 0.047$). The authors remain open to the possibility that any subsequent differences in attainment between the two cohorts might be due, at least in part, to this slight difference at entry; at

Table 5. Demographic data relating to the control and treatment cohorts.

| Variable: n (%)	Cohort	
	Pre-L2L (control)	L2L cohort 1 (treatment)
Total no. students	148	118
Gender		
Female	84 (56.8)	69 (58.5)
Male	64 (43.2)	49 (41.5)
Ethnicity		
White British	129 (87.2)	109 (92.4)
Non-White British	19 (12.8)	9 (7.6)
Special educational needs		
None	112 (75.7)	80 (67.8)
School action	19 (12.8)	17 (14.4)
School action plus	17 (11.5)	21 (17.8)
Statement	0 (0)	0 (0)
Pupil premium		
Not eligible	103 (69.6)	81 (68.6)
Eligible	45 (30.4)	37 (31.4)
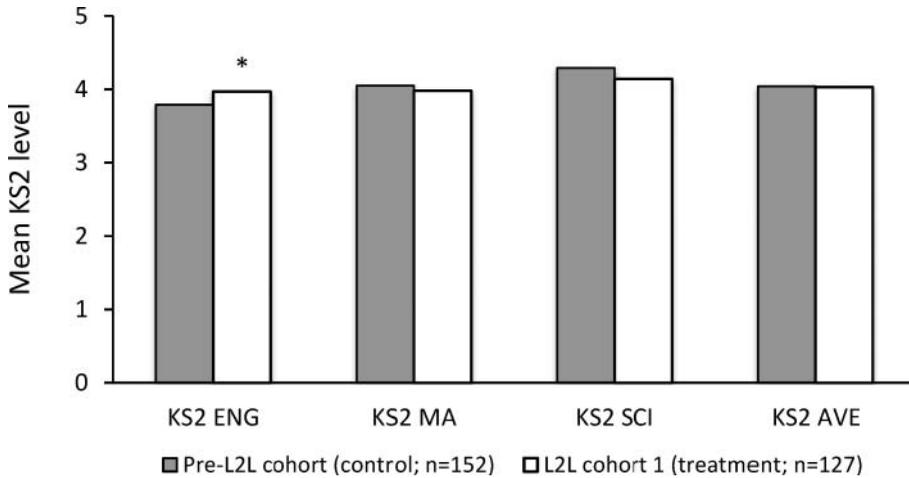
Figure 2. Baseline measure: KS2 attainment at entry: pre-L2L vs. L2L cohort 1.
* Statistically significant difference, vs. control group; $P = 0.047$.

the very least, the potential consequences of this difference at baseline warrant closer examination. We shall return to this point in the 'Discussion' section.

A further baseline comparison of the two cohorts was carried out comparing Cognitive Ability Test (CAT) data at entry. The D-level test was used − a combination of verbal, non-verbal and quantitative reasoning tests, designed as a standardised test for students aged from 10 years and 6 months, to 12 years and 11 months. As can be seen in Figure 3, the L2L cohort had slightly higher scores on average than the control cohort in verbal reasoning, but had lower scores for non-verbal and quantitative reasoning, and lower average CAT scores overall. Both cohorts were below the national average at entry (i.e. an average CAT score of less than 100).
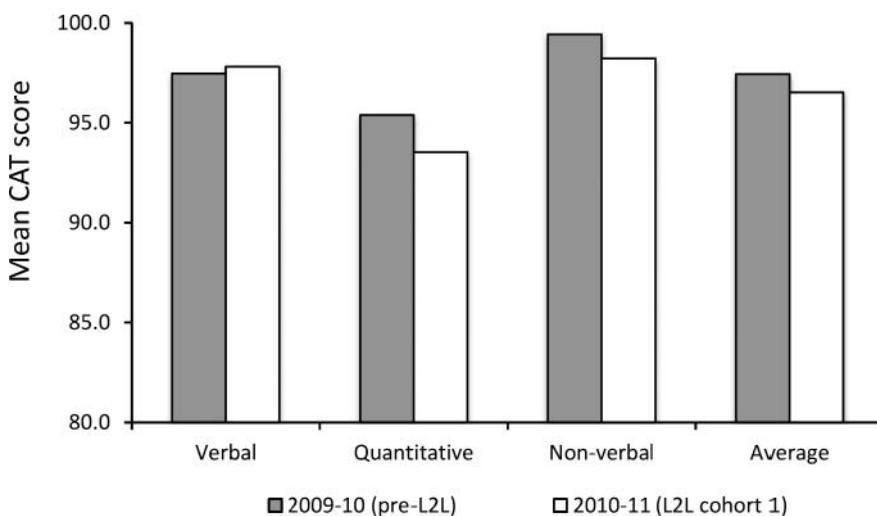

Figure 3. Baseline measure: CAT scores at entry: pre-L2L vs. L2L cohort 1.

Overall subject attainment and closing the gap analyses

The progress of each cohort was tracked using summative assessment data recorded at three points throughout the year (autumn, spring and summer), throughout years 7−9. As well as comparing the academic progress of the treatment and control cohorts, these data enabled a 'closing the gap' analysis, in which the progress of students eligible for the PP (i.e. economically disadvantaged students) was compared with their peers, in each of the two cohorts. By comparing the students' overall attainment with the 'closing the gap' analyses, we were able to determine not only whether the gap closed, but also how (i.e. whether it was from the bottom up, or top down).

Secondary measures

A range of secondary measures were also used to triangulate these primary findings. These included pre- vs. post-year 7 CAT testing; students' entries in their RLJs; student and teacher interviews; and a range of questionnaires. These data will form the basis of a subsequent paper, which will consider *why* the L2L curriculum at Sea View was so successful at raising academic attainment across the curriculum.

Results

Analyses of baseline KS2 SATs and entry level CAT scores were carried out using parametric statistics (independent samples *t*-test), since these data followed a normal distribution. A paired samples *t*-test was used for the pre- vs. post-intervention analyses of CAT scores. For the post-intervention analysis (comparing the proportion of students from each cohort who either hit or exceeded their target grades), the students' attainment data were transformed into a binary code (0 = 'below target', and 1 = 'hit or exceeded target'), and were analysed using a non-parametric method (independent samples Mann−Whitney U test). Throughout the study period, students' target grades were based on the Fisher Family Trust (FFT) D metric (FFT-D is generally seen as an aspirational target grade, since it assumes that the student will achieve the same progress as similar students in the top quartile of similar schools. The use of FFT-D was particularly ambitious in this instance, since the school was in special measures throughout the study period, with higher than average numbers of students eligible for the PP, and an intake that was some way below the national average at entry).

Student attainment across the curriculum

By the end of year 9, there was a significant increase in the proportion of students either hitting or exceeding their target grades in the L2L cohort, compared with the pre-L2L control group. As can be seen in Figure 4, these improvements were even more pronounced among students eligible for the PP (i.e. students from disadvantaged backgrounds). It is worth emphasising that the pre-L2L control group had 400 more lessons of subject learning throughout KS3, making the significant comparative gains in subject learning among the L2L (treatment) cohort all the more remarkable.
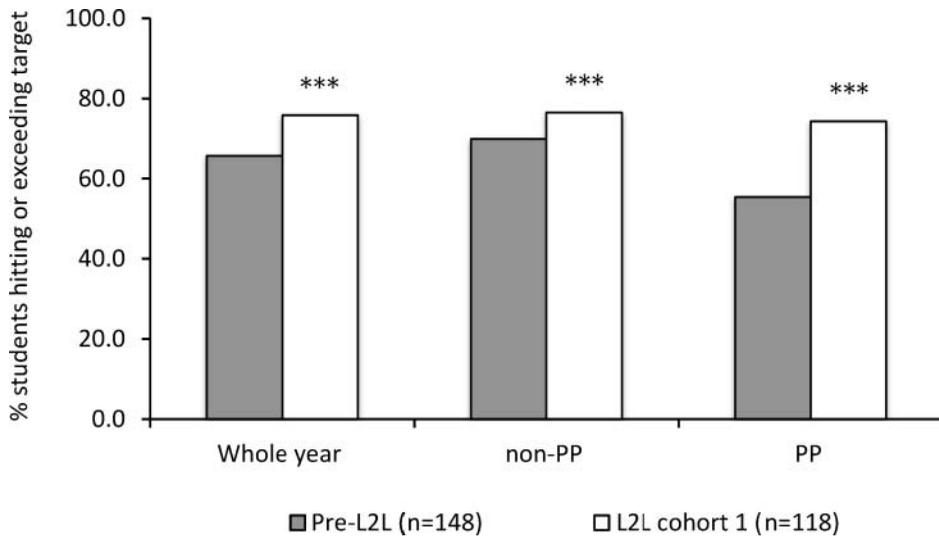
Figure 4. Students' attainment after 3 years: L2L cohort vs. pre-L2L control group.
*** Statistically significant differences, vs. control group; $P \leq 0.001$.

'Closing the gap' analysis

Figure 5 compares the attainment gap between students eligible for the PP and their peers, and shows how this gap closed significantly in the L2L cohort, compared with the pre-L2L cohort (matched control group).
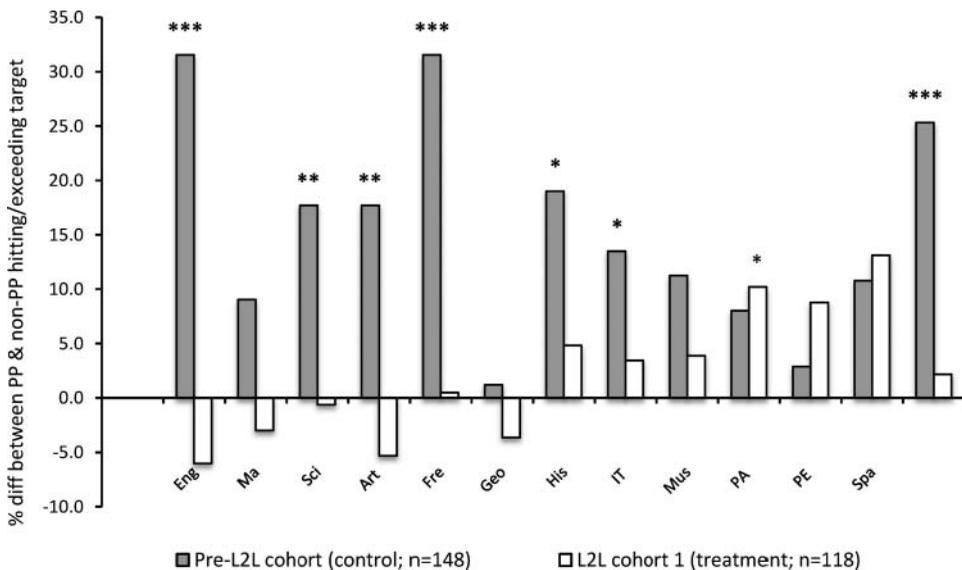

Figure 5. Closing the gap analysis: pre-L2L (control) vs. L2L cohort 1 (end of Y9 data).
*** $P \leq 0.001$; ** $P \leq 0.01$; * $P \leq 0.05$ (statistically attainment gap between PP and non-PP students).
Pre-L2L (control group): PP students $n = 45$, non-PP $n = 103$; L2L (treatment) PP $n = 37$, non-PP $n = 81$.

Most striking here are the data on the right-hand side of Figure 5: when we combine the students' attainment data across all subjects at the end of year 9 (comprising autumn, spring and summer assessments in each subject, for each student), the attainment gap between students who receive the PP and non-PP students was 25% in the pre-L2L control group ($P \leq$ 0.001), compared with just 2% in the L2L group ($P = 0.687$). In 9 of the 12 subjects, the attainment gap between PP and non-PP students was lower in the L2L cohort. In the pre-L2L control group, differences between PP and non-PP students were statistically significant in six of the subjects (English, science, art, French, history and IT) by year 9, whereas in the L2L cohort none of the gaps were significantly different. In five of the subjects (English, maths, science, art and geography), following 3 years of L2L the gap had closed so far that the difference lay in the opposite direction, with PP students outperforming non-PP students.

In three of the subjects (performing arts (PA), physical education (PE) and Spanish) the gap was larger in the L2L cohort. However each of these cases is idiosyncratic. In the case of Spanish (and also French), the number of students taking the subject at the end of year 9 was much lower than the other subjects (around 40 students for each language, with a far lower proportion of students eligible for the PP). Consequently, the data for French and Spanish are less robust than for the other subjects. Interviews with teachers of PA and PE revealed that students' target grades in these subjects are based on academic performance in KS2 maths, English and science. It is broadly accepted that students' target grades (on which this analysis rests) are much less reliable as indicators of future performance in these practical subjects, than for academic subjects such as English, maths, science and the humanities.

Baseline measures

To ascertain whether the closing of the gap outlined above may have been due to differences at entry, the performances of PP and non-PP students at entry (KS2 SATs and year 7 CATs) were compared, in each cohort. In fact, somewhat surprisingly, in the pre-L2L control cohort, PP students performed slightly better in their KS2 SATs than non-PP students overall (see Figure 6). In the L2L treatment cohort however, there was a gap between
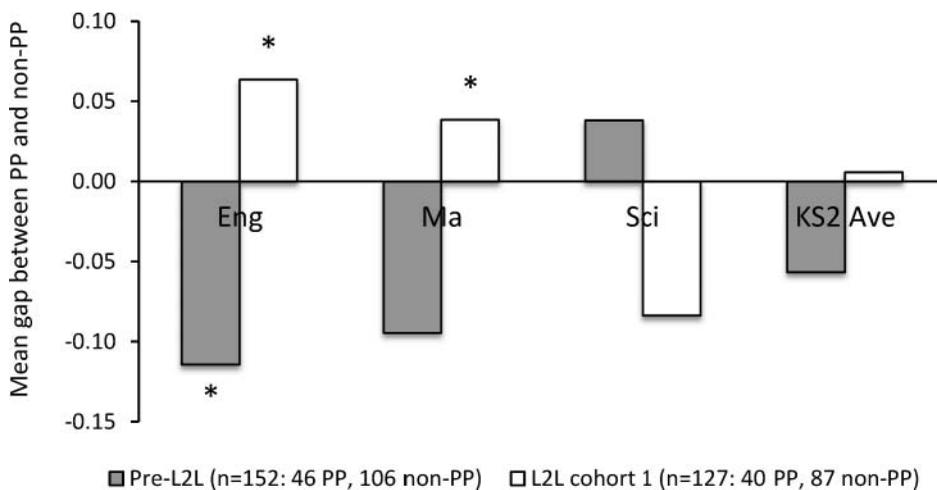

Figure 6. Baseline measure: pupil premium gap at entry: pre-L2L vs. L2L (KS2 data).
Statistical significance: * $P \leq 0.05$ (PP vs. non-PP students, within cohort comparisons).

PP and non-PP students at entry, in line with national trends. When viewed in light of the PP gaps at the end of year 9, this means that the gains of PP students in the L2L cohort relative to their pre-L2L counterparts were even larger than they appear in Figure 5, since the L2L treatment cohort started from a position of greater disparity than was evident within the pre-L2L control cohort.

Discussion

This evaluation of the L2L curriculum at Sea View suggests that, when the attainments of students in the L2L cohort were compared with those of the 'control' cohort from the previous year, this programme was associated with:

- significantly improved attainment across the curriculum (∼10% overall increase in the proportion of students hitting or exceeding their target grades);
- a significant closing of the attainment gap between PP students and their peers (from 25% in the control group to 2% in the treatment group, by the end of year 9).

This evidence of improved attainment, with particular benefits for those in the PP group, appears to validate the decision to implement a combined approach to L2L at Sea View, comprising a taught curriculum in combination with a range of measures designed to transfer and embed learning-centred skills and dispositions throughout all school subjects. It is relevant to note that a recent large-scale evaluation funded by the EEF, incorporating 48 UK schools, found that children who regularly engaged in philosophical enquiry showed gains in reading and mathematics, and that these gains were most pronounced among disadvantaged pupils (Gorard, Siddiqui, & Huat See, 2015). Since weekly philosophical enquiries also formed a core component of the taught L2L curriculum at Sea View, the gains reported here are consonant with these findings. This analysis therefore goes some way to explaining how L2L leads to enhanced subject attainment across the curriculum − by helping students learn how to speak, listen and reason more effectively.

It is the authors' contention that the gains outlined above result from the combined effect of several effective elements of the intervention. These include providing regular structured opportunities for students to develop metacognitive and self-regulatory functioning; an ongoing focus on developing their speaking and listening skills; and a coherent whole-school strategy for promoting the transfer of skills and dispositions developed through the L2L curriculum to other subject areas. Thus, while any one component of the programme might have had a marginal but non-significant effect on student learning, the multifaceted nature of the L2L programme at Sea View means that several such factors may have aggregated and interacted to produce significant overall gains in subject learning.

One important aspect of the L2L curriculum at Sea View, which does not feature centrally in the descriptions above but which was seen as essential to the success of the programme, was that in the day-to-day running of the lessons, teachers of L2L placed great emphasis on helping students overcome social barriers to effective learning. Right from the outset in year 7 there was a consistent focus on helping students learn how to work well in any group they found themselves in. As mentioned earlier, the L2L curriculum included a focus on using talk effectively for collaborative learning. Moreover, whenever students encountered problems in working with others, the L2L teacher would chair a restorative meeting with the group to address the problems. The teacher would ask

simple, scripted questions of each student in turn to discover how the problem behaviours arose, to elicit what had happened and why, and then to guide the students toward an equitable way forward. Over time, the teacher's support diminished as students developed the ability to manage conflicts among themselves.

While initiatives such as L2L are sometimes considered and even dismissed as 'progressive', the ethos at Sea View was to help students develop a range of proactive learning-centred skills and dispositions through traditional teaching methods, including modelling, explaining, providing opportunities for deliberate practice and plenty of high quality feedback, within a culture of high demand and individual accountability.

Why did the pupil premium attainment gap close in the L2L cohort?

As mentioned in the 'Method' section above, although the attainment of the pre-L2L (control) and L2L (treatment) cohorts was broadly similar at entry, there was a small but statistically significant difference in the KS2 English SAT results, with the L2L group having performed better than the pre-L2L group (average score 3.79 vs. 3.97). The authors remain open to the possibility that any subsequent differences in the attainment of the two cohorts may be due, at least in part, to this slight difference at entry. However there are a number of reasons to believe the numerous significant gains that followed were driven, at least in part, by the L2L programme. First, although there was a difference in English, the KS2 maths and science results were lower in the L2L (treatment) group than in the pre-L2L (control) group at entry. However the L2L cohort subsequently performed significantly better in these subjects, compared with the control group. Furthermore, as discussed in the 'Results' section above, there was a statistically significant difference in the KS2 English SAT scores of PP and non-PP students, in both cohorts. Somewhat surprisingly this difference was in favour of PP students in the pre-L2L control group (but not in the L2L treatment group), as shown in Figure 6. By the end of year 9 however, there was a hugely significant attainment gap in English between PP and non-PP students in the pre-L2L control group, in favour of non-PP students (a difference of more than 30% in the proportion of students hitting or exceeding target; $P < 0.001$), indicating significant underperformance among PP students throughout KS3 in the pre-L2L control cohort. In contrast, the gap in the L2L treatment group had closed so completely that PP students were outperforming non-PP students in English by the end of year 9 (a 6% gap in the proportion of students hitting or exceeding target). Looking at the 'closing the gap' analysis more widely, when all subjects were combined, the PP attainment gap at the end of year 9 was 25% in the pre-L2L control group, and only 2% in the L2L treatment group. This difference stands in stark contrast with the modest difference in the attainment of the two cohorts in terms of KS2 English SAT results. It is also worth emphasising that as well as closing the gap, the L2L cohort also performed significantly better *overall* than the pre-L2L control group, with statistically significant improved attainment even among non-PP students. In contrast with interventions that target only PP students, the L2L programme at Sea View appears to have closed the PP gap in an equitable manner, with all students gaining from the programme, and exceptional gains among disadvantaged students.

The teaching and learning practices that comprised the L2L curriculum at Sea View were selected because they have been found previously to be particularly effective at raising the attainment of students from economically disadvantaged backgrounds. For

example, a number of the most effective strategies identified in the Sutton Trust-EEF Toolkit (Higgins et al., 2011), which was designed to help schools decide how best to invest the PP, feature centrally in the L2L approach we developed at Sea View (e.g. feedback, metacognition, peer tutoring, oral language interventions). So while the 'bottom up' closing of the PP attainment gap at Sea View was entirely welcome, it was not unexpected − rather, it simply suggests that the L2L programme at Sea View achieved what it set out to achieve.

The L2L programme at Sea View was a mixed ability approach. Permeated throughout the curriculum were regular opportunities for students to 'think together' and thus learn *from one another*. This process goes both ways. For example, in year 8, students were required to maintain a detailed portfolio of evidence for their 'personal effectiveness' course. Students from bottom sets in particular initially struggled with this, but learned a lot from higher ability students who were typically (though not always!) more adept at organising their work. Conversely, students from lower sets tended to excel at speaking and listening tasks such as philosophical enquiries, whereas high achieving students can sometimes struggle with such open-ended discussions, becoming exasperated because they 'just want to know the answer'. In L2L lessons, all students were required to develop their ability to reason out loud, thinking and working together in pairs and small groups to achieve much more than they could by themselves. The effectiveness of this aspect of the L2L programme resonates with previous research with children aged 10−11, which found that teaching students how to 'think together' in this way raises academic attainment and non-verbal reasoning scores (Mercer & Littleton, 2007).

Limitations of the study and implications for further development

This was a relatively small study, with only 118 students in the treatment group. At the start of the study period, the attainment of students in both the treatment and control classes was some way below the national average. Whether these promising findings can be replicated in schools with different demographic profiles − or even in other schools with similar intakes − remains to be seen. As mentioned in the introduction, this intervention was implemented by a dedicated group of teachers who had been involved in the design of the L2L curriculum, with one of the authors taking a leading role. In a very real sense, these teachers 'owned' the intervention. As also discussed in the introduction, it has been observed that educational interventions typically have strongest effects when implemented by their designers. It would thus probably be unrealistic to expect the kinds of results reported here to be obtained in other schools through a 'top down' implementation of the same teaching strategies and content. Nevertheless, the findings presented here provide a persuasive case for extending this approach to schools if a similar whole-school staff commitment and involvement could be achieved. Whether that would be compatible with the use of a large-scale, randomised controlled trial, to explore whether these outcomes − accelerated learning for all, with particularly significant gains among students from economically disadvantaged backgrounds − can be replicated on a wider scale, is a matter for serious consideration.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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