Exploring and developing reasoning in primary English

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Michaela is an ESRC-funded student in Education at Durham University and is particularly interested in exploring reasoning in Primary education.

Research funded by NINEDTP as part of the Economic and Social Research Council (ESRC)

Thank you to my supervisors, Prof. Steven Higgins and Dr David Waugh, and to my former supervisor, Dr Per Kind, for their invaluable guidance, insight and support throughout this project.

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The socio-cultural framework describes reasoning as a cultural phenomenon, expanding thinking to something which is played out in public. Drawing upon the academic field of cognitive history, this project argues that academic domains have developed their own 'styles of reasoning', which can be found as ways of arguing in debates and written texts, and which should be promoted in the school curriculum. This project identifies styles of reasoning drawn upon in English literature and of importance within primary English. Activities are developed which can be adapted to promote particular reasoning styles in the primary classroom. Transcripts are coded and analysed using the Cambridge Dialogue Analysis Scheme (CDAS) (Vrikki et al., 2018) which has been modified to capture style-specific reasoning in English. This paper gives an overview of the theoretical underpinnings of the project as well as a brief description and justification of methodologies used.

Keywords: reasoning styles, thinking, primary English, socio-cultural.

Introduction

Teaching thinking and reasoning, particularly within primary education, has presented schools and teachers with difficulties (Mercer & Howe, 2012; Nickerson, Perkins & Smith, 2013; Wegerif, 2010), despite recognition of the importance of teaching reasoning within schools (e.g. McPeck, 1981; Trilling & Fadel, 2009). This partially stems from the lack of cohesive and uncontested theory around reasoning and how it should be embedded within education. The obstacles teachers face in understanding the principles behind research on thinking and reasoning and in modifying their practice have been documented (Billings & Fitzgerald, 2002; Lefstein, 2008; Mercer & Howe, 2012; Sedova, Salamounova & Savricek, 2014). Adding to these problems is the lack of attention given to reasoning, particularly across academic subjects, within the national curriculum (DfE, 2014). The project reported here aims to stimulate improved teaching of reasoning in primary English lessons. To achieve this aim, a theoretical framework of reasoning 'styles' important within English has been constructed. Activities drawing

upon the ideas of dialogic teaching have been developed to target reasoning styles and have been subject to formal trialling.

Reasoning

Reasoning has been defined in numerous ways for varying purposes. For the purpose of this research, a broad definition of reasoning as "the process of drawing conclusions" (Leighton, 2004) is adopted. This encompasses many of the main ideas proposed in the multiple definitions and also fits with a 'common-sense' understanding of reasoning held in wider society, including schools. Being able to communicate the main ideas of this research to practitioners in schools is a fundamental requirement of the project.

Reasoning in socio-cultural theory

Reasoning is often considered from a psychological perspective focusing on innate reasoning as an individual cognitive process. Yet this perspective is criticised for failing to deal with higher-order reasoning extending beyond innate processes (Fodor, 1983). Philosophers largely focus on ideas like critical thinking, norms and values, logic and frameworks of argumentation (e.g. see Brandom, 2009; Kuhn, 1991; Toulmin, 1958). In contrast to psychological and philosophical approaches to reasoning, socio-cultural theory argues that knowledge and reasoning develop within cultures before becoming internalised by individuals. Typically associated with Vygotsky (e.g. 1978), socio-cultural theory maintains that language, among other tools, is used to mediate knowledge (Mercer, 2000; van Drie & van Boxtel, 2008; Vygotsky, 1962, 1978; Wertsch, 1991). The importance of communication and interactions with others is highlighted (Fernández, Wegerif, Mercer, & Rojas-Drummond, 2001; Howe, 2010). This definition expands reasoning from something existing within the mind of the individual to something which is played out in public, as "talking, arguing and

showing" (Hacking, 1992).

Reasoning is therefore considered to be a cultural phenomenon invented by, and part of, particular cultures. Academic domains represent different cultures; it is argued that disciplines have developed particular 'styles' of reasoning to draw conclusions and decide which ones count as valid arguments. Cultural reasoning draws upon the epistemic and social norms established in academic disciplines as well as their conceptual and procedural knowledge bases. This domain-specific approach to reasoning styles has been developed and explored in some fields (most notably in science) yet has been largely ignored in others (particularly arts-based domains). The reasoning practices within English literature have received limited attention yet there is a need to explore and make explicit the typical reasoning processes drawn upon here. This is especially important for teaching and learning: if students are to develop their capacities to reason appropriately within particular academic cultures and therefore participate fully, it is important that these practices are made explicit, taught and practised.

The 'styles' concept

The notion of reasoning 'styles' draws upon the academic field of cognitive history (Nersessian, 1995, Netz, 1999, Tweney, 2001) which studies written material to explain the interaction between *external* (cultural) and *internal* (cognitive) reasoning. It is argued that reasoning, in line with socio-cultural theory, can be found as ways of arguing in discussion and written texts. Reasoning styles are defined as "a pattern of inferential relations that are used to select, interpret, and support evidence for certain claims" (Bueno, 2012, p. 657). These ideas have been explored mainly in relation to science: Crombie's framework of six styles of scientific reasoning arose following extensive study of European scientific texts spanning two thousand years (1995). His

research provides a framework for identifying styles in other disciplines, through analysis of written material and immersion in a particular culture.

Research questions

This paper draws upon a larger empirical study used towards fulfilment of a PhD in Education. The study has three main research questions:

- What styles of reasoning predominate in the academic domain of English literature and have most relevance for the primary English curriculum?
- How can relevant reasoning in English literature be realised in scaffolding tasks for use in primary English teaching?
- How efficiently are the scaffolding tasks stimulating intended styles of reasoning in students' discourse?

This paper will focus primarily on the first two questions with findings reported at a later date.

Reasoning styles framework for English

To create a framework of reasoning styles applicable to English, it was necessary to look towards the English literature culture and its materials to identify styles of importance. This follows the cognitive history tradition and the model provided by Crombie (1995). The first phase of the project involved analysis of a wide range of texts, debates and lectures from English literature to identify the styles of reasoning drawn upon by academics in the field. Since reasoning styles which are also applicable to primary English were required, analysis also focused on two additional sources: the programme of study for English within the primary national curriculum (DfE, 2014) and associated assessment materials (e.g. Standards and Testing Agency, 2015). This was a pragmatic move given that the framework had to be applicable to the primary stage of

education and had to be understood by teachers of this phase. It was also hoped that the framework would complement current national curriculum requirements, so that teaching and promoting reasoning styles were not viewed as competing or additional demands within schools. These three main sources were considered in terms of the types of reasoning exhibited or required and each contributed to the final framework. The criteria for including particular styles in the framework focused first on their identifiability in the academic culture of English literature; they should represent key ways of forming and justifying conclusions within products of the culture. This should be supported in literary theory. Secondly, they should bear some resonance to the reasoning styles important within English in schools. Although school-based examples will illustrate differences in progression, the key hallmarks of individual styles should be applicable and appropriate from primary school onwards. Thirdly, the styles should be distinguishable from one another. While overlaps between reasoning styles may occur in practice, the descriptions of each should be distinct to make the key modes of thinking explicit so that they can be targeted in English lessons and analysed individually. There is no hierarchical structure within the styles identified and the importance of each varies according to the particular focus, literary text and purpose of analysis.

The framework

The five key styles are thus termed:

- **The genre-based style**: consideration of the genre(s) drawn upon within a text, including its associated conventions, how this is employed, and to what effect;
- **The structural style:** use of and reflection upon the organisational devices and structural features utilised within a text to achieve a sense of unity;

- **The analogy-based style:** use of analogy to create, explore and contrast images, characters and themes within and between literary works;
- **The contextual style:** consideration of background contextual aspects which supports creation and/or interpretation of a text;
- **The language-based style:** consideration of language and linguistic devices used to direct and flavour text.

It must be noted that this project does not claim to identify an exhaustive list of styles. It is accepted that others conducting similar analysis may produce a different version of the framework. The five styles described here are presented as what has emerged from the analysis undertaken here. They are being trialled in schools which may clarify, modify or change the styles. Despite the tentative claims regarding the existence of these styles, analysis was conducted thoroughly and rigorously; styles were identified after analysis.

Using the framework in the primary classroom

Whilst research can identify the predominant styles of reasoning for each academic domain and associated school subject, simply knowing about which styles dominate in English will not alone develop students' capacities to reason. There is therefore a need to develop activities which provide students with opportunities to practise subject-specific reasoning. Since language, communication and talk are central within sociocultural theory and to the development and practise of reasoning, a dialogic approach was sought. Dialogic teaching is widely advocated in research (Alexander, 2008; Littleton & Mercer, 2013; Michaels & O'Connor, 2013) although authors use a range of terms to refer to practices involved (Hennessy et al., 2016). This research will broadly follow principles identified by Alexander which suggest that dialogic teaching is collective, reciprocal, supportive, cumulative and purposeful (2008, p. 38). Research

has highlighted the lack of talk within classrooms alongside a preference towards low-level tasks and questioning, which place limited cognitive demand on students (Howe & Abedin, 2013; Smith, Hardman, Wall & Mroz, 2004). Changing this is not straightforward, yet embedding the reasoning styles into scaffolding activities, which make students practise and reflect on the reasoning involved may help to enhance student reasoning.

Methodology

The next phase of the project requires development, piloting and formal trialling of teaching materials designed to stimulate particular reasoning styles in primary English. While space does not permit detailed description of data collection and methods of analysis, briefly, lessons are audio recorded, transcribed and coded using a framework designed to focus on reasoning and dialogic teaching and learning. Trialled activities address three of the five styles from the framework (genre-based, language-based and analogy-based); selected given their appropriateness and importance within Key Stage 2. Four main activities are being trialled across these styles: odd one out, fortune lines, diamond ranking and role on the wall (see Higgins & Baumfield, 2011, for discussion of the first three activities). The activities should be flexible enough to be adapted to probe different styles of reasoning. Using different activities to promote the same reasoning style should permit analysis of the range of types of response generated within a particular style, regardless of the specific task. Conversely, by using the same task across different reasoning styles, the task-specific reasoning features or affordances may be observable.

Analysis

There are three main layers to data analysis. Firstly, transcripts are coded using a version of the Cambridge Dialogue Analysis Scheme (CDAS) (Vrikki et al., 2018)

developed from an earlier version: The Scheme for Educational Dialogue Analysis (SEDA) (Hennessy et al., 2016). The CDAS framework has been revised and developed in this project with additional coding categories added aiming to identify style-specific reasoning in English. The second layer of analysis focuses on task-specific affordances in terms of thinking and reasoning promoted by particular task structures. The third layer considers the impact of the teacher and/or researcher acting as a scaffold to reasoning and dialogue. This will also represent one of a number of ways in which the framework is evaluated: if teachers and/or students are able to make the reasoning styles explicit or demonstrate their understanding of them, this will help to verify their identifiability and communicability. It is hoped that trialling activities and evaluating their educational value will lead to recommendations for improving teaching of reasoning in primary English.

Next steps

Although this paper does not report empirical findings, it aims to provide both an overview of the theoretical assumptions underpinning the project, and description and justification of the methodology employed. The trial is now well under way. While formal evaluation of the success of these lessons in terms of promoting particular reasoning styles is not yet available, initial consideration based on analysis of early data is promising. Moreover, the particular coding categories developed to capture the style-specific elements of reasoning appear to offer reliably identifiable categories.

References

Alexander, R. (2008). Towards dialogic teaching: Rethinking classroom talk (4th ed.). York: Dialogos.

Billings, L., & Fitzgerald, J. (2002). Dialogic Discussion and the Paideia Seminar. American Educational Research Journal, 39(4), 907-941.

Brandom, R. B. (2009). Reason in philosophy: Animating ideas. Massachusetts; London: The Belknap Press of Harvard University Press.

Bueno, O. (2012). Styles of reasoning: A pluralist view. Studies in History and Philosophy of Science, 43, 657–665. https://doi.org/10.1016/j.shpsa.2012.07.008

Crombie, A. C. (1995). Commitments and Styles of European Scientific Thinking. History of Science, 225–238.

Department for Education. (2014). The national curriculum in England: Framework document. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/381344/Master_final_national_curriculum_28_Nov.pdf

Fernández, M., Wegerif, R., Mercer, N., & Rojas-Drummond, S. M. (2001). Reconceptualising “scaffolding” and the zone of proximal development in the

context of symmetrical collaborative learning. Journal of Classroom Interaction, 36, 40–54.

Fodor, J. A. (1983). The modularity of mind : an essay on faculty psychology. Cambridge, Mass.; London: MIT Press.

Hacking, I. (1992). 'Style' for historians and philosophers. Studies in History and Philosophy of Science Part A, 23(1), 1–20. https://doi.org/10.1016/0039-3681(92)90024-Z

Hennessy, S., Rojas-Drummond, S., Higham, R., María Márquez, A., Maine, F., Ríos, R. M., … Barrera, M. J. (2016). Developing a coding scheme for analysing classroom dialogue across educational contexts. Learning, Culture and Social Interaction, 9, 16–44. https://doi.org/10.1016/j.lcsi.2015.12.001

Higgins, S., & Baumfield, Viv. (2001). Thinking through primary teaching. Cambridge: Chris Kingston Publishing.

Howe, C. (2010). Peer groups and children's development. Oxford: Blackwell. http://dx.doi.org/10.1002/9781444318098.

Howe, C., & Abedin, M. (2013). Classroom dialogue: a systematic review across four decades of research. Cambridge Journal of Education, 43, 325e356. http://dx.doi.org/10.1080/0305764X.2013.786024.

Kuhn, D. (1991). The skills of argument. New York, NY, US: Cambridge University Press. http://dx.doi.org/10.1017/CBO9780511571350

Lefstein, A. (2008). Changing Classroom Practice Through the English National Literacy Strategy: A Micro-Interactional Perspective. American Educational Research Journal, 45(3), 701–737. https://doi.org/10.3102/0002831208316256

Leighton, J. P. (2004). Defining and Describing Reason. In J. P. Leighton & R. J. Sternberg (Eds.), The Nature of Reasoning (pp. 3–11). Cambridge: Cambridge University Press. https://doi.org/10.1017/CBO9780511818714.001

Littleton, K., & Mercer, N. (2013). Interthinking: Putting talk to work. Abingdon: Routledge.

McPeck, J. (1981). Critical thinking and education (Issues and ideas in education series). Oxford: Martin Robertson.

Mercer, N. (2000). Words and minds: How we use language to think together. London: Routledge. http://dx.doi.org/10.4324/9780203464984.

Mercer, N., & Howe, C. (2012). Explaining the dialogic processes of teaching and learning: The value and potential of sociocultural theory. Learning, Culture and Social Interaction, 1, 12–21. http://dx.doi.org/10.1016/j.lcsi.2012.03.001.

Michaels, S., & O'Connor, C. (2013). Conceptualizing talk moves as tools: Professional development approaches for academically productive discussion. Socializing intelligence through talk and dialogue. Washington DC: American Educational Research Association.

Nersessian, N. J. (1995). Opening the Black Box: Cognitive Science and History of Science. Osiris Science, 10, 194–211.

Netz, R. (1999). The shaping of deduction in Greek mathematics: a study in cognitive history. Cambridge: Cambridge University Press.

Nickerson, R. S., Perkins, D. N., & Smith, E. E. (2013). The Teaching of Thinking. New York; London: Psychology Press.

Sedova, K., Salamounova, Z., & Svaricek, R. (2014). Troubles with dialogic teaching. Learning, Culture and Social Interaction, 3, 274–285.

Smith, F., Hardman, F., Wall, K., & Mroz, M. (2004). Interactive whole-class teaching in the national literacy and numeracy strategies. British Educational Research Journal, 30, 395-411. http://dx.doi.org/10.1080/0141192041000168970 6.

Standards and Testing Agency. (2015). 2016 Key stage 2 English reading test framework: National curriculum tests from 2016: For test developers. Retrieved September 8, 2018, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/628816/2016_KS2_Englishreading_framework_PDFA_V3.pdf

Toulmin, S. (1958). The uses of argument. Cambridge: Cambridge University Press.

Trilling, B. & Fadel, C. (2009). 21st century skills: Learning for life in our times. San Francisco, CA: John Wiley & Sons.

Tweney, R. D. (2001). Scientific thinking: A cognitive-historical approach. In K. Crowley, C. D. Schuun, & T. Okada (Eds.), Designing For science: Implications from everyday, classroom and professional settings. Mahwah, NJ: Lawrence Erlbaum Associates.

van Drie, J., & van Boxtel, C. (2008). Historical Reasoning: Towards a Framework for Analyzing Students' Reasoning about the Past. Educational Psychology Review, 20(2), 87–110. https://doi.org/10.1007/s10648-007-9056-1

Vrikki, M., Wheatley, L., Howe, C., Hennessy, S. & Mercer, N. (2018). Dialogic practices in primary school classrooms. *Language and Education*. DOI: 10.1080/09500782.2018.1509988

Vygotsky, L. S. (1962). *Thought and language.* Cambridge MA: MIT Press.

Vygotsky, L. S. (1978). Mind in society : the development of higher psychological processes. Cambridge, Mass.; London: Harvard University Press.

Wegerif, R. (2010). Mind-expanding: Teaching for thinking and creativity in primary education. Buckingham: Open-University Press.

Wertsch, J. V. (1991). Voices of the mind : A sociocultural approach to mediated action. Cambridge, Massachusetts: Harvard University Press.