Research Practice Based Enquiry
Children’s Experiences of Learning Autonomy in Cognitive Acceleration ("Let's Think") in Maths Lessons

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Abstract

This study examines what scope Let’s Think in Maths (based on the ‘Cognitive Acceleration’ approach) has for the development of learning autonomy in students. Qualitative data collection methods were used to research Year 4 students’ experiences of the lessons over a period of six months (N=30). An analysis of the data showed that the LT approach appeared to hold significant potential for the development of learning autonomous experiences in students, but that metacognitive learning and personal agency seemed to be dependent on contextual factors of classroom ethos and the functioning of meta-learning skills. The variables that featured as mediating the production of learning autonomy are explored and discussed. The study concludes by considering the wider implications of a renewed focus on developing learning autonomy in students.
Introduction

Despite significant investment in recent years (Boulton, 2012), educational achievement in Mathematics in the UK remains low in comparison to many other developed nations (PISA, 2012). Advocates of the Let’s Think (LT) in Maths Programme argue that the intervention, formerly known as Cognitive Acceleration (CA), counteracts this trend by raising achievement in students as measured by both curriculum-based assessment and Piagetian-style developmental tasks (Shayer & Adey, 2002; Shayer & Adhami, 2007; Shayer et al., 2007). In addition to producing outcomes of higher attainment, CA has been regarded as having the potential to simultaneously function as a ‘Trojan Horse’ for the development of student ‘learning autonomy’ (James et al, 2007). As such, CA proponents have argued that they have an intervention that holds both ‘professional credibility’ in producing both higher test scores, as well as promoting longer-term aims of education in the development of skills such as metacognition and cooperative learning (Adey & Shayer, 1994; Shayer et al., 2007).

This study explores to what extent the notion of learning autonomy is pedagogically realised and experienced by students in LT lessons. Learning autonomy is defined here as the interaction between notions of ‘self-rule’, with the concepts of metacognition, ‘knowing about knowing’ (Schoenfeld, 1987; James et al, 2007) and self-regulated learning: ‘self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals’ (Zimmerman, 2000:14). Understood in socio-cultural terms, learning autonomy is referred to as incorporating social learning as a key component and as such, distinct from liberal notions of ‘independent learning’ (Meyer et al., 2008). Implied within the concept of learning autonomy are instructional and pedagogical debates around student choice, the role of the teacher and student in learning episodes, and affective-motivational relationships between perplexity, ‘failure’ and conation.

The research was carried out in a middle-attaining maths class (30 students), situated in a school in an area of socio-economic disadvantage. The LT in Maths approach was initially invested in by the school as a means of developing problem-solving and conceptual approaches to learning mathematics. CA was considered to have some scope for countering cognitively passive, procedurally-focussed lessons (Boaler,
To plan and teach in a manner that was pedagogically faithful to the approach, I worked with several LT consultants through participating in the LT in Maths Years 2-4 programme training. This study explores the LT approach from the under-researched perspective of students (Hargreaves, 2014), something which does not appear to have been previously written about in relation to CA (Adey, 2008). Over the course of six months, ten LT lessons were taught with the class alongside the collection of various forms of qualitative data including interviews, observations, questionnaires and journals in order to gauge impact. If learning autonomy is in a broad sense acceptable as a desirable and authentic goal of education (Boud, 1988; Ecclestone, 2002), what, if anything, can be gained from the CA approach regarding the promotion of this lifelong attribute? In consciously propagating a contrasting approach to traditionalist pedagogy, and with research to back up its position, CA brings up wide-ranging questions about the nature of learning, the role of student autonomy in lessons and to this end what effective instruction might look like (Marshall & Drummond, 2006).

Literature Review

The concept of ‘learning autonomy’ closely relates to the idea of students taking agency over their learning and can be understood in the etymological sense of self-governance: developing the capacity to “take charge of one’s own learning” (Holec, 1981:83). It has been asserted that such a learning disposition can be achieved through nurturing students’ ability to ‘learn how to learn’: practices that “encourage learners to be reflective, strategic, intentional and collaborative” (James et al., 2007:28). Developing students’ ability to learn alongside their understanding of subject-content knowledge of lessons appears to be associated with some breaking of the so-called ‘didactic contract’ (Brousseau, 1997), whereby students learn to move away from being solely reliant on teacher support towards states of purposeful autonomy (James et al., 2007). Pedagogical approaches promoting such autonomy are surmised by Laevers (2000:27) as “respecting children’s sense of initiative by acknowledging their interests; giving them room for experimentation; letting them decide how an activity is performed and when a product is finished, involving them in the setting of rules and the solution of conflicts”. In a broader sense, autonomy can of course stretch beyond task-based learning. Ecclestone (2002) for example differentiates between procedural, personal and critical autonomy; the latter of which hints at a broader prerogative of evaluating and questioning the status of the socio-political environment (Friere, 1972).
An emphasis of developing learning autonomy in students is refuted by those who argue that student dependency precedes independency, and that learning outcomes are best achieved through direct instructional models of teaching (Rosenshine, 2009). Advocates of an information-processing model of learning argue that limitations in human working memory necessitate the avoidance of ‘discovery’-type modes of instruction, considered to cause excessive cognitive load (Kirschner et al., 2006). Social constructivist-based theorists however reject such critiques for misconceptualising the role of mediation and scaffolding (Tobias & Duffy, 2009), and deficient in addressing wider goals of socialisation (James et al., 2007). CA authors also controversially suggest that the high student learning gains observed using the intervention are likely in fact to be due in part to a ‘contamination’ effect that the social constructivist approach had on teachers instructional style in other lessons (Shayer, 2008). While CA does not argue that direct instruction has no place outside CA lessons, proponents do appear to be implying that some degree of re-balancing is needed. In amongst such contrasting theories of learning lie huge implications about how much autonomy students should be given and the related roles that teachers and students should assume.

A commonality between both constructivist and direct instruction approaches however, is their shared classification as ‘productive success’ models, based on the premise that shorter-term success in relation to learning outcomes will accumulate into success in the longer-term (Kapur & Rummel, 2012). An alternative model, which in many ways bears a striking resemblance to LT lesson sequences, but without a Piagetian element, is that of ‘productive failure’: the concept that students who are given space to fail at a task go on to outperform students taught through conventional instruction modes. Kapur & Rummel (2012) argue that the allowance for such learning autonomy, where students are encouraged to explore multiple representations and solution methods, as they are in CA lessons, appears to consequentially lead to deeper, longer-term learning. The suggestion is that non-stigmatised experiences of failure allow students the opportunity to reflect and self-regulate their own cognitive processes.

James et al. (2007) asserted that ‘learning how to learn’ and the development of learning autonomy is best associated with constructivist and socio-cultural perspectives on learning. This contention is slightly confounded by findings to suggest that metacognitive thinking can be equally developed in direct instructional approaches (Jager et al., 2005). However, it would seem that from a socio-cultural perspective, a ‘transmissive’ mode of instruction is by definition, unlikely to encompass peer-facilitated autonomous experiences within learning to the same degree (Matusov & Hayes, 2000). In this way, the LT model does appear to present as a fairly unique example of situating socially-based metacognitive learning at the centre of instructional design. It claims to do so through a theoretical syntheses of Piaget, Vygotsky and Feuerstein thought, approaches often presented as dialectically opposed within constructivist theory (DeVries, 2000;
Lourenco, 2002), but that are framed as complimentary (Adey & Shayer, 1994) and reciprocal (DeVries, 2000; Fuson, 2009; Lourenco, 2012). For CA authors, Piagetian developmental tasks provide the stimuli through which students can be accelerated through the cognitive stages. Such tasks are considered best facilitated through a realisation of a Vygotskian understanding of social mediation as a fundamental mechanism of learning. Some influence of Feuerstein’s theory of Mediated Learning Experience is also evident in the structured approach and the emphasis on facilitating metacognitive experiences (Feuerstein, 1996; Larkin, 2010) alongside general constructivist concerns of ‘concrete preparation’, ‘bridging’, ‘cognitive conflict’ and social learning (Goulding, 2010).

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Fig. 1 Goulding (2010): ‘The origins of the CAME theory base’

A common thread in LT that binds the constructivist theory-bases of Vygotsky, Piaget and Feuerstein thinking is the crucial role given to human mediation, considered as a primary cause of metacognitive thinking. The unifying idea is that learners can learn more socially than they would be able to by themselves (Shayer & Adhami, 2002). For Feuerstein, this facilitated for students a means towards subject learning, but crucially also the ‘ability to learn’, something which in turn is seen as increasing students’ readiness for direct instruction (Shayer & Adey, 2002). LT lessons’ emphasis on talk and reasoning again draw on a Vygotskian understanding of language and thought being inextricably linked alongside the notion of learners as ‘cognitive apprentices’ engaging in peripheral, ‘observational learning’ (Lave & Wenger, 1991; Dennen, 2004). Feuerstein argued that the intensity of mediation needed for ‘culturally deprived’ children, those who were crucially disadvantaged in their capacity to learn, had to be proportionally high. Relatedly, Piaget emphasised that while learning could arise spontaneously without adult-led mediation, a significant amount was non-spontaneous and required intervention. Rather than positing the mediatory role in the adult, CA draws on Vygotsky to argue that students themselves can serve this important role of mediation, reciprocally providing support to each other for tasks which fall within a peer’s ‘zone of proximal development’ (Shayer, 2003).
In recent years, the socio-cultural and constructivist model proposed by Shayer and Adey (2002) has been questioned by some, who have expressed doubt about the theoretical explanation for the large effect sizes produced (Leo & Galloway, 1996; Wiliam, 2013a). It has been suggested that CA authors have not as yet incontrovertibly made the case for ‘cognitive acceleration’ to exist as the causal factor for the raised achievement gained in cited studies (Jones & Gott, 1998; Goulding, 2010; Wiliam, 2013a). Other factors such as the nurturing of resilience (Dweck, 2006; Duckworth, 2009) and increasing student talk (Mercer & Sams, 2006; Alexander, 2010; Goulding, 2013) could be proposed as alternative explanations for recorded learning gains. With metacognition and self-regulated learning ranking highly in meta-analyses around impacts on student achievement (Higgins et al., 2013), there is question too around to what extent it is the focus of producing metacognitive experiences that is essentially at the heart of the large effect sizes (Pennequin et al., 2010). However, in such commentaries, there appears equally little evidence on which to falsify the proposed theoretical background and some explanations have been considered dismissible by CA authors (Adey, 1996). Most proponents of the approach appear to be contented with CA as an evidence-based approach towards raising student attainment. Missing from such a view however seems to be an appreciation of to what extent LT holds further promise for the promotion of student meta-learning skills.

The idea of metacognition, a pillar of LT lessons and a key aspect of learning autonomy, asserts epistemological power of knowledge within the learner. Bruner (1996) defined metacognition as knowing the distinction between ‘personal knowledge’ and ‘objective’ knowledge. Through reflective abstraction, learners are presented as being able to evaluate their own thinking in order to make connections with new knowledge and so potentially self-regulate. It is thought that such metacognition is possible from a young age (Flavell, 1979), but also that teachers have found the concept difficult to translate into classroom practice (Larkin, 2008). It seems that complex mediating factors appear to limit self-regulatory behaviour from manifesting (Zimmerman, 2005; Annevirts & Vauras, 2006; Biemiller et al., 2010). These look to be of significance because the relationship between metacognition and self-regulation is argued as critical to the learning of Mathematics (Wong, 2008), problem-solving (Swanson, 1990), as well as for lower attaining students (Pennequin et al., 2010). A Vygotskian understanding of language as inner as well as outer speech also hints at the personal and social nature of metacognitive functioning (Lee, 2011; Martinez et al., 2011; Luftnegger et al., 2012; Thompson & Johnson, 2014). Inner speech is considered as "something new brought in from the outside along with socialisation" (Vygotsky, 1986:126). Shayer (2008: 16) compounds that in CA, “the classroom atmosphere envisaged was one where the teacher mediates the process of reflective abstraction and conflict resolution in the context of Vygotskian-derived collaborative learning".
If developing metacognitive functioning is agreed as a worthy goal, the types of learning that promote such thinking become pertinent (James et al., 2005; Pennequin et al., 2010). CA practitioners describe facilitating experiences of metacognition as being akin to facilitate students’ ‘sifting’ through multiple ideas in order to find those which are valid and reliable (Larkin, 2010). Implied within this view is the contested idea that new conceptual learning is optimally served through providing students with experiences of ‘cognitive conflict’ as a route towards concept attainment (Tirosh et al., 1998; Dekkers & Thijs, 1998; Pintrich, 1999). Vygotsky (1986:188) wrote: “the only good kind of instruction is that which marches ahead of development and leads it; it must be aimed not so much at the ripe as the ripening functions”. Complementary to this is Piaget’s suggestion that humans have a natural propensity to work towards equilibration, and this sets off a process whereby learners work to assimilate and accommodate new understandings of the world (Adey & Shayer, 1994; Fosnot & Perry, 1996). It has more recently been suggested that individual students’ experience of cognitive conflict is ultimately a ‘personal event’ (Hadjiachilleos et al., 2013), where variables of affective, motivational and personal factors are likely to be at play (Sternberg, 1998; Perry, 2002; Lee et al., 2003; Luftnegger et al., 2012).

The LT approach appears to have pedagogical elements that hold some potential for developing learning autonomy in students through centring on the development of metacognitive thinking, a socio-cultural definition of self-regulated learning, giving students some autonomy of choice within tasks, and rooting a sense of interdependence through emphasising student collaboration and mediation (Johnson & Johnson, 2002). In doing so and as “a constructive criticism of normal instructional teaching” (Shayer & Adhami, 2007:1), the guiding principles may demand then, not only an adoption of certain pedagogical content, but possibly too, a reconsideration of classroom dynamics.

**Methodology**

Action research was used as a design methodology for this study (McNiff & Whitehead, 2007): ‘action’ in terms of the implementation of LT lessons over a sustained period of six months, and ‘research’ in investigating its effects on students’ experience of learning autonomy. This study facilitated an innovation in practice, namely the LT approach to teaching mathematics, and investigated the impact it had on students’ self-reported and observed experiences (Koshy, 2010). Due to the descriptively rich nature of such data, an experimental quantitative design would not appear to have been able to meet these aims, and so was
avoided. As a form of teacher-practitioner inquiry, findings would be sought to help improve classroom practice in situ. I would be an active participator in the study, with a unique opportunity to systematically observe and reflect on the learning behaviours of my students through various means of data collecting. While action-research is problematised for some as lacking generalisability, it was the interpretivist methodological position of this study that the dependent variable of ‘learning autonomy’ required data that could attempt to record interactions between the intervention and students’ experiences. Seeking reliability in findings was addressed through triangulating several forms of data collection in order to provide qualitatively rich information (Denscombe, 2010). Since longitudinal experimental studies with large sample sizes have already researched achievement effects in CA lessons (Shayer & Adhami, 2004; Shayer & Adhami, 2007; Shayer & Adhami, 2010), there appeared little rationale for attempting to repeat these on a small scale. While there have already been many such research studies measuring the achievement effects of CA programmes, there were none found specifically looking at student experiences (Adey, 2008).

Despite increased prominence in policy in recent years, student voice and understanding students’ experiences of learning are still considered a neglected field in the literature (Graham, 2012; Hargreaves, 2014), and something believed to be given somewhat of a tokenistic appreciation in many schools (Rudduck & Fielding, 2006; Lundy, 2007). Closer inspection of the ideal brings up complexity around how reliably student voice can be gauged. With heterogeneity of opinions, existent power relations (Taylor & Robinson, 2009), validity and contextual issues, there is debate too about whether a wider concept of pedagogic voice needs to in fact be considered as more of a product than a peripheral element of learning (Arnot & Reay, 2007). Despite such complexities, an evaluation around the ‘effectiveness’ of the LT intervention would essentially appear to be poorer for not having to taken into account the views of students (Rudduck & Flutter, 2010). As McIntyre et al. (2007) remind us, the United Nations Convention of the Rights of a Child charter reasons that “all school pupils have a right to be consulted and to have their voices listened to.” There is research moreover to suggest that this process can be an empowering experience for both students and teachers (Flutter, 2007).

**Data Collection**

Several qualitative data collection methods were used to ascertain children’s experiences of learning autonomy during LT lessons. The following data collection methods were chosen to evaluate what student, peer and teacher perceptions of the lessons were.
Interviewing

Focus group interviews

Six participants were selected to be interviewed and recorded on a fortnightly basis for the duration of the study so as to gain phenomenological insight into the ‘privileged information’ of student views (King & Horrocks, 2010); the ”experiences of participants and the meaning they make of that experience’ (Seidman, 2013:16). The group was ‘purposively sampled’ (Denscombe, 2010; Morgan, 1998) to provide a degree of representation in the class in terms of national curriculum attainment level, ethnicity, gender and personality (Bernstein, 1990). Students were also chosen after having appeared to show some diversity in opinion as expressed during their first reflective journal entry (Morgan, 2013). Through the group interview discussions, wider issues came into discourse around motivational and affective aspects of learning as well as students’ feelings towards different styles of teaching. Interviews then sought to capture description of both students’ ‘external reality’ and ‘internal experience’ (Silverman, 2013).

I became fairly conscious of the importance of non-obtrusiveness in interviewing students and of trying not to lead interviewees to a particular viewpoint (McCracken, 1988; Seidman, 2013). I re-iterated at the beginning of each interview that I was interested in gaining their honest opinions. Delivering these interviews myself as a teacher seemed to provide both benefits and disadvantages. In many ways, I considered myself an ‘insider’ with ‘inside knowledge’, perceiving a good relationship with the students and experiencing the lessons for the first time myself with a genuine interest in the effect on the class (Mercer, 2008). Nevertheless, “individuals have not a single status, but a status set” (Merton, 1972:22) and this was of course likely true of myself and interviewees, whereby students responded to me in part at least as their teacher (Bibby, 2009). On the other hand, participants appeared on several occasions in particular to be quite frank about their positive and negative experiences in the lessons and of learning in general. They were in fact, seemingly openly critical in their opinions, feelings and experiences of LT lessons in the context of learning at school (Denscombe, 2010).

Interviews can be said to have on the whole followed a ‘semi-structured’ group approach, whereby fairly specific topic and questions were decided ahead of time but of undetermined order and length (King & Horrocks, 2010). Planned topics that followed on from certain lines of enquiry were explored during the interview sessions, including discussion around styles of teaching, level of autonomy and choice in lessons, dealing with ‘failure’ and perplexity, the role of the student and teacher; the role of peers as instructional resources, and affective aspects of social learning and metacognition. During most interviews, we first looked at a ‘critical incident’ from the previous lesson through either reading a lesson transcript, sharing a lesson video recording, or simply recalling an event. During group discussions, levels of debate,
disagreement and consensus emerged between participants to which I generally remained an observer, but used probes, paraphrasing or prompts to ensure participation and clarity and inquire whether a ‘joint construction of meaning’ was occurring (Mishler, 1986). It was for this opportunity of gaining ‘non-directive’ and ‘synergistic’ (Stewart et al., 2007) information through diverse views that a focus group was chosen over interviewing individual students (Kvale & Brinkman, 2009; Liamputtong, 2011). One child in the focus group listened actively during discussions but was less vocal than other students. I tried to counter this by specifically allocating her extra opportunity to respond to questions, which she usually did when afforded some encouragement (Arnot & Reay, 2007).

**Interviewing a partner LT practitioner**

At the end of the study, I interviewed a partner teacher who also taught the LT lessons with a similar rationale of comparing experiences the programme and to see whether any correlation existed around perceived trends in findings. Beyond this more formal semi-structured interview, the partner teacher and I discussed the personal challenges of teaching the LT programme and how we felt students responded throughout teaching the programme.

**Lesson Recordings**

All lessons were documented either by videoing or audio recording segments or whole lessons. Segments perceived as relevant to the study were later transcribed and categorised by topic themes such as ‘peer-learning’ or ‘cognitive conflict’. Recording of lessons was particularly fruitful in reviewing whole-class discussion periods and student group work during exploratory work phases. As a limitation, the recordings were unable to simultaneously record the interactions of different groups working in class at the same time.

**Questionnaires**

The questionnaires were designed to ascertain students’ views around issues that related to learning autonomy before, during and after teaching the LT lessons over a six-month period. Questionnaire data was used as part of a ‘multi-method’ approach to essentially qualify the themes arising from the lesson transcripts, focus group interviews and teacher and student journals. Limitations of the questionnaires appeared to relate to those of descriptive and highly structured data collection methods, such as participant motivation, variable question response rates and the prescribed nature of the questions asked (Munn & Drever, 2004). Coding grids were used to analyse the questionnaire data by topic (Gillham, 2007).
Reflective journals

Student reflective journals

Students were given a separate journal from the first LT lesson and were explained that the books were confidential diaries in which they could write down their thoughts and reflections on lessons. It was communicated to students that they could express their views in any means they wished and could illustrate their ideas too if they wanted. Students were given two question prompts at the end of each of the LT lessons through which to frame their ideas. The first was a generic metacognitive question, as laid out in the programme as a plenary convention: ‘what do you think you learned today?’ The second question prompt changed each lesson evolving from a pedagogical issue that was arising in the study such as ‘how did you feel about being confused in today’s lesson?’ A methodological limitation to these responses found in asking individual students about their reflections was that children were often much more fluent in articulating in speech their explanations than they were in their written responses.

Teacher reflective journal

After each lesson, I recorded a short reflection of my experience in a practitioner journal. These written reflections attempted to analyse the narrative of the lesson rather than solely present a recount. The LT ‘pillars’ of metacognition, bridging, social construction, cognitive conflict and concrete preparation were often used as points of reference and were considered in relation to the development of student learning autonomy. Lesson reflections were sent to the LT training course leader (a requirement of the course), who invariably responded with provocative questions aimed at enhancing critical reflection.

Ethical Issues

Ethical guidelines for qualitative research were honoured during the planning and carrying out of this study (Kvale, 2007; Hammersley & Traianou, 2012). Child and parental consent was ascertained before the start of the research through a letter explaining the right of the parent or child to not be included in the study or withdraw at any stage. The data for students whose parents or they themselves objected to being included in the study was omitted from the research. The aims of the study were made transparent to both students and parents and an opportunity was provided for parents to meet if they had any concerns. Lessons were taught roughly fortnightly and were envisaged to complement national curriculum learning in mathematics. Children who were brought out of their lunchtime for interviews were able to choose
voluntarily whether they wanted to participate or not, and it was explained that they could withdraw at any
time. Interview sessions were also kept to a minimum so that children could have some recreational time
after their lunch. All names used in this study were changed for the purposes of anonymity.

Analysis of Results

Data collection in each of the outlined methods were compared, contrasted and ‘condensed’ for
commonalities and themes, which then fed back into the direction and focus of further qualitative data
collected (Miles et al., 2014). Several clusters of themes and sub-topics emerged from this analysis, outlined
below, indicating how LT lessons may have been interacting with perceived evidence of learning autonomy
(Lichtman, 2006).

Metacognition and Cognitive Conflict

Elicitation of cognitive conflict in LT lessons appeared to indirectly contribute to the development
of metacognitive thought. Observational and self-reported data showed that students commonly
experienced feeling perplexed in lessons, and this appeared to relate to the existence of underlying
misconceptions in conceptual understanding. However, the allowance for cognitive conflict to emerge,
coupled with a certain apparent propensity in students to seek equilibration, often seemed to lead to
socially-mediated metacognitive states of thinking in students (Sutherland, 1992). The points of intentional
contention were often brought up by students in discussions during the lessons and in post-lesson
interviews. As Ibrahim observed, perplexity and conflict within the class often led to vigorous class debate:

Ibrahim: I liked that lesson because of the confusion, because there were like two
different answers. So like, I like the class discussions and everyone is like fighting to
get words in.

Hasna: Debating, not fighting.

Ibrahim: And’s that’s why people who got it right had to convince the other people
right. I enjoyed helping them because they wanted to learn. First Mark was no no no,
then I convinced him. Then I gave him hints, then he said yeah you are right. Then he went to tell you.

Eric: If you get everything right, you won't learn anything.

[Focus Group Interview: 5.3.2014]

Usually in pairs or groups of three, students attempted to solve problems presented to them through either spontaneously discovering by themselves that certain employed approaches did not work, or other times through the teacher’s selection of a variety of attempted solutions. Both were reported by many students as occasions where they re-thought their thinking process, and tried to discern which presented approach was correct, more systematic, more efficient, or in what ways also valid. These type of ‘sifting’ discussions appeared to produce more useful metacognitive experiences in students in contrast to general reflections at the end of lesson around what students felt they had learned in the lesson, something they found difficult to do. Whilst these post-lesson reflections were pursued with the aim of students becoming more familiar with the underlying mathematics of lessons, more specific question prompts around comparisons, decisions made, bridging connections, learning behaviours and areas of challenge during the lesson sequences appeared to lead to more thoughtful student responses.

There seemed to be barriers however as to whether metacognitive thinking manifested for students, appearing to be mediated by the degree of cooperation between peers, the clarity of peer-led explanations given, and on occasions through some children not being able to grasp the qualitative difference between the presented example and their own. Nevertheless, the experience of having gone through initial exploration of cognitive conflict, and ‘productive failure’ (Kapur & Rummel, 2012), did appear to increase students’ ability and motivation for engaging in later whole-class peer-led instruction. There was some evidence through questionnaires given at around the mid-point of the study that many of the children self-reported to have thought and talked more about the lessons afterwards with friends and family than they normally would. In this sense, cognitive conflict left unresolved at the end of lessons may not always have necessarily represented the end of a learning episode.

Cooperative Learning

Cooperative social learning seemed to have a strong potential for facilitating metacognitive experiences in students with two main categories of peer-mediated learning in lessons: group cooperative
learning activities, and whole-class discussion; the latter of which was orchestrated by the teacher. In students’ reflective journals, nearly all children wrote that their partner or someone else in the class had convinced or helped them to understand an aspect of the lesson that they were confused on from the question prompt ‘what helped you most to understand the learning in this lesson?’ From the beginning to the end of the study, questionnaire data also supported the idea that most students believed working in a group had the potential to positively aid their learning. In the questionnaires, the most common responses revolved around the idea of others giving new information that they would not otherwise know. In the focus group, children echoed sentiments around the support that their partner provided:

_Gwen: So say I’m in a pair with someone and I explain it my way. Then I look at it a different way, from a different view from how they’re explaining it and then I think yeah that is right, I can’t believe I made that silly mistake. Now I think about what I was thinking then and then I compare it to what I am now thinking._

_Eric: Sometimes you can learn from someone else. Sometimes I look to see what I can find is wrong with my answers. You might have written a certain answer but when you look at someone else’s, you can see a different way._

_Ibrahim: I like it when you’re in pairs and then there are two groups of pairs discussing together. I like it when everyone has a different answer. It helps my learning. I think of them all and then at the end, yeah, I can choose which one is the most right._

[Focus Group Interview: 2.5.2014]

The degree to which cooperative learning skills and learning dispositions were developed in students appeared to impact on the potential benefits of cooperative learning (Watkins, 2009). Some students felt that productive learning depended a lot on their partner’s willingness to collaborate and listen to them. There was of course too variance within and between other classes taught around cooperative learning behaviours and the apparent effectiveness of ‘peers as instructional resources’ (Wiliam, 2011a). Teaching a LT lesson in another class for example, most children thought of effective group work as ‘taking turns’ rather than working together in partnership by reasoning and building on each other’s ideas. Cooperation did on the whole appear to be assisted by perceivably high levels of engagement in lessons, but affective issues around learning behaviours dominated student responses around the drawbacks of such group work. In an early focus group interview, students appeared quite astute to the complex nature of social interactions and as a result saw both benefits and limitations of collaborating:
Ibrahim: Friends are good, but there are issues with working with them. You know sometimes you help them but they say no.. (and disagree). Would they say that to a teacher? No I don’t think so.

Hasna: Because you know my partner, she doesn’t like me helping her because she thinks she’s taking my ideas. But I think you know, maybe another time, her idea could help me. Sometimes, the argument is that we both want to go different ways - my way or this way.

Beth: I think it’s nice to work with each other because you might remember a bit more but sometimes it’s nice to work by yourself. And sometimes it helps if you don’t know what you’re doing.

[Focus Group Interview: 26.2.2014]

Facilitating whole-class peer-led discussion on most occasions did appear to be able to bring about concept attainment in most students, but it seemed this outcome was largely dependent on the skill of the teacher to find a fitting selection of examples to compare and activate discussion around. A partner LT teacher also felt that because they were discouraged from ‘leading’ questioning towards answers, the contingent nature of class discussions meant that a fine balance was needed to orchestrate eliciting misconceptions, pursuing certain student-initiated trails of thought, and knowing when to avoid discussion routes that would lead the class too far astray. The partner teacher reflected that she realised how much she had in the past led class talk, and ‘brushed over things’ as a means of moving through points of confusion in students (Hodgen, 2004). Despite the difficulties of leading such discussions, these appeared on the most part to be crucial for facilitating student understanding:

Gwen: Well to be honest, the thing that helps me most is the discussion. Has anyone noticed I ask ‘why is this?’ ‘Why is that?’ The reason I ask is because there has to be a reason for everything. That’s the purpose of the discussion so that’s why I think discussions are important.

Eric: I was kind of confused. So I was thinking and thinking ‘how did she know how to do it?’ Over and over in my brain. Then I kind of got it. The carpet session was the most helpful part where we learned the most. I didn’t get it until after she explained it to the class and
then I was like, ahh! People started talking about it. On my table I heard some people talking; my partner explained to me and then it made me think more deeply.

Hasna: Arguing is good because you are talking on people’s ideas and then it helps you understand.

Ibrahim: When we have discussions on the carpet yeah, that’s when you’re like, I want the day to be longer. You don’t want to stop.

[Focus Group Interview: 5.3.2014]

For the instances where cognitive conflict was particularly strong, usually towards the end of a lesson, whole-class discussions seemed to be most fruitful towards producing equilibration in students. Since continuing with further episodes of the lessons was dependent on students gaining conceptual understanding, it was crucial that a critical mass of the class had filtered the ideas presented and grasped the learning enough to be able to move on. Simple voting assessments were often employed to gauge whether agreement had been reached, and demonstrated that in most lessons, social learning did appear to have taken place. This process was demonstrated on one occasion when after a child heard an explanation of division by a peer at the front of the class, they spontaneously stood up and adjusted their previous written answer:

Gwen: We of course, divided it by two, but Mr Rolls gave us a clue - they both like to have the same thing. So we sorted their sweets out by their pattern. So like they’re partnered with each other. So we made here [pointing to scribble on paper] a kind of mistake.

[Mustafa comes up to write half on his paper being shown on the board]

Mr Rolls: Mustafa, why did you come and write half there?

Mustafa: Because half of 12 equals 6.

Mr Rolls: It’s interesting that when she was talking, you came and wrote it.

Mustafa: Basically. What I thought she said was that they were actually sharing it, which I realised was actually the same as half, so I wrote it down.

[Lesson transcript: 5.3.2014]
Feedback

Non-judgemental teacher, student and peer feedback appeared necessary for the facilitation of student learning autonomous experiences. During discussions with other LT teachers, they initially reported finding it difficult not to lead or praise - seemingly common and established practices (Henderlong & Lepper, 2002; Van de Bergh et al., 2013). Non-affirmation of student responses from the teacher did seem to be important towards promoting an increased level of reflection in class and group discussion. By not being suggestive about the validity of answers, students were encouraged to make a decision for themselves, and so appeared to be engaging more in self-regulatory rather than adult-led feedback. The result appeared to be that an increased amount of dialogic learning and student talk could be observed in lessons where students for example debated and argued points of contention, rather than fixating as much on finding a particular answer. In fact, this became true to such an extent in one lesson on multiplicative reasoning, that student-led dialogue in the class grew very prolonged, and I struggled with balancing how long such exploratory and seemingly beneficial debate should continue for. A child in the focus group later answered that such discussions had to ultimately be limited by the teacher because otherwise "it can go on for like two months, or two years...!"

*Ibrahim*: Yeah there’s no right or wrong answers so the teacher wants to know what you think, so you understand.

*Hasna*: You’re wasting too much time because you’re talking too long on the carpet, so you can’t work in your books.

*Eric*: No, because that’s where you get the discussion and arguments.

*Hasna*: [Our headteacher] checks our books. She doesn’t check our like carpet arguments.

*Gwen*: Yes she does, sometimes..

*Eric*: If we have the arguments, it’s like, less time on the books, and you understand it more.

*Hasna*: Yes I agree, I’m going to reject my point and agree.

[Focus Group Interview: 5.3.2014]

Through discussion and in their journals, many students reflected that they felt peer feedback should be kind, and that when they perceived it as threatening, it distracted them from their learning (Butler, 1988; Stern & Backhouse, 2011). After this specifically came up through the focus group, as a class, we were able to address this point through further discussion and modelling around cooperative group working skills and protocols.
Classroom Ethos

The impact of the LT teaching strategies were then seemingly dependent on a wider classroom ethos. Producing learning equilibration through student-led feedback was one of the most challenging aspects of teaching the lessons. Orchestrating student conceptual understanding through whole-class discussion was particularly difficult at first as the class had developed a pre-existing ethos around respecting different perspectives and multiple solution representations (Boaler, 2013). Since peer-led social construction is bestowed such a critical role in LT lessons, when discussion produced a wide variety of opinion, a hierarchy of views were not always easy to discern for the students and did not always seem to clearly provide scaffolding towards higher learning. On occasion, it appeared to become unclear for conflicted children to gauge which ideas were more valid than others. In one particularly challenging lesson on measurement, students for example needed to be convinced that double the length of a joined ‘4-dot line’ was a ‘7-dot line’. I realised that with the intention of encouraging children to share their different perspectives on solving problems, I may have inadvertently strengthened position-taking, where students felt they needed to assert a certain view and then seek to defend it (Khan et al., 2005). This proved to be a hindrance during some lessons taught during the study because students who carried the misconceptions being targeted became concerned with arguing their viewpoint rather than being reflective and open to their peers, who in turn grew increasingly exasperated at not being heard (Kuhn & Pearsall, 1998). Hana reflected: “Some people were a bit stubborn! So when me and Gwen tried to work it out. I kept telling them - we are counting the spaces not the dots... so now what do you think the answer is?” After the lesson, I questioned in my lesson reflection whether those children finding the targeted learning difficult were then in fact experiencing cognitive conflict at all.

Fixated on their own viewpoints, a few students were unable to evaluate their concepts alongside the competing and valid ideas of their peers. ‘Cognitive conflict’ perhaps cannot be said to have occurred for these children. If so, any metacognitive thoughts they did have would have simply been based on incorrect ideas.

[Teacher journal entry: 5.3.2014]

A major theme then of encouraging student reasoning within the LT approach was understanding the multiple layers of influence that learning ethos of the class seemed to exert. Moving beyond debate and dialogue as an end in itself, it became apparent that implied within a productive learning ethos has to be a shared attitude of open-mindedness and reflexivity about personally held views (Posner
et al., 1982; Kesselring & Muller, 2011). Without this, identifying with thought concepts appeared to have the potential to block the very contrasting views that were necessary for assimilation and accommodation-type processes to take place (Tirosh et al., 1998; Vosniadou, 2007).

**Student Voice**

The process of gauging student voice itself seemed to contribute to a sense of student autonomy in those consulted with by engaging with their expressed views around the types of learning they were experiencing. On being asked through questionnaire and in the focus group, students were generally positive about their experiences of learning in LT lessons, with a large majority feeling it had benefitted their learning, although most children found it difficult to iterate what aspect of mathematics they had specifically improved in. Beyond this, I felt that affording students a voice to communicate their ideas was crucial in attempting to create an autonomy-promoting learning environment. Students appeared to be energised about being interviewed, with many asking to be part of the focus group and those involved asking keenly when the next session would be. A degree of co-construction about the effectiveness of the programme could then be explored through more in-depth focus group discussion alongside students’ reflective journals and general classroom dialogue. These suggested to me that tangible benefits of student feedback and an increased sense of democratic participation could be reaped from affording students a voice and where adjustments to lessons could be made as a result of the consultation process. Specifically, through raised issues, a greater sense of equitability was encouraged in class discussion, non-judgemental cooperative peer interactions were modelled and discussed, and students’ capacity for reflexivity appeared to show some improvement over the six months of teaching the LT lessons (Jonassen, 1999; Gillies & Ashman, 2003).

Interviewed students were clear on the contrasting types of mathematics learning that they felt were disengaging or non-beneficial to their learning. On the whole, they were mostly critical of teaching that took a teacher-led, direct instructional approach - one in direct opposition to the LT approach and the more inquiry-based mathematics lessons they had experienced. In one focus group interview in particular, students seemed to exhibit some signs of critical autonomy in relation to the role of the teacher (Ecclestone, 2002):

*Hasna: The thing is with the teachers, they try to say everything and so you don’t have time… but the teachers, they could say less, for the children to say more. They do know a lot, but they should say less because let’s say it was them ten years before, they wouldn’t*
want their teacher to say everything because they would want to be learning. You’re not really learning that much because the teacher’s just giving you everything.

[Focus Group Interview: 24.3.2014]

Through questionnaire data too, most students showed a strong preference for rich active learning contexts (Hattie, 2011). However; some respondents expressed a liking for a variety of instructional styles without a singular preference. Students expressed that they generally felt that their opinions should be taken account of, though there was some debate as to the degree of autonomy students should be afforded. In the focus group, Gwen felt particularly strongly that as students were central to the purpose of education, they had observable rights. Child I (see below) debated with her that it is right for teachers to have an authoritative role in classrooms.

Gwen: Sometimes the teachers don’t take our opinions, but we are the teachers’ job so they have to take our opinions. Do you think that should be into the curriculum or the law? You know teachers make choices for us even though we don’t have a say. But we are the teachers’ job. We are why the teacher is here. So do you not think they should take in at least some of our ideas?

Ibrahim: Yeah but whatever the teacher says, you have to do because they are here to help you learn something so they teach you something.

Gwen: Maybe teachers and students should be equal with an equal amount say. Actually I think a little more kids...

[Focus Group Interview: 2.5.2014]

Discussion

A prominent theme from an analysis of the data seemed to be that while LT lessons had many aspects that associated positively with the concept of learning autonomy, these did not operate in a vacuum, and could not be easily understood as separated from the classroom context in which they were introduced (Matusov & Hayes, 2000; Dennen & Burner, 2008). The mediatory context of the classroom: the individual students, the class ethos and the skill of the teacher all appeared to have a deciding influence on
the effectiveness of the LT pedagogy as autonomy-promoting (Kyriacou, 2001). The following table was designed to capture the relationship between these key aspects of the data where autonomy-promoting features of LT lessons were mediated by concurrent factors that shaped the actual experience of learning autonomy by students (Van Velzen, 2012). An attempt is made here to synthesise the theoretical intentions of the pedagogical approach with the challenge of implementation within a classroom setting (Ghaye & Ghaye, 1998).
### Autonomy-promoting aspects of LT lessons

<table>
<thead>
<tr>
<th>Function</th>
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<tbody>
<tr>
<td>Success of learning mediated by degree of interdependence and cooperative functioning of class or pair (Butler, 1988; Johnson &amp; Johnson, 2002; Baines et al., 2010)</td>
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**Exploratory talk and reasoning in pairs and related peer feedback**

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<tr>
<th>Mediated by</th>
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<tr>
<td>Promotes learning autonomy through social facilitation of learning and metacognitive thinking and through ‘observational’ or apprentice-type learning (Lave &amp; Wenger, 1991).</td>
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**Teacher feeds back to student responses non-judgementally and without praise.**

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<thead>
<tr>
<th>Mediated by</th>
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<tbody>
<tr>
<td>Promotes metacognitive thinking in children by not giving ‘clues’ as to which answer is correct. Encourages students to reflect by themselves on the validity of presented arguments. Challenges traditionally established roles of student and teacher, and learner passivity (Van de Shaaf et al., 2013).</td>
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**Problem posing and planning. Peers model suggestions for ways to solve a problem at the front of the class.**

<table>
<thead>
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<th>Mediated by</th>
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<tr>
<td>Elicits open-ended discussion around what constitutes quality through the use of exemplars.</td>
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**Within activities, students have the choice of how to go about solving a given problem.**

<table>
<thead>
<tr>
<th>Mediated by</th>
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<tbody>
<tr>
<td>Encourages collaborative problem solving skills such as conjecture and rationalising, paired discussion, reflection around progress and autonomy of choice (Swanson, 1990; Kohn, 1993).</td>
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</table>

**Dialogic style of learning during whole-class discussion.**

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<th>Mediated by</th>
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<tr>
<td>A conscious move away from didactic Initiation-Evaluation-Response style questioning (Wiliam, 2011a) towards shared dialogue in the class led by students and facilitated by the teacher as needed.</td>
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**Discussion and comparisons of multiple representations and solutions to problems.**

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<th>Mediated by</th>
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<tr>
<td>Encourages meta-cognitive ‘sifting’ of information through the presentation of a hierarchy of student examples and reflection around the strategies used (Sternberg, 1998).</td>
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</table>

**Second and third episodes of lessons following on from first episode allowing students to use their newly gained understanding in a different situation.**

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<thead>
<tr>
<th>Mediated by</th>
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<tr>
<td>Facilitates bridging and metacognitive self-regulatory skills through the application of conceptual knowledge.</td>
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</table>

**Plenaries around what has been learned in the episode and what relations exist with other LT lessons.**

<table>
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<th>Mediated by</th>
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<tr>
<td>Bridging the concrete context to mathematical principles and concepts and nurturing a relational understanding of mathematical ideas.</td>
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**Discussion around the programme promoting reflection around modes of learning in mathematics.**

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<th>Mediated by</th>
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<tr>
<td>Allowing student voice to be expressed about classroom learning and styles of instruction.</td>
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Fig. 2: Factors that mediated the functioning of learning autonomy in Let’s Think in Maths lessons

The extent to which students experienced learning autonomy appeared then to relate to several different layers of context. As James et al. (2007) had postulated, learning autonomy seemed in large part to be preceded by the development of meta-learning skills, and these in themselves necessarily associated with
the ethos of the class and the degree to which this ethos had a moulding effect on individuals within the
class. To deconstruct the multitude of factors seemingly at play when considering learning autonomy in LT
lessons, James et al.’s (2007) terms for understanding Assessment for Learning (AfL) have below been
adapted and expanded on in relation to LT. In their original proposition, James et al. (2007) argued that AfL
could be considered as a tool for facilitating ‘learning how to learn’, and this in turn would lead to developing
learning autonomy in students. The themes from an analysis of the data of feedback, cognitive conflict,
cooperative learning and dialogic teaching are represented in the outer section, informed by the LT
pedagogical hallmarks of multiple representations and solutions, social construction, bridging and beginning
lessons with a concrete preparation stage. These are shown as in turn being reliant on several aspects of
classroom ethos and student meta-learning skills seemingly mediating the resulting outcome of
metacognitive experiences. Teachers and students seemed to be required to assume a non-judgemental role
in instruction (Butler & Winne, 1995), students needed to adopt an open-minded position towards
contested ideas (Kang et al., 2005), and teachers had to move beyond didactic-type interactions towards
empowering students to themselves be instructional resources (Hargreaves, 2007; Wiliam, 2011a). It is
suggested then that in the LT in Maths lessons, metacognitive experiences of planning, evaluating, self-
reflection and self-regulation (Pulksteinen & Pulkkinen, 2001) were most effective when insulated by these
supporting factors. Students seemed to learn most effectively when they were also developed in their
learning habits: being reflexive, reciprocally collaborative, persevering in the face of initial task failure, and so
assuming a growth mindset over simply trying to be seen to perform (Watkins, 2010; Dweck, 2006; Abiola &
Dhindsa, 2011).
A seeming parallel appears evident in LT lessons between the requirement for both students and teachers to adapt to different extents by engaging in the approach. Students had to habituate to predominantly relying on themselves and each other in order to resolve various phases of cognitive conflict, and teachers had to work out how to facilitate this occurrence (Perrenoud, 1998). It is perhaps this challenging of established norms of instructional relationships that remains one of the most intriguing aspects of the LT approach. Indeed, an untold narrative around this study was the LT training programme and the teachers met on the course that were attempting to introduce LT lessons in their own classes and schools. Research around this teacher development perspective of introducing new pedagogical interventions such as LT in mathematics would possibly shed further light on how, beyond important teaching ‘pedagogical content knowledge’ (Ball & Bass, 2000), teachers are able to realise a shift in the learning atmospheres of their classrooms (Hodgen, 2005; James & McCormick, 2007).

There were various methodological limitations to the research. While rich data was seemingly produced from focus group interviews, and although an attempt at representation was made, their opinions could not of course fully embody those of each member of the class. Since as a class we had also invested time through the year looking into how to create an effective collaborative learning ethos, it was at times hard to decipher to what extent students had assimilated certain shared class views that were then expressed in the study. Further research with a focus on learning autonomy in LT lessons, with a more extensive sampling size may offer further exploration of the ideas presented in this study. Other areas worthy of further research might be testing within the LT approach how the intervention interacts with student personalities, motivation and attributional styles (Weiner, 2000; Larkin, 2010; Dweck, 2006), gender (Frankel, 2007; Croussouard, 2012; Boaler, 2013), cultural backgrounds (Hartman, 2001) and reported positive associations of bilingualism with metacognitive executive functioning (Calvo & Bialystok, 2014).

While debates in education will perhaps continue around which instructional models of teaching hold the most promise for raising student attainment (Mayer, 2004; Tobias & Duffy, 2009), the findings of this study seem to suggest that the premise of such dichotomising is inadequate in fully representing the relevant wider issues involved. As well as asking which approaches create the highest attainment effect sizes (Hattie, 2011; Higgens et al., 2013), we perhaps need to question what kinds of contrasting and multiple effects are produced therein and what factors of implementation make an intervention successful. Such is the case with
meta-analyses and rankings of educational initiatives that rank Piagetian programmes such as LT (Hattie, 2011) that they could perhaps falsely give the impression that the teaching approach alone produces particular outcomes (Wiliam, 2013b). The data offered in this study supported an idea to the contrary that it was the implementation and the context of implementation that was also seemingly crucial to the success of the intervention (Gutman & Schoon, 2013).

Conclusion

The LT in maths lessons were evidenced in this study as holding significant potential for developing student learning autonomy through their facilitation of metacognitive and self-regulated learning experiences. The developmentally challenging tasks appeared to serve well as ‘obstacles’ (Derry, 2013) for which cognitive conflict and so deeper reasoning and reflection on used strategies could prospectively take place (Russell, 1981; Paris & Paris, 2001; Derry, 2013; Meyer, 2013). These in turn seemed to promote cooperative learning as a mode of problem solving, autonomy of choice for students, and dialogic styles of learning as a means of refining generated ideas (Hope, 2002; Baines et al., 2010; Pritchard & Wollard, 2010; Stern & Backhouse, 2011). However, the potency of students’ metacognitive learning experiences did seem to be inherently reliant on meta-learning capabilities (Claxton, 2002), and the context of a supportive classroom ethos. To maximise learning, students had to realise the importance of group reciprocity and interdependence (Galton & Williamson, 1992; Johnson & Johnson, 2005; Gillies, 2007), engage in cooperative and magnanimous interactions (Mercer & Sams, 2006), and personally adopt a certain openness towards new information that could contradict held ideas (Fisher, 1998; Kesselring & Muller, 2011). Affording students autonomy in this study was not akin to unrestricted freedom of choice (Ryan & Deci, 2006; Lewis & Vialleton, 2011; Irwin, 2012), but rather some necessary sharing of control and a role of orchestration on the part of the teacher (Benson, 2010; Holton & Clark, 2006).

As well as an important instrumental means to academic success (Adhami et al., 1999), the development of learning autonomy in students can be considered as broadening in terms of simplistic notions of intelligence (Fisher, 1998; Laevers, 2000; Coffield, 2014) and holding wide implications for children’s socialisation (Bleazby, 2006; Snape & Fox Turnbull, 2013). With global changes afoot, it has been suggested that it will be the co-development of the non-cognitive skills hinted at in this study, that will be essential for the success of learners in the future (Gutman & Schoon, 2012; Jackson, 2012). Complex communicative and collaborative skills (Sondergaard & Murthi, 2012), resilience (Lee-Duckworth, 2012),
reflexivity and creativity in problem-solving (Costa & Kallick, 2008) seem to be increasingly recognised as areas of key competency for future employees (Heckman et al., 2006; Carneiro et al., 2007). Should such trends prove true, the current socio-political structural rather than pedagogical emphasis in schools (Alexander, 2011), may be looked back on as being somewhat limited (Coffield, 2014). This study concludes in acknowledging the challenge of developing student learning autonomy but also by suggesting its significance (Gifford, 2005; Hacker et al., 2009).

While western societies strongly subscribe to ideals around democratic participation, these would seem to imply that populations are brought up with a critical and formative ability to interact with their socio-political context autonomously (Friere, 1972; Aldag & Fuller, 1999; Mayer, 2009). We might question then what routes exist for developing these qualities in our citizens of the future? Metacognitive thinking has been theorised as a continuum from the earlier stages of self-monitoring and adaptability, pointed to in this study, towards possible longer-term goals of critical autonomy as a reconstruction in views of the world, oneself and knowledge itself (Barnett, 1997). It is questionable whether our education system currently values learning autonomy in itself as an unmeasured outcome, and whether employable approaches such as LT, are critically evaluated in terms of their potential for developing non-cognitive skills. It could be contended that only with this intention of developing autonomous and socially-equipped lifelong learners in mind that as educators we can start to make claim to ‘preparing our students for a world we cannot possibly imagine’ (Wiliam, 2011b).


Appendices

1. Focus Group Transcript Excerpts

26.2.2014

Mr Rolls: What did you think of that lesson?
Gwen: It was a bit crazy.
Hasna: Yeah, and you kept adding so much stuff each time. The boy and the girl came and then it was three - the brother and the two girls.
Ibrahim: Yeah I liked that
Mr Rolls: So when we kept adding to the complexity, what did you think?
Ibrahim: We kept going to a different step. Say if you’re here yeah and you want to get here yeah, but you just stay here, it’s so easy for you, then what’s the point of learning.
Gwen: Just like walking a bridge
Ibrahim: You have to walk forward
Hasna: Like Mr Rolls says, it doesn’t matter about the answer, it’s about how you worked it out.
Man: You’ll learn from the mistakes.
Ibrahim: Yeah because no one’s perfect. Say if you got them all right.
Hasna: Some people do wanna be perfect.
Ibrahim: So like in one lesson, I was like, this is so easy, I’m going to get them all right so I just kept on doing it. Then I just realised, I’m not learning anything because it’s too easy so I should get something hard.
Mustafa: You should get some challenges to get something harder.
Ibrahim: The thing I liked about the lesson you did on marbles, we didn’t do the same thing, we kept adding stuff to it.
Mustafa: And with the cars, we kept on challenging ourselves.
Gwen: Now that I’ve tried Ms White’s class, it’s totally different. You know those other teachers, they show you how to work it out.
Eric: Like Ms Williams. She’s like, first you blah blah blah, then I’m like puhhhhhhhff…
Mustafa: And Ms White just shows you - and just says, this is how you work it out, especially the method and this is how you do it.
Gwen: In Ms White’s class, it’s all about getting the right answer because I got one answer wrong and she was like: “[sarcastic voice] no Gwen, you do it this way” and some people were smirking at me.’
Mr Rolls: And how did that make you feel?
Gwen: Er a bit er embarrassed. Angela and Tariq were smirking at me, and I said, “at least I’m learning.”
Eric: If the teacher tells you how to do it and then the next day they tell you again do this and this and this and it’s like arghh… [giving-up action]. It’s a waste of time because I already know it. We don’t have to go over it again, again and again.
Ibrahim: You know yeah like we’re doing a lesson yeah, and other people find it easy and we don’t find it easy and they want to go to another level. Just to be sure yeah, don’t believe them because sometimes they’re just saying they find it easy when they don’t. You don’t know what they’re thinking.
Gwen: I’m not sure no one would say that.
Ibrahim: Yeah other people are doing that - because once I did that. Once I was sitting next to someone, I saw he was finding it hard, even though he didn’t know what he was doing, he didn’t want to say.
Mr Rolls: You were really honest there Ibrahim and you said you did that once - why was it you felt you had to?
Ibrahim: Because first I thought, yeah I wanna skip this lesson yeah and then a couple of days later yeah, you did the other lesson that was related. If every lesson was different, then I felt I’m going to get everything wrong.
Mr Rolls: So you feel lessons are good if they build on each other?
Ibrahim: Yeah…
Mustafa: Some people find it hard but sometimes don’t go on the carpet because they don’t
want to like be shamed by their friends because they don’t know what to do. Because their friends may say - ‘you don’t even know that?’

Gwen: Yeah but you’re learning! That’s all that matters.

Mr Rolls: Do you think people do worry about that in our class?

Mustafa: No.

Gwen: You already said it.

Mustafa: Sometimes.. I’m not really sure but some people do feel like that.

Ibrahim: If they still don’t know what to do, give them an example, with the instructions.

Eric: You could have a table for people who are stuck with maybe one person who understood there to help them.

Mr Rolls: Do you remember one part of the lesson when Gwen was speaking and then Marcus came up and changed his answer?

Beth: I think it’s nice to work with each other because you might remember a bit more but sometimes it’s nice to work by yourself. And sometimes, you don’t have a clue on what you’re doing.

Gwen: So imagine I’m working with Hasna, making 8ths with a paper and then Hasna says no no no, and then this big argument starts.. ‘this is my tissue’. the argument is that we both want to go different ways - my way or this way. By the time we have stopped arguing, it’s the end of the lesson.

Eric: So instead of arguing you should share.

Mr Rolls: If someone has a different point of view than you is that helpful?

Gwen: Ah yeah it does.

Beth: Er sometimes because you can learn more sometimes.

Ibrahim: You know sometimes you help them read and then they say.. I said that.. I said that… and when you’re trying to help them, they say no.. Would they say that to a teacher? No I don’t think so.

Ibrahim: Choice yeah - sometimes you got no choice. The teacher’s teaching you something, if they give you choice, you just do anything so what’s the point.

Beth: About choice, I think sometimes it’s good for the teacher to tell you what to do and sometimes it’s better for you to choose.

Gwen: So it’s just that Ms White today got some answers wrong and the class got it right. When we look at Mr Rolls, he gives us a choice.

Mr Rolls: What choice do you feel you are given?

Gwen: You give us choice. But remember that marble lesson, I think you gave us too much choice.

Mr Rolls: So how did you feel about the confusion in yesterday’s lesson?

Hasna: It was really good because we could gain more like er, work on that. Some people like getting everything right so they can be star student…

Ibrahim: No one was star student.

Hasna: Yeah no one is star student, but they want to be, that’s the thing. Just say it’s really easy… You’re challenging yourself.

Ibrahim: I liked that lesson because of the confusion because there were like two different answers. So like I like the class discussions and everyone is like fighting to get words in.
Hasna: Debating, not fighting.
Ibrahim: And that’s why people who got it right had to convince the other people right. I enjoyed helping them because they wanted to learn. First Mark was no no no, then I convinced him. Then I gave him hints, then he said yeah you are right. Then he went to tell you.
Gwen: Some people were a bit stubborn. So when me and Grace tried to work it out. I kept telling them – we are counting the spaces not the dots and what do you think the answer is? 8. Where did you get 8 spaces from?
Gwen: You know [the LT consultant], who was there to observe us. She went around and talked to us about this, talked to us about that. I don’t really mean to be rude, but she was sitting down and talking to the class and like ‘when are you finished?’ But the way the consultant was talking to us, it’s more important that us kids are talking so we’ve got the question haven’t we? I’m not sure she should be interrupting like that.
Ibrahim: [shakes head vigorously] I actually liked it because she encouraged us. When Gian was at the board, she was encouraging us like that’s her job, she’s trying to teach us. Interfering is something else. That’s like next level yeah.
Eric: With Gwen’s idea, I kind of disagree. She’s trying to make us understand.
Gwen: The point of this is that we have to work it out ourselves.
Beth: The teacher’s trying to help you understand the question. But some children get confused at finding the answer. Sometimes teacher should help, and sometimes, you should do it yourself.
Eric: But the teacher tells you do this, this and that. And then when you go through it later, you’re like... ah I remember what it’s like, you do this and this.
Hasna: The thing is with the teachers, they try to say everything and so you don’t have time. I’m not pointing to you Mr Rolls... but the teachers, they could say less, for the children to say more. They do know a lot, but they should say less because let’s say it was them ten years before, they wouldn’t want their teacher to say everything because they would want to be learning. You’re not really learning that much because the teacher’s just giving you everything.
In terms of cog conflict at end of lesson, 7 children still not sure.
Mr Rolls: What do you think a teacher would normally do at the end of a lesson?
Mustafa: They will just give you the answer at the end.
Eric: Because the next lesson, they might just say, Ok just forget about the working out, just say the answer. Forget about the question, just say the answer. Yeah, finish it, then we don’t have to do it.
Ibrahim: In a normal lesson, it would be here’s the question, ok line up, 1 2 3, finish.
Mustafa: Mr Rolls wants to know how you worked it out. He doesn’t really care about the answers.
Ibrahim: Yeah there’s no right or wrong answers so in his class, he wants to know what you think, so you understand.

24.3.2014

Mr Rolls: Do you think more about the ‘thinking lessons’ than normal lessons?
Hasna: I think about this lesson more (than other lessons); it’s like a challenge for me. If I keep on thinking about it round and round in my head, then I can cut that as soon as possible.
Mr Rolls: Ibrahim, last time you had an argument with Eric. And on that particular occasion, you were very convinced about something which you later found out was incorrect.
Ibrahim: To be honest, sometimes I wanna be right- I put pressure on myself. And just from that day onwards yeah I realised I was wrong. I was kind of happy. Eric brought something up, you know like arguing with me.

Mr Rolls: I am interested in you feeling convinced you were right.

Ibrahim: That’s what I do- because if I get something wrong, I don’t wanna put me down. If I get something wrong and everyone puts me down, then I don’t feel to do it, cos I think they will keep on doing it.

Mr Rolls: So you felt you had to defend yourself, otherwise you would be shown up?

Ibrahim: Yeah.

Hasna: Arguing is good because you are talking on people’s ideas and then it helps you understand. Basically, you should say what you think, see what people say and then think about it.

Ibrahim: If I’m wrong yeah, that does put me down yeah, but I like trying and that’s only one question and I can do other ones.

Hasna: I got it wrong, I’m happy about that, but if they are saying it to me aggressively yeah then I don’t like it.

2.5.2014

Mr Rolls: How do you feel teachers respond to you when are struggling in learning maths?

Gwen: Ordinary teachers like they get frustrated. For example, at my Dad’s family’s house, my grandma speaks to me in Urabel and I don’t understand. Now my auntie get frustrated and she just says ‘just turn off the light’. Now that’s how teachers get. They get frustrated and stress put on because the children are not getting the answer. A better approach - they should slowly wrench the answer out of them. You know teachers make choices for us even though we don’t have a say. But we are the teacher’s job. We are why the teacher is here. So do you not think it should they take in at least some of ideas?

Ibrahim: Yeah but whatever the teacher says, you have to do because they are. Here to help you learn something so they teach you something.

Gwen: Yes but we know what helps us learn, but the teachers don’t.


Gwen: Teachers and students should be equal with an equal amount say. Actually I think a little more kids.

Mustafa: Course teachers know more than us.

Gwen: People don’t realise that teachers have the most important jobs the world. They are the teaching the next generation. They could be footballers, scientists, spokes people, musicians, could be the next prime minister.

Mr Rolls: Do you think [metacognition] comes from yourself or someone else?

All: Both.

Eric: Sometimes you can learn from someone else- sometimes I look to see what I can find is wrong with my answers. You might have written a certain answer but when you look at someone else’s, you can see a different way.

Ibrahim: Sometimes I try to compare and then I can’t compare well because they are so different. Then we find out that both of our answers are wrong and then I start thinking to myself deeply about the new answer.
Mr Rolls: Do you think lessons where there is a lot of talk, group work and class discussion- do they help you think about your thinking more than a traditional lesson where the teacher talks a lot at the board?

Mustafa: Definitely

Gwen: So say I'm in a pair with someone and I explain it my way. Then I look at it a different way, from a different view from how they're explaining it and then I think yeah that is right, I can't believe I made that silly mistake. Now I think about what I was thinking then and then I compare it to what I was thinking and then I imagine it in my head as two whiteboards, I misplaced this number for example.

Ibrahim: I didn't get it until after she explained it to the class and then I was like, ahh! People started talking about it. My table I heard some people talking, my partner explained to me and then it made me think more deeply.

Eric: I was kind of confused. The same says I - so I was thinking and thinking how did she know how to do it. Over and over in my brain. Then I kind of got it. The carpet session was the most helpful part where we learned the most. So I did that (thought about thinking) because I looked at my friends one and then I looked at my one and then I was like looking at what was different.

Gwen: But when a partner is right, sometimes they go. See?

Mustafa: Yeah that's true some people do that.

Ibrahim: I like the ones when you're in pairs and then there are two groups of pairs. I like it when everyone has a different answer it helps my learning. I think of, then at the end yeah i can choose which one is the most right.

2. Post-study Interview with Partner LT Teacher

Luke Rolls: Do you think the LT approach promotes children to take more control of their own learning?

Farhana: I think it does promote children to use their own choice of method rather than me telling them to use a certain strategy. They will find their own way to get to an answer using their previous knowledge. It is not teacher-led and so the outcome is not dictated by what I've just taught them. A lot of my children struggled with that initially because they were so used to me saying, 'you have to use this method'. So it's definitely something that's promoted their autonomy.

Luke Rolls: Are you saying you feel the lessons don't limit children then so much by laying out a specific learning objective and outcome?

Farhana: It's not so much the objective, but that in normal lessons, there is often a certain method children need to follow in, for example teaching addition, you have to teach it so
that it is done and laid out in a certain way, whereas with the LT lessons, it’s what they 
know and they will approach it in the way they feel comfortable. And if they have a 
problem, then the teacher might re-adjust the lesson based on that, or show them a certain 
way other children have used, but it’s based on the children’s level of outcome. Whereas 
normal lessons can be based on the teacher’s input. That’s the big difference for me - rather 
than getting them to do what I’ve taught them, I’m changing my lesson a lot based on what 
they’ve taught me and how they’re responding to the problem.

I think LT also definitely promotes metacognition in children. My lower attaining students in 
particular have shown me that with their freedom to explore the maths, they are far more 
confident and seem to be able to access many more different parts of their brain 
compared to a normal lesson where they can get stuck and then the rest of the lesson is 
limited for them.

Luke Rolls: Would you say that has anything to do with the nature of the given tasks?

Farhana: Yes, I think it’s to do with the open-endedness of the tasks and that children are 
not hung up on there being a correct answer - even if there is one, that’s not the direction 
they are going towards. They are given the room to explore to find their answer.

Luke Rolls: What was your experiences as a teacher of eliciting cognitive conflict in the 
students?

Farhana: I think it’s evident when the cognitive conflict comes up - a moment of freezing 
amongst the children. You know, you’re stuck… It’s like a car crash; you don’t know where 
you’re going. It’s difficult to overcome it and I don’t think I’ve quite mastered that. It’s about 
understanding once the cognitive conflict is there, what do you provide? Do you have an 
input to guide them away from it? A way to resolve the cognitive conflict… It’s something 
i’m still struggling with. And it’s different for every lesson - the conflict is different, so in each 
lesson, your response to it is going to be very different.

Luke Rolls: What do you think the children’s feeling is towards feeling perplexed and 
confused?

Farhana: I think they are much more accepting of it now whereas at the beginning they 
were getting far more frustrated, and I think that was also partly a response to their 
teacher’s attitude. I was not comfortable in accepting them to be conflicted - I was like ‘you 
have to get this, you have to get this…’. ‘You have to accept that not all children will get it 
in every lesson. Now I am more comfortable with that, the children are more comfortable 
with that.

Luke Rolls: Do you think you have encouraged this change in students’ attitudes towards 
feeling stuck?

Farhana: I’m now constantly saying ‘there’s no right or wrong answer’, and especially with 
these lessons because they are exploratory, the children are happy with what they have 
achieved. They can say ‘this is what I believe’, and they can justify their answers a lot more. 
Definitely, my attitude has made a big difference to their attitude.

Luke Rolls: Do you think children working in groups in the LT lessons does facilitate 
metacognitive thinking?
Farhana: I think children learn in a very different way when they learn in a group. When they learn with their peers and from their peers, to some extent, and it's not always the case, they learn better. It sticks in their head more. My fear always with collaborative learning is the group composition, and if they are not made up well, you can have problems like behaviour management, but since putting things into practice, like the things we have been looking at on the course over the year, such as roles and responsibilities, I have noticed a big difference. It’s getting them to take responsibility for themselves and within a group - that’s very important. Not letting one person in the group dictate.

Luke Rolls: What other problems did you have in facilitating collaborative learning?

Farhana: Certain children still taking over; whether they were right or not, because of their past role in the classroom, where they were seen as the 'smart' child, and other children allowing them to do that. Those children would accept any answers that came from that 'smart' child as if there was no other alternative. That was my biggest issue; I think that we have now overcome that. I do also still find that in bigger groups, children can choose to opt-out, but again with the roles, that has helped with that. There have been far more positives than negatives really.

Luke Rolls: How did you find not praising and not leading?

Farhana: Not leading is hard - I still struggle with it. Especially when you've seen the lesson taught and you have desired outcomes. I think one of the negative outcomes of having being taught the lesson in the training is that, as adults, we give ideal responses, so you expect that to take place in the class, but children are so different in their views and misconceptions that it really shocks you and then in the lesson, you don’t know how to respond to it. Again, the longer you do, like now we are in month seven, you are more accepting of it and it’s getting yourself confident to be accepting but not leading in giving some suggestions. Getting that balance is difficult. I'd like to believe I’m getting better at it, but who knows?!

Not praising… I’m better at not praising verbally by saying ‘well done - you’re amazing,, your answers perfect,’ but it’s still quite evident that I do praise. I was watching somebody else teach a LT lesson the other day where the teacher still did use a lot of praise, and I don’t think it had a negative effect, but it is against the principles of the approach. I don’t praise explicitly, but through my choice of student exemplars, I think I am inadvertently praising by moving on to show a more sophisticated example. But then the child of the first example then must feel like their one wasn’t very good. So it’s important we mix it up, but then do we want to confuse them further? I’m feeling a bit split towards the praise issue. I’m not convinced, but it might be because of what I had already implemented and it was too late with my previous use of praise. I do think it is a lot my failure earlier on to have separated praise from learning, and only use it for behaviour. I don’t think it’s a failure of the LT approach, but that I couldn’t fully implement it in my class. It will be interesting for me to see with a new class how I can try to implement it because I am now a lot more aware of my understanding of praise.

Luke Rolls: Did you have any of what can seem like 'stubbornness', where students become attached to a specific answer and then find it difficult to take on another view?
Farhana: I haven’t and I was shocked because I have quite a few strong personalities but my class have been very open to new ideas and it has been really nice to see that even though lower attaining students were at first cautious, they were willing to express their ideas and say whether they agreed with another idea or not. And after a while, it didn’t matter who the child was, but that everyone in the class would be able to accept whether they agreed with a particular idea given.

Luke Rolls: LT lessons have been framed as a kind of critique to normal instruction. Do you feel there is a need for this critique of typical classroom teaching?

Farhana: I definitely feel there is a need for LT lessons. I look at my children and the way I teach them, and my fear is, if we don’t move more to LT-type lessons, and I’m not saying get rid of all direct instruction, children are going to become very linear learners. They learn something and they don’t know how to apply what they’ve learned beyond what they’ve been taught. That’s what LT teaches them, applying knowledge across different areas of maths. Direct instruction-type learning is not right for every child.

3. Student Questionnaires

a) Pre-study

i) In solving maths problems in lessons, do you prefer working:
   a) in pairs
   b) in groups
   c) by yourself

ii) How do you think working in a group can help you with your learning?

iii) What problems do you have when you work in a group?

iv) What helps you best in a lesson to take charge of your own learning?

v) Listen to the description of two types of maths lessons [direct instruction vs. guided discovery]. Which do you prefer and why?
vi) How much do you think you correct yourself when solving a task?
   never   sometimes   often   nearly always

In solving maths problems in lessons, do you prefer working:
   a) in pairs
   b) in groups
   c) by yourself

How do you think working in a group can help you with your learning?
   I think it helps you so people know different things so you can put it in a big brain altogether.

What problems do you have when you work in a group?
   People over talk each other and start getting all "he didn't let me do that."

What helps you best in a lesson to take charge of your own learning?
   When someone explains to me I get it but if no one explains to me I get stuck.

Listen to the description of two types of maths lessons. Which do you prefer and why?
   I prefer A. because the teacher gives you time to do it by yourself but if you don't get it the teacher help you.

How much do you think you correct yourself when solving a task?
   never   sometimes   often   nearly always

vii) What do you think could improve our Maths lessons?
viii) Is it more important for the teacher or yourself to monitor your own learning? why?
ix) What kind of choices do you like to have in how you solve a maths problem?
x) What comments from teachers and other students are helpful to you when you are learning?
xi) What comments from teachers and other students are unhelpful for you when you are learning?

b) Mid-study

i) Do you find ‘thinking lessons’ more or less interesting than normal lessons?

ii) Do you think about the lessons more afterwards?

iii) Do you talk to family or friends more or less about the lessons?
c) Post-study

i) Do you think feeling stuck helped you learn or not? Why?

ii) Does working with others help you with your learning? In what ways?

iii) What stopped you from learning with others?

iv) Do you think the story beginning of the thinking lessons are important or not? How?

v) How can we achieve ‘dinner table conversations’?

vi) Did you notice that as the teacher, I didn’t praise your answers? (“Interesting.. Do you agree?”) How do you feel about that kind of feedback?

vii) Do you think you did more talk in thinking lessons than you did in Year 3? How is the type of talk different?

viii) Which type of lesson do you prefer; one where the teacher instructs you what to do, or a ‘thinking’-type lesson, where you explore, come together and discuss?

4. Student Questionnaire Sample
12.5.14

I learnt about how to make sure that your answer is not always right.

The thing that helped me the most is that listening to other people's answers can be right.
6. Teacher Reflective Journal Sample

15.1.14 LT Data Handling Lesson: ‘Snails and Flowers’

I felt some tension in the lesson today between allowing enough time for exploratory discussion and maintaining pace. My normal tendency would be to not use a prolonged amount of time for a plenary. I felt though that without it, there would not have been ample opportunity to bring out the relevant and desired learning points, particularly when episode concept attainment for some pairs appeared to be reliant on this whole-class discussion part of the lesson. Comparing a selection of examples seemed to work very well for asking of students to think again about their own responses. There seems to be an inherent curiosity here for students to see what their peers did and so in the process compare their answers. Students were mostly convinced after spotting the number sequence pattern of the data set in episode 2, that they could definitely predict what amount would appear next (in section D). I wanted to bring our the point that we cannot be certain about this (in real life). While I didn’t specifically tell them this - that we cannot, I think my repeating of the question led them to think that I was suggesting a particular answer. This seems to illustrate the difficult issue of not leading through questioning in LT lessons as well as how to most effectively promote meta-cognitive reflection through facilitative feedback.
# Masters and Diploma Students’ Ethics Review Form

## Outline of proposed research to be submitted for ethical approval

PLEASE NOTE: Before completing this form you will need to discuss your proposal fully with your Supervisor/s.

Please ensure that all necessary letters and other documents are attached.

This Ethics Review Form needs to be completed before starting data collection for your PBE or RPBE module.

- For participants taking PBE, please complete a final version of this form in consultation with your supervisor. Please submit it to your supervisor for clearance before you begin your enquiry.
- For participants taking RPBE, the form should be submitted during the Spring Term at your face to face taught session.

<table>
<thead>
<tr>
<th>Department</th>
<th>Curriculum, Pedagogy &amp; Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name(s):</td>
<td>Luke Rolls</td>
</tr>
<tr>
<td>Supervisor(s):</td>
<td>Adam Unwin</td>
</tr>
<tr>
<td>How may you be contacted? (address, telephone and email)</td>
<td><a href="mailto:lukerolls@me.com">lukerolls@me.com</a></td>
</tr>
<tr>
<td>Into which category does your research fall?</td>
<td>Master of Teaching (MTeach)</td>
</tr>
<tr>
<td>Title of your course:</td>
<td>Research &amp; Practice Based Enquiry (RPBE)</td>
</tr>
<tr>
<td>Provisional Title of Project:</td>
<td>Children's Experiences of Learning Autonomy in a Cognitive Acceleration in Maths Programme</td>
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</tbody>
</table>

PLEASE ANSWER THE FOLLOWING QUESTIONS giving full details where necessary:

1. Project design:
   a) What are the aims of your project and/or your research questions?
      I aim to gather qualitative data to explore students’ experiences of learning autonomy in their Cognitive Acceleration / ‘Let’s Think in Maths’ (LT) lessons in year 4. I will explore children’s views around aspects of this teaching approach/intervention and enquire how for them it differs from their previous experiences of learning.
b) What is the design of your project?
   I will use action research.

c) What data collection methods will be employed?
   - Interviews of six to eight focus children. Children will be engaged in discussion around the questions and issues arising from the action research. These students will be selected to provide some degree of representation in the class based on attainment, ethnicity, gender and personality.
   - Video footage of the lessons will be taken to evidence children’s interactions in class with the learning approach.
   - Class discussions that centre on reflecting on the effectiveness of learning during class plenaries will be audio recorded and transcribed.
   - Pre and post-study questionnaires will be given out to gauge the development of student opinion.
   - Students’ reflective diary entries will be analysed for evidence of children’s experiences of the programme.
   - A LT consultant will be interviewed during the study to gauge their opinion about the students’ development.
   - An interview with a Year 3 Teacher introducing the LT approach in their classroom.
   - I will write a personal reflective journal to document my thoughts and feelings about the introduction of the LT programme and its perceived impact.

(If you have already drafted a questionnaire or a format for structured interviews/unstructured interviews, please attach it).

2. Will your research involve human participants? If (if no, go to question 3)
   Yes

   a) Who are the participants (i.e. what sorts of people will be involved)?
      30 Primary School Year 4 students

   b) How will they be recruited?
      I teach this maths group daily.

   c) If participants are under the responsibility of others (such as parents, teachers or medical staff) how do you intend to obtain permission for the participants to take part in the study?
      (Attach letter or details of permission procedures.)
      A headteacher-approved letter will be sent to parents of the children involved that will explain briefly the purpose and nature of the research. It will be clear that there is no obligation for their child to be part of the study. Parents will have the opportunity to opt out of the study if they do not wish data to be collected about their child. There will be a section of the letter that can be filled in and returned to me that parents can fill in if they wish to opt out of the study.

   d) How will you obtain the consent of participants?
      The purpose of the research will be explained to all students in the class, and all students will have a verbal and written opportunity to raise any questions, concerns or issues that they may have regarding the study. A consent form will then be given to students giving them the opportunity to opt in or out of the study. Should they decide to opt out of the study, their data will be omitted in the research report.

      The year 3 teacher and consultant will be asked for their opinions and views on the issues that come up over the study. They will be consulted with as to whether they permit their data
to be included in the write-up of the study and their consent will be obtained by asking them to sign a short statement saying that they have been informed about the study and that they give their informed consent for their comments to be used in the data analysis and writing up of the study.

e) Describe the process by which you will inform participants about what you are doing: As well as the letter, I will spend some time explaining to the class the purpose and context of the study. I will allow students the opportunity to ask any questions and will give them a time where they can come and discuss with me if they have any further questions.

I will communicate the aims of the research to the year 3 teacher and CAME consultant by verbally explaining my research as well as giving them a copy of my research proposal. I will share and consult on my findings with them as participants as the study progresses.

f) Might participants experience discomfort or embarrassment as a result of your study?

Students might feel embarrassed about being videoed or in one-to-one interviews. I will work to overcome this through:
- class discussion and on-going dialogue around the importance of contributors' ideas, answers and opinions. In any class discussion, a group ethos around respectful listening and learning-orientation will be reinforced.
- reassuring participants before interviews about their rights around participation and specifically that they are free to withdraw at any time.
- maintaining an open and non-judgemental tone to interview responses and more generally within the learning context.
- allowing students opportunities through their reflective journals to express their affective feelings around what they are experiencing, in order to gauge whether the research process needs adapting to meet the needs of the students.
- gauging student voice through verbal class discussion to assess whether broader adjustments need to be made to the format of the teaching.

g) How will it be made clear to participants that they may withdraw consent to participate at any time?

This will be included in the letter and explained verbally to the children. Reminders about this will be given to children at key research stages (e.g. before interviews) during the study. The voluntary nature of participation will also be made explicit to both the year 3 teacher and consultant by including in initial written communication about the study, a clear description of their right to withdraw consent of participation from the study at any time.

h) Will you provide participants with information about the findings of your study? (This could be a brief summary of your findings in general; it is not the same as an individual debriefing.) If YES, what form will this take?

I will consult with my senior leadership team at the end of the study to see whether this would be appropriate as a communication to parents. In class, students will be briefed in summary form about the findings of the study. I will share the outcomes of the study with the LT consultant and the year 3 teacher.

i) How will information obtained from or about participants be protected?

(See the Main Principles of the Data Protection Act.)

The names of children will be changed in the study. The principles and spirit of the data protection act will be observed throughout the study.

j) What steps will you take to ensure the secure storage of personal data?

I am mindful to keep student records/video recordings confidential, securely stored and access these only in private spaces. All computerized data/work will be stored in password protected areas. Completed student questionnaires and their personal reflective diaries will be kept in a
locked filing cabinet at times when they are not being directly used.

3. Are there particular features of the proposed work which may raise ethical concerns or add to the complexity of ethical decision making? If so, please outline how you will deal with these.

My proposed focus group may miss parts of their lunchtimes to participate in the interviews. I will give children complete choice as to whether they wish to participate in the focus group and will spread sessions to minimise any disruption.

4. Outline any other information you feel relevant to this submission, using a separate sheet if necessary.

Notes and references:


You should read and understand the BERA ethics guidelines:


If you are conducting research with children and young people, P Alderson & V Morrow (2004) Ethics, social research and consulting with children and young people, Barnardo’s, Barkingside, has useful suggestions.

If you are planning to carry out any research which will bring you into face-to-face contact with children or young people (under the age of 18) in the United Kingdom, you will need to have a Criminal Records Bureau (CRB) check before you start. If you do not already hold a current CRB check, you will need to obtain one. The relevant forms can be obtained from the ITE section of Registry; to whom they should be returned with the fee; obtaining a CRB check will take about a month. If you are an overseas student, the procedure is different; full details can be found in the helpful booklet available from the ITE section of Registry; you will need a ‘Certificate of Good Behaviour’ which can be obtained from your embassy or other appropriate organisation.

I confirm that the information given above is correct and I endorse the following statement: "I confirm that I have attended the ethics session on an appropriate course, and that I will seek further advice and support if and when unanticipated dilemmas arise. I have also read and understand the following set of guidelines, which I will abide by in my research: BERA”

Signature(s)    Luke Rolls           Date 22nd January 2014
Masters student ethics review

To be completed by the student

Student’s name: Luke Rolls
Student’s Department: Curriculum, Pedagogy & Assessment
Course: MTeach
Project title: Children’s Experiences of Learning Autonomy in a Cognitive Acceleration in Maths programme

To be completed by the supervisor/first reviewer

Do you foresee any ethical difficulties with this research?

No, Luke needs to make sure in the interview situations that are part of this project, that participants are as comfortable as possible, e.g. quiet, confidential (not overheard).

Signature of supervisor/first reviewer: Dr Adam Unwin Date 22nd Jan 2014

To be completed by second reviewer

Do you foresee any ethical difficulties with this research?

No.

Signature of second reviewer: ……………………… Date ………

Decision on behalf of Reviewers

X Authorised
Authorised subject to the following additional measures
Not authorised for the reasons given below
Referred to Faculty Research Ethics Committee (FREC)

Points to be noted by other reviewers and in report to FREC: