Possibility Thinking: culminative studies of an evidence-based concept driving creativity?

<table>
<thead>
<tr>
<th>Journal:</th>
<th>Education 3-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuscript ID:</td>
<td>RETT-2011-0065.R1</td>
</tr>
<tr>
<td>Manuscript Type:</td>
<td>Original Article</td>
</tr>
<tr>
<td>Keywords:</td>
<td>possibility thinking, theorising everyday creativity in education, 'what if' and 'as if' behaviour</td>
</tr>
</tbody>
</table>

URL: http://mc.manuscriptcentral.com/rett  Email: M.Brundrett@ljmu.ac.uk
PT article Nov 2011: Figures

Figure 1: Stage 1 model of pedagogy and possibility thinking (Cremin, Craft & Burnard, 2006)

Figure 2: Stage 2 thematic focus (Chappell et al, 2008)
Figure 3: Stage 3 taxonomy of question-posing and question-responding within Possibility Thinking

Figure 4: Possibility Thinking in 3- to 5-year-olds from Burnard et al, 2006
Enabling task and pedagogy

Peer collaboration

PROCESS
Question-posing
Question-responding
Immersion

PROCESS-OUTCOME
Being imaginative
Play
Innovation
Risk taking absent

OUTCOME
Self-determination
Development
Intentional action

Enabling task and pedagogy

Fig 5: Possibility Thinking in 9-to 11-year-olds (the present study)
Table 1: Range of evidence across the sites

<table>
<thead>
<tr>
<th>Features</th>
<th>Site: South West</th>
<th>Site: East Anglia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question-posing</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Question-responding</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Self-determination</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Intentional action</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Development</td>
<td>Strong</td>
<td>Strong</td>
</tr>
<tr>
<td>Being imaginative</td>
<td>Strong</td>
<td>Medium</td>
</tr>
<tr>
<td>Play/playfulness</td>
<td>Strong</td>
<td>Medium</td>
</tr>
<tr>
<td>Immersion</td>
<td>Medium/Strong</td>
<td>Medium/Strong</td>
</tr>
<tr>
<td>Innovation</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Risk-taking</td>
<td>Absent</td>
<td>Absent</td>
</tr>
</tbody>
</table>
Table 2: Commonalities between sites

<table>
<thead>
<tr>
<th>Existing features in both sites</th>
<th>Existing features in neither site</th>
<th>New feature in both sites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question-posing</td>
<td>Risk-taking</td>
<td>Collaboration</td>
</tr>
<tr>
<td>Question-responding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-determination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intentional action</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Being imaginative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play/playfulness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immersion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innovation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Possibility Thinking: culminative studies of an evidence-based concept driving creativity?

Abstract

The authors have for some years studied the concept of ‘possibility thinking’, or ‘what if’ and as if thinking in children aged three to eleven, which generates novelty - and the pedagogical strategies which foster it. They have argued, on the basis of previous qualitative studies, that ‘possibility thinking’ (PT) is at the core of creativity in education.

Having begun as a conceptual study for seven years this team has undertaken empirical studies of PT in classrooms. This paper discusses findings from the third phase of empirical work focusing on nine to eleven year olds. The particular research question addressed here is ‘What characterises possibility thinking as manifest in the learning engagement of children aged 9-11?’

A small-scale qualitative study, involving co-participation with teachers, the paper features episode analysis of naturalistic video data featuring children aged 9--11 in two schools. It focuses on possibility thinking evidenced by children engaged in a range of classroom activities, some established as individual activities and others as group work.

The study reveals some features of PT in both sites (question-posing, question-responding, self-determination, intentional action, development, being imaginative, play/playfulness, immersion and innovation) to differing degrees of strength. Risk-taking was absent in both and a new feature, collaboration, evident in both. Differences were documented in how question-posing and question-responding manifest, compared with earlier studies with younger children.

This study seeks to make an evidence-based contribution to the characterisation of PT as driving creativity in the classroom, with implications for research and practice.

Key words: possibility thinking, theorising everyday creativity in education
Introduction: situating possibility thinking

For a period in the early 21st century, English education was characterised by efforts to re-ignite creativity in education as vital in cultural and economic development – alongside concern with raising standards of achievement in the traditional subjects. The impetus for creativity can be traced to the National Advisory Committee on Creative and Cultural Education (NACCCE, 1999), which recommended a core role for a democratic notion of creativity in learning and pedagogy. For a decade, increasing attention was paid to creativity in the curriculum (DCDF, 2006, 2007). Primary schools in particular were encouraged to innovate and offer a more integrated and creative curriculum (DfES, 2003). Policy developments encouraged integration of the arts, culture and education. Common across these policy documents was a commitment to ‘little c’ creativity (Craft, 2000, 2001, 2002), or everyday, lifewide creativity as well as creativity inherent within school subject domains. And thus, exploration of possibility – transformation from what is to what might be – was one way of exploring creativity in education (Jeffrey and Craft, 2006).

Whilst a change of government in 2010 signalled a change in perspective, a professional commitment to nurturing the creativity of students has continued to inform the development of pedagogy in the early years, primary and secondary education (eg Craft et al, 2011, Clack, 2011, Chappell et al, 2011).

The authors of this paper have collaborated over some years, theorising aspects of creativity in education, and focusing particularly on the concept of ‘possibility thinking’ at its core. Their focus has shifted from conceptual (Craft, 2000, 2001, 2002) to empirical work seeking to characterise ‘possibility thinking’ in children aged three to eleven.

This paper first outlines the theoretical background to the studies of ‘possibility thinking’ (PT), together with the previous two phases of empirical work. It then relates PT to the wider policy and research literature on creativity. Introducing Phase 3 of the PT studies, on which this paper focuses, the focus, research design and methodology are given and findings presented and discussed. Finally concluding
thoughts are offered, relating the findings back to wider current and recent conceptualisations and empirical studies of everyday creativity in different parts of the world.

Theoretical background
The term, ‘Possibility Thinking’ (PT), was originally coined by Craft (1999) to represent a process which may be common across creativity in differing domains of enquiry and across life, as well as across differing levels of generative activity, from ‘little c’ to ‘big c’ creativity. Developed initially in conceptual work (Craft, 2000, 2001, 2002), it was encapsulated as the posing of the question ‘what if?’ in different ways and contexts, together with perspective taking, or ‘as if’ thinking. To this degree, it was argued that PT could be seen as involving the shift from ‘what is this and what does it do?’ to ‘what can I or we do with this?’

In the early conceptual work, Craft suggested that this shift from what is to what might be involves questioning, imagination and combinatorial play (Craft, 1999, 2000). Using the concept in an ethnographic study in order to interpret the learning of primary children (aged 3-11), Jeffrey (2006) concluded that implicit within PT is engagement with problems. Working with Jeffrey’s data, Craft and Jeffrey further suggested that it involves not only solving problems, but also finding and honing them (Jeffrey, 2006; Jeffrey and Craft; 2004, Jeffrey and Craft, 2006).

Since 2004, additional qualitative empirical work to explore the nature of possibility thinking in classrooms in terms of both learning and pedagogy has been undertaken by an expanding group of researchers (e.g. Burnard, Craft and Grainger 2006; Cremin, Burnard and Craft, 2006). This examination of PT has involved several overlapping stages of naturalistic, qualitative co-participative enquiry.

Stage 1 (2002-2006) focused on PT and pedagogy with 3-7 year olds. The findings identified a number of distinct, but interlinked features of children’s and teachers’ engagement with PT, both valued and nurtured in the broader context of a playful enabling environment. These included the confirmation of posing questions as the driving process, alongside self-determination, play, immersion, innovation, being imaginative and risk-taking. Stage 1 also reported on
operational elements of pedagogy associated with nurturing PT. These included: standing back, placing high value on learner agency, and making time and space for creativity, as shown in Figure 1 (from Cremin et al., 2006).

Insert Figure 1: Stage 1 model of pedagogy and possibility thinking (Cremin, Craft & Burnard, 2006) here

Stage 2 (2006-7) focused on question-posing in Possibility Thinking with the narrower focus of 5-7 year olds, with additional data from the same settings. It led to the recognition that play and immersion provide the context for PT, as shown in Figure 2. Analysis also indicated that taking intentional action (coded action/intention) and autonomy and agency (coded self-determination) permeated the process. During Stage 2, being imaginative, risk-taking, question-posing and question-responding were identified as the core components of PT. Innovation was conceptualised as not only part of the process, but also a possible outcome of ‘possibility thinking’ and thus, potentially, a condition for attributing creative learning (Burnard et al., 2008).

Insert Figure 2: Stage 2 thematic focus here

The Stage 2 analysis also resulted in a taxonomy of children’s question-posing and question-responding (Chappell et al, 2008a; Chappell et al, 2008b), revealing distinctive elements, and exploring the dynamic relationship between the two.

The fine-grained taxonomy of question-posing and question-responding was situated within the wider conceptual constellation of PT emergent from Stage 1, as summarized in Figure 3. This figure seeks to represent the dimensions at the heart of possibility thinking as evidenced from the empirical work thus far. The cone shape represents the degree of inherent possibility in what was possible regarding children’s questions, from narrow to broad, with the choice of question frame type articulated at the centre of the cone. Within degrees of possibility there were three main types (or categories) of question: leading questions, service questions (which enabled the leading question to be followed) and follow-through questions (detailed questions enabling follow-through questions to be seen through). The variety of types (or categories) of question-responding...
which might then be stimulated are represented (in no particular configuration) in the lower circle.

**Insert Figure 3:** Stage 3 taxonomy of question-posing and question-responding within Possibility Thinking here

By the end of Stages 1 and 2, the team was increasingly concerned to explore the extent to which the processes of PT and the pedagogic strategies identified might or might not be evidenced among older primary aged learners, particularly since in England the culture of performativity (Ball, 1999) was seen to be narrowing both curriculum and pedagogy (English et al., 2001; Jeffrey and Woods, 2009). Furthermore, stress among upper primary children appeared to be rising (as noted by Tymms & Merrell, 2007 in an independent review of primary education), and it was argued that curriculum overload and the backwash of high-stakes testing was limiting primary practice (Alexander, 2004; Grainger, 2004). A concern for the extent to which opportunities for nurturing children’s creativity might be compromised in the upper end of the primary school led the team to begin a third stage of the study, this time with older learners.

This paper draws upon data from the resulting Stage 3, which involved research with 9-11 year olds in two new sites in England. Stage 3 returned to the original research questions and focused on how PT is characterised in this age phase, and the nature of the related pedagogical strategies employed by teachers who foster PT. Mirroring Stage 1, this third stage was also a collaborative, naturalistic qualitative enquiry. This paper reports on findings which address one of the two research questions of Phase 3 and focuses on characterising PT\(^1\). The particular research question, then, which is explored in this paper is ‘What characterises possibility thinking as manifest in the learning engagement of children aged 9-11?’

---

\(^1\) A fourth stage of the study is under way with 3- to5-year-olds (Craft et al, 2011) and 5-to18-year-olds (Chappell and Craft, 2011). The latter is not discussed here: the former is referred to later. Neither does this paper refer in detail to other work on PT in other curriculum areas with 9-to11-year-olds such as drama (Lin, 2010, 2011) and dance (Craft and Chappell, 2009, Chappell et al, 2009, Chappell et al, 2011) although work on PT in mathematics (Clack, 2011) is referred to later in the paper.
Situating Possibility Thinking in policy and wider literature

The empirical work on PT is situated in a context in which creativity is increasingly valued by educational systems all over the developed and developing world. Whilst policy and research work in England, the location of the study reported here, had been at the forefront of such developments in the first decade of the 21st century, in 2010 a new government brought with it, as indicated above, a reverse in this trend. A White Paper for schools (DFE, 2010) and a consultation on the National Curriculum (DfE, 2011) promised a return to a narrower, knowledge-focused, core curriculum, without reference to skills, dispositions and attitudes and thus without reference to creativity. A performative, marketized school system was heralded, separating, as Fielding and Moss suggest (2010) government from society.

This work on PT seeks to contribute insights into the nurturing of creativity in the classroom. It acknowledges the distinction between ‘big c creativity’ which focuses on the work of the genius (such as the work of Gardner, 1993; Simonton, 1994) and ‘little c’ or ‘everyday’ creativity (such as the work of Craft, 2000; 2001, Kaufman and Baer, 2006; Plucker, Beghetto, and Dow, 2004; Sternberg, Grigorenko, and Singer, 2004). The PT work also seeks to explore what Beghetto & Kaufman (2007) call ‘mini-c’ creativity, in other words the processes involved in personal meaning-construction at an everyday level. Whereas for Beghetto and Kaufman, mini-c creativity provides a transformative foundation for later little c and big c creativity, the conceptual and empirical examination of PT, as will be shown, asserts the presence of mini-c meaning-making inherent in little c creativity.

In common with other creativity scholars (Moran and John-Steiner, 2003; Eteläpelto & Lahti, 2008; Rojas-Drummond et al, 2008), the PT work emphasises the influence of the social and cultural context in the construction of meaning and of creative endeavour. This contextual sensitivity encompasses the wider English cultural context in which this body of research has been located.

In England, since the late 1990s creativity in education has developed an increasingly high profile both in policy and research. A key policy landmark was the report from the National Advisory Committee on Creative and Cultural Education (NACCCE, 1999), (later reinforced by
the Roberts Review 2006), which set an agenda and unlocked
resource for schools and other agencies to begin to develop creativity
in education more extensively. A ‘democratic’ approach to creativity
was tabled in this report which saw the role of imagination harnessed
purposefully to produce original and valuable outcomes. This was
developed by the Qualifications and Curriculum Authority (QCA,
2004; 2005) to produce an operational definition and application of
creativity in the classroom which recognised imagining what might be
as a key element.

The role of imagination in creativity appears undisputed. It is in
understanding how the seed of imagination is manifest in classroom
practice that the PT research seeks to make a contribution. It does so
by examining how this seed comes to fruition through engagement
(as discussed above), with increasing attention over time to the social
context. For Beghetto (2007), what enables children to shift from
internalised, mini-c creativity (making sense of the world), to manifest
a new idea or possibility, which is recognised as such by others (and
which he and Kaufman name ‘little c’ creativity, 2007), is the capacity
he calls ‘ideational code switching’. He proposes this concept as a
metaphor to help teachers understand the capacity of learners to
shift from intra-personal creativity (i.e. generating new ideas which
are personally meaningful) to inter-personal creative expression (i.e.
generating novel ideas which are interpersonally meaningful). For
Beghetto (ibid), ideational code-switching involves moving from mini-
c to little-c creativity with ease – akin to the ways in which multi-
lingual speakers move between languages as appropriate.

Although Beghetto’s theory was developing in the United States in
parallel with the Stage 3 PT study, similar paths were being travelled.
Whilst the early conceptual work on PT (Craft, 1997, 1999, 2000,
2001, 2002) and some of the later work (e.g. Jeffrey and Craft, 2006)
focused on the individual, the team’s empirical work described here
had increasingly moved, through the micro-analysis of Stage 2
exploring question-posing and question-responding, to a focus on
social context and engagement (Chappell et al., 2008). The Stage 3
work was therefore particularly sensitised to the social context of the
classrooms in which the data were collected, mindful of the
arguments that everyday creativity is a social phenomenon (e.g. Miell
and Littleton, 2004; Vass, 2007).
Conceived in these terms, the focus of the Stage 3 study as a whole, was what characterises possibility thinking as manifest in the learning engagement of children aged 9-11 in the classroom setting, together with the pedagogy associated with it.

In the light of this, the research outlined in this paper sought to:

- identify and compare commonalities and differences across sites in relation to dimensions of PT (question-posing and question-responding ranging from possibility narrow to possibility broad)
- clarify how strongly other categories of question-posing and question-responding (i.e. self-determination, intentional action, development, being imaginative, play/playfulness, immersion, innovation and risk-taking) are manifest and the strength and range of dimensions of PT.

The focus of this particular paper is thus on categorising PT. A separate strand of Phase 3 analysis has focused on pedagogical strategies which are associated with PT.

**Research design and methodology**

A qualitative methodology was adopted as part of a naturalistic, collaborative inquiry using a case study approach in which the case was bound as classroom interaction using purposive sampling using specific criteria discussed below. Data collection was carried out in two state primary schools, one in East Anglia and one in the South West region of England. The South-West site involved two classes (children aged 9-10 years), and the East Anglia site involved just one class (children aged 10-11 years).

Selection of the research sites involved two sets of sampling criteria. First, schools were selected on the following contextual characteristics and criteria. Schools:

- with longstanding university partnerships
- who were serving comparable communities to one another
- with comparable pupil intake to one another
- who were facilitating high attainment among children
- with distinctive reputations for outstandingly creative and personal approach to teaching and learning.
The second sampling and key feature of the criteria of classrooms selected involved teachers, focusing on those who:

- exercised formal or de facto leadership in the pursuit of creative learning and teaching in the school
- were identified by colleagues within and beyond the school as experienced
- were recognised (through professional organisations – for example local authority, national projects such as Creative Partnerships, or national organisations such as the Qualifications and Curriculum Authority as it was then known - and university partnerships with Cambridge, Exeter University or the Open University) as creative professionals
- were encouraging collaboration between children in distinctive ways (contrasts between the sites are discussed below).

Building on research in which teachers introduce group work to investigate what happens when students are given more opportunity to engage in dialogue (Mercer, 2000, Mercer and Littleton, 2007, Wells 1999), data were obtained by collecting video records to develop deeper accounts of single groups of pupils working together on a problem-based learning engagement and activity which featured opportunities for creativity in learning.

Video records of classroom interactions were a crucial component of the research plan. Video records of groups of children working on tasks were made and analysed to characterise the dimensions of possibility thinking as manifest in a range of learning engagement.

**Ethics and data collection**

Informed consent was gained from children, their parents and from school staff, with the right to withdraw together with assurance of the anonymity of data, and secure storage of data. The two research assistants (Chappell and Dragovic) acted as non-participant observers. The study adopted strategic research principles for non-participant observation.

Data elicitation methods included video observation, interviewing and the collection of documents. Around twelve lessons were observed in each site, across a range of curriculum areas including mathematics, English, geography, science and art. Each class lasted...
approximately 1 hour, resulting in a total of 24 hours of video data in all. Teachers were interviewed (along with several introductory conversations) and documents such as students’ work, photographs, curriculum guidelines and data on class planning as prompts during the interview were used.

It was, however, mainly through the content analysis, episodic indexing, coding, segmentation, analysis and comparison of videos of concrete circumstances (classroom activity, time, space, events, situations) that the theoretical and conceptual tracing/ framing of PT was developed and refined. It is therefore on the video data that this paper draws.

Data reduction
The data reduction involved the researchers narrowing in on four selected episodes (one from each of the classes visited in the South-West site and two episodes from the class visited in East Anglia). The episodes selected were considered by the team to be a representative corpus for descriptive codification. These were then subjected to extensive and focused analysis by all five researchers and analytic codes were developed through an iterative inductive and deductive process as discussed later in this paper.

Contextualising the episodes
The activities within which the episodes drawn upon in this paper were located are of relevance to note.

In the first episode, chosen from the South-West site (and undertaken with children aged 9-10), the curriculum focus was science and focused on investigating the melting of ice. The teacher introduced the activity through sharing a story which involved St Francis Drake, a dream and a living ice bird that cried tears which turned into ice-eggs. He then produced a large number of actual ice-eggs about the size of a large melon and handed them out the children, inviting them to work in groups for the day to design an experiment to investigate something about their ice egg, with a focus on melting. The episode chosen for closer analysis, comes from the early part of the day when the groups received their ice egg and began to think about what their experiment might encompass.
The second episode, also chosen from the South West site (and undertaken on the same day with children in the parallel class and so also aged 9-10), the teacher invited the children to explore the properties of magnets. There were five stations around the room with different magnets and accompanying activities, and groups of five rotated around these stations for around ten minutes at a time. A teacher or teaching assistant was on hand to offer assistance for the more complex tasks (the classification of objects in relation to their magnetic nature and an iron filings task exploring polarity). The remaining tasks ranged from completely open exploration of magnets, to using magnets on either side of a piece of paper to trace lines. The segment of the episode drawn upon for closer analysis, involved two boys exploring a box of different shaped magnets on the table top. What both episodes in the South West had in common was that they were set up to encourage collaboration.

The third and fourth episodes were both drawn from the East Anglian site (involving children aged 10-11 years olds), independently exploring a mathematics and an arts-based task respectively. Unlike the South West site, these tasks were set up as individual ones. In the former their teacher shared with them a few simple mathematics tasks and then asked them to solve more complex mathematics tasks on the worksheet with their ‘talking partner’. The episode drawn on here comes from the early part of that task and shows children collaboratively working and helping each other towards increased understanding. In the arts task, children were working to create small-scale, layered clay houses, which would each eventually become a tile in a wall display. The teacher set an open-ended task of each child creating their own representation of an important local area houses/buildings and gave them time and space to explore how to do that. Video data collected shows the children first working on their own and then choosing to help each other and to co-operate.

Data analysis and emergent coding
Initially, two of these four video sequences were coded by the two researchers. Taking these key codes a further four video sequences were coded individually. A final two sampled videos were then coded and again this produced more codes. The final process was to recode all the video material by three independent researchers to ensure the validity of the coding system.
The analysis involved both inductive and deductive processes, the latter drawing on categories derived from the existing PT theoretical framework using the following definitions:

i. question-posing: investigative behaviour, verbal and non-verbal
ii. question-responding: behaviour responding to investigations by self and others, both verbal and non-verbal
iii. self-determination: self-directed actions, self-chosen
iv. intentional action: activity/behaviour having a clear goal
v. development: thinking moving forwards
vi. being imaginative: “as if” thinking
vii. play/playness: being in an ‘as if’ space, improvising
viii. immersion: concentration, absorption, orientation
ix. innovation: original /unique outcome/behaviour
x. risk taking: danger, failure, fear, ‘going to the edge’

As will be seen in the next section, these categories, or features, are listed here in order of degrees of strong, medium to weak evidence strength, meaning depth and range of data.

In addition to the deductive analysis, through the inductive analysis the team remained open to the identification of new features of the concept of PT.

Findings and discussion

The data analysis revealed key features (reflecting previous research on possibility thinking; definitions in previous section) in relation to the research question ‘What characterises possibility thinking as manifest in the learning engagement of children aged 9-11?’

The features varied in depth and range and were interpreted in relation to degrees of strong, medium to weak evidence strength. This enabled the researchers to identify similarities and differences between sites, as shown in Table 1.

Insert Table 1: Range of evidence across the sites here

As can be seen from Table 1, some features of PT were evidenced consistently strongly across sites, and the feature least evidenced was risk-taking. Three elements struck the team as particularly interesting
among these 9- to 11-year olds; two extending previous studies and one introducing a new feature as follows.

**Element 1:** The ways in which question-posing (Q-P) and question responding (Q-R) manifested, as distinct from findings in Phase 2 with younger children (Chappell et al, 2008)

**Element 2:** The reinforcement of some features of PT and the continuing absence of risk, reflecting findings from Phase 2 with younger children (Burnard et al, 2006) though contrasting with later work with younger children (Craft et al, 2011).

**Element 3:** The emergence of collaboration as a feature, later also identified in a further study of younger children (Craft et al, 2011).

Findings in relation to each of these three elements are now presented and discussed in turn.

**Element 1:**
Ways in which question-posing and question-responding manifested

Question-posing we defined as both verbal (V-Q-P, i.e. verbalisations using question words such as what, how, etc and verbalised questions where the question itself was inherent within the child’s intonation) and non-verbal (N-V Q-P, i.e. where questions were inherent in behaviour). All of the focus episodes for this study offered evidence of verbal question-posing but non-verbal question posing was not consistently present at the East Anglian site. Yet, whilst it was not evident in a collaborative mathematics activity which focused on small group problem-solving using the concept of compound area, what was evident was a questioning stance.

The following vignettes offer brief examples of verbal and non-verbal question-posing.

In the South West site, as the ice-eggs are placed on the children’s work-tables, a babble of excited questions can be heard from all of the children in the room. At a table close to the camera, the children exclaim as they notice details about the egg, for example: “Look at it, it’s got all these little bubbles in it”. They wonder how to begin their investigation formally, and
use ‘leading questions’ (Chappell, 2008b), for example: “What
do we do for our experiment?” Other questions are also
recorded, which enter the realm of ‘as if’ or the imagination, for
example, “What shall we call it?” Their non-verbal questions are
implied in their body language as they crane in, frowning,
focusing, pointing, leaning in squinting close to the ice-egg their
group is investigating.

In the East Anglia site, during the episode involving the
construction of the clay houses, direct questions can be heard,
such as “Can I borrow this”? Using the taxonomy developed
from the earlier study of younger children (Chappell et al, 2006),
such questions can be seen as ‘service questions’ enabling an
already-defined job to be done. Many non-verbal questions
can be observed as children consider their own clay tiles, and
develop the designs on them, appraising their work as they
further embellish it.

During the mathematics investigation episode in the East Anglia
site, we hear other service questions which support the thinking
necessary to develop a response to the task set. For example,
we hear one partner say to the other, “what you’re doing is you
are adding this little side to that side here and that means that
inside here has to be a box but there is no box?” It is notable
that there is little non-verbal questioning in this mathematics
episode, which may be reflect the children’s intellectual or
conceptual interaction rather than the physical interaction
undertaken with the clay houses.

What the analysis revealed, then, was that the children’s questioning
stance evident in each of these classroom activities, was evidenced
both verbally and non-verbally (through expression, gesture and body
language). The absence of non-verbal questioning in one of the
activities (the mathematics one) may have reflected the degree of
conceptual vs practical engagement inherent in the domain and
activity.

Question-responding (Q-R) we defined as verbal or non-verbal activity
responding to a question by testing, predicting, undoing, accepting,
rejecting, evaluating, compensating, completing, repeating. The
analysis showed evidence of both accepting and rejecting across all
episodes, suggesting that these processes may be dynamics of question-responding.

The following vignettes offer brief examples of verbal and non-verbal accepting and rejecting.

In the South-West site, Joel and Kit\(^2\) were engaged in making a model of a man out of magnets. The video sequence shows the boys both verbally and non-verbally accepting and rejecting one another’s ideas of where the magnets should go – to make eyeballs, a ‘mini me, and a sun – exploring as part of this how the magnets connect and hold together.

In the East Anglia site, in the clay houses episode, the researcher’s fieldnotes document the apprenticeship of one child by another: “The girl looks and listens to Chris\(^3\) attentively for a few seconds, while Chris is demonstrating what to do then she starts rolling clay into a sausage” – accepting the suggestion of using this technique.

Also in the East Anglia site, in the maths investigation episode, the question-responding is verbal, as with the question-posing. In this example, first Rhiannon\(^4\) says: “You can’t do it because you don’t know what that is and you don’t know what that is because you need to work out what that is”. Mae\(^5\) rejects her idea by saying: “I know it’s 10 metres... If you do that and then you do that...” - thus using the statement to springboard her own suggestions in.

Whilst accepting and rejecting were found in all episodes whether expressed verbally or not, other aspects of question-responding were also found though not as consistently. Thus, in the ice-egg episode, predicting, testing and evaluating were all evidenced. In the magnet man, clay houses and mathematics investigation episode, these were evidenced in a more exploratory way alongside completing, repeating, compensating, undoing.

\(^{2}\) All names have been changed
\(^{3}\) All names have been changed.
\(^{4}\) ditto
\(^{5}\) ditto
The analysis of these episodes suggests, then, that accepting and rejecting – expressed verbally and non-verbally - may be core components in question-responding, whilst other elements of question-responding are evidenced according to the activity involved.

Although there were similarities with what had been found previously, the question-posing and question-responding utterances and gestures evident in these episodes with older children were distinct from those we had previously witnessed with younger children (Chappell et al, 2008) in the breadth of possibility inherent in the task children were engaging in. Rather than investigations being driven by child-initiated exploration, each learning activity in this analysis was framed by a very clear boundary by the teachers and thus was inherently perhaps narrower in terms of possibilities that could emerge.

Thus for example the ice-egg at the South-West school was set up as a scientific investigation and whilst several children are documented in the video material as immersed in awe and wonder, and in the imagination of the story which led to (and could come from) these ‘eggs’ appearing in the classroom, their focused work was actually on devising a scientific investigation, which narrowed their possibility thinking. Similarly, the making of clay houses was set up with clear parameters by the teacher: the house had to be complete within one class session, it must not be too three-dimensional because it would sit on a wall (and thus must not protrude too far), it was to be a standard size, it was to fit within a historical theme. The children were therefore working with a task which had inherently narrower possibility than it might have had.

In addition, then, to the revealing of accepting and rejecting as core elements in these episodes, the breadth of inherent possibility was framed much more tightly by teachers’ framing of the tasks in which these children were engaging. This contrasted with earlier studies where children had initiated more of their own activity. **There are implications here for how teachers frame creative activities for children.**

**Element 2:**
Reinforcement of some features of PT and continuing absence of risk

It was notable that, other than the question posing and question responding, three other key features previously identified in episodes of PT with younger learners, were also identified strongly here:

- **self-determination**: self-directed actions, self-chosen
- **intentional action**: activity/behaviour having a clear goal
- **development**: thinking moving forwards

Two further features were strongly evidenced in the South West site:

- **being imaginative**: “as if” thinking
- **Play/playfulness**: being in an ‘as if’ space, improvising

These two features were however only evidenced to a ‘medium’ degree in the East Anglian site. When the wider context of each of the episodes is considered, it can be seen that the two South West episodes were highly playful in nature, one of them (the ice-eggs) involving the suspension of disbelief, and the other (the magnets) involving playful exploration. In the East Anglian site, the two episodes were less inherently playful, involving mathematical problem-solving using shape formulae in one episode, and involving the construction of a clay tile representing a house. In the two East Anglian sites there is thus less inherent opportunity to play or to operate ‘as if’. This may in part be explained by the fact that in this classroom the children are a year older, and in their final year of primary school. One of the features of this final year of school is the final assessments undertaken by all children in core subjects which include mathematics. Schools are under pressure to maintain high pupil achievement due to performative pressures that judge not only children’s own worth but the performance of schools and teachers by these results. There may therefore be implications here for teachers in considering, in the face of performative pressures, how to offer older primary children opportunities for immersive, playful activity that may nurture their creativity by enabling them to engage in ‘as if thinking’ and encouraging self-determination, intentional action and forward-thinking.

Interestingly, informed by strength of evidence (analytic mechanism as discussed prior to Table 1), there seemed to be an equal degree of medium to strong immersion by children (i.e. concentration,
absorption) in the two sites, despite the difference in the inherent playfulness, and in each site it seemed to the research team that there was an equivalent degree (medium) of pupil innovation (i.e. generating original or unique outcomes). This suggests that, although the episodes in one site were inherently more imaginative than those in the other, this may not have been important in relation to children’s capacity to be deeply involved in their learning and to generate creative work.

Intriguingly, in both the South West and the East Anglian sites however, **risk-taking by pupils seemed to be absent**. This reflected the earlier empirical work with younger children in PT Phases 1 and 2, although a later study of younger children (Craft et al, 2011) has identified risk-taking in child-initiated play. In the case of these children aged 9-11 the absence of risk-taking may reflect the teacher control over the nature of the task in each case; as this was the teacher’s agenda, the children were undertaking their creative work on the teacher’s terms. It may also possibly say something about the code of accepted conduct within these classrooms where the teacher’s framing of creative work was not challenged by the children. Equally it could be that risk-taking was occurring but our approach to the research did not detect it. The fact that risk-taking was absent however does raise the question of whether it is actually necessary to possibility thinking.

**Element 3: Collaboration as an emergent feature**

An emergent feature which became apparent from the analysis in both of these sites, was much greater opportunity for and success in collaboration in groups. This we defined as PT happening so as to build ideas together – rather than individuals working in relation to one another. There was evidence in most episodes of collaboration in groups as important. Apprenticeship (children showing one another ways of approaching their work through their behaviour, and modelling actions on the behaviours of others) was seen occurring between peers during collaborative work – as shown in the small vignette regarding the clay houses given earlier.

The emergence of collaborative creativity in the classroom is increasingly documented in a range of contexts. These include, for example, collaborative creativity in the upper primary age group in
dance (Chappell, 2006), in creative writing (Vass et al, 2008) and in mathematics (Clack, 2011). Some of this research is specifically focused on possibility thinking; Clack’s work, which explored possibility thinking in children aged 9-11 in the mathematics classroom, identified co-operating and collaborating as one of four features of children’s mathematical PT behaviour.

More recent possibility thinking research (Craft et al, 2011) has also revealed collaboration in possibility thinking enacted by much younger children, too. There may be implications for teachers in considering how collaborative creativity can be acknowledged and encouraged in older primary learners.

**Discussion and conclusion**

Overall, the analysis brought out commonalities across the two sites, in terms of both presence and absence, and one new feature. Features more strongly present are given in bold, as shown in Table 2.

*Insert Table 2: commonalities between sites here*

In Phase 1 of the earlier PT work, with younger children (Burnard et al, 2006), the characteristics of PT had been characterised in terms of process, outcome and a mix of both, as follows in Fig 4.

*Insert Figure 4: Possibility Thinking in 3- to 5-year-olds from Burnard et al, 2006 here*

What the current study reveals is the relative strength (or in the case of risk-taking, absence) of these features, and introduces the new context of peer collaboration, as represented in Fig 5, which also acknowledges the enabling task and associated pedagogy (the latter of which is only briefly discussed in this paper). Peer collaboration perhaps warrants greater attention by practitioners keen to nurture children’s creativity in this pivotal phase of childhood.

*Insert Figure 5: Possibility Thinking in 9-to 11-year-olds (the present study) here*

As will be seen, in Fig 5, ‘Play’ has been moved into ‘process-outcome’ close to ‘Imagination’ reflecting overlap, in this study,
between imaginative and playful behaviour which was particularly striking given the older age group of 9-11 year olds. Again there are implications here for practitioners in nurturing playful potential through immersive and imaginative contexts, in the learning of children who are in the upper part of the primary school. It could be that the distinctions and synergies between imaginative behaviours and playfulness in PT could be fruitfully explored in future studies.

Further areas for investigation in new studies and thus in the development of practice, would be the weaker presence of both immersion and innovation, and the complete absence of student risk-taking. The strongly performative environment of the wider national schools context in England where this study was undertaken, means that schools need to balance the fostering of student creativity with ensuring high attainment. This latter in turn reflects on how creative potential is framed by teachers and on the school as a whole. It is possible that, in such a context, teachers retain greater control over the curriculum and learning than they might otherwise do, because encouraging risk-taking by students may be seen as a potential threat to high attainment (or even to creativity). It may be that the lower degree of student immersion and the weaker evidence of student innovation reflect this greater teacher control. Given the more recent study of possibility thinking in child-initiated play (Craft et al, 2011) which revealed children highly immersed, innovating and indeed taking risks, further studies could help deepen understanding and characterisation of what opportunities for PT children experience, and the degree to which risk-taking is necessary to PT.

Finally, the nature of peer to peer collaboration between pupils in possibility thinking episodes could be further investigated not only by practitioners but also by researchers, in particular exploring the nature and dynamic of apprenticeship relationships between children.

**Concluding thoughts**

This study has sought to generate further evidence-based analysis of PT and to explore further, how PT drives creativity in the classroom. Drawing upon situated creative learning perspectives, the researchers
sought to identify in these new classroom contexts the range of dimensions and categories of PT and what role PT plays in creativity.

The research reported in this paper revealed children working with ideas collaboratively, recognising one another’s ideas and building these into personal and collective responses to tasks spanning the investigation of the properties of ice-eggs, construction of a magnet man, mathematical investigations and making their own personal clay tile. Whether working on a product which would be eventually a personal one (in the case of the clay tile) or a collective outcome (as with the ice-eggs, magnet man and mathematical investigations), the children were demonstrating Beghetto’s (2007) ‘ideational code switching’ (discussed earlier). They were, in other words, able to share their ideas with others and have these recognised.

Children documented in this study were thus making the transition from their own internal meaning-making or mini-c creativity to sharing that with others, or what Beghetto and Kaufman (2007) call little c creativity. Whilst for Craft (2005) the intrapersonal and interpersonal dimensions are all part of little c creativity, what this study of possibility thinking offers is some insight into the processes at work as children make the transition from their own to shared creativity. It is hoped that, to this degree, it may offer some contribution to the as yet separately traversed territory explored by the conceptual work undertaken by Kaufman and Beghetto in the USA and the empirical and conceptual work by the authors of this paper and others researching PT in England and Taiwan (eg Clack, 2011, Lin, 2010, 2011). The degree to which PT as an evidence-based concept can help to shed light on what drives everyday creativity and how, is for others to judge.

Acknowledgments
The team thank all of the children and teachers participating in earlier phases of this study. In addition, we wish to acknowledge the contribution made by Susanne Jasilek and Anne Meredith, Consultant Researchers in earlier phases of the PT work, and the funders: Cambridge, Exeter and Open Universities.

Biographical notes
DELETED FOR PEER REVIEW
References


1 SATS as they were known, were undertaken by all Year 6 classes in the year we collected this data. Some schools have since chosen to boycott these controversial assessments.