Ruth Howard
Module Title: Investigating Research
MA Title: Effective Learning and Teaching
Word count: 3149

MA Dissertation Proposal: The impact of students generating and answering questions in facilitating learning conceptualised as knowledge construction

Introduction

This research proposes to consider students' conceptions of learning and their corresponding beliefs about the purposes of questioning, with a focus on questioning strategies to guide learning conceptualised as knowledge construction achieved through an action research design methodology.

Learning has a variety of meanings for different people. Often, one's initial and dominant conception of learning involves the taking in of knowledge (Watkins, Carnell and Lodge, 2007). The purpose of teaching therefore, would involve the transfer of knowledge. "In this conception of learning, people's ways of talking about a 'good learner' emphasise things like memorising, and the evaluation of learning is seen as outside the person – it's about performance and compliance" (p10). Within this view, students are passive recipients of teacher transmission, which is then checked via convergent questioning methods.

However, such conceptions of learning and resulting teaching practices whereby learning is the product of instruction, show little progression from the practices evident in the first classrooms on the planet – Sumeria 3000BC (Watkins, Carnell, Lodge, 2007). This 'banking' (Friere, 1970) of knowledge pedagogy should be rejected;

> "what students understand does not have a straightforward correspondence to what they have been told or read. As has been cogently argued, minds are not containers of knowledge propositions; nor can knowledge be directly transmitted through talk or text, since it must be constructed by each individual or knower" (Wells, 2000, p13)

Instead, learning is now widely conceptualised within a socio-constructivist framework, where knowledge is created and recreated between people, each bringing their own personal experience and information from other sources. The framework proposes that learning requires participation in a subset of activity systems. "Who that person becomes, depends on the activity system he/she participates in" (Wells, 2000, p4). The curriculum thereby serves as a means and not an end where learning and teaching is both exploratory and collaborative (Wells, 2000).

Literature Review

One such 'activity system' or strategy involves training students to generate and answer questions. There is a large amount of empirical support for the strategy

of students generating and answering questions which facilitates the process of knowledge construction. This process involves discussing content with someone else, which can transform how we think about it (Vygotsky, 1978). The effects of such strategies are indicated through performance in pre-test and post-tests to suggest causality using an experimental group and a control group. Random sampling of students to match groups serves as a measure to attempt to control differences between the groups so that these can be eliminated as casual factors, although not with complete certainty. The specific strategy, which is either created or employed to train students to ask and answer questions, ensures that the process is translated into an explicit procedure, which can be repeated with a high degree of consistency (Dowling and Brown, 2010, p44).

King (1994) used two guided questioning strategies and compared the effects to one unguided questioning strategy. Initially, all students in all three conditions received training on how to explain. This involved teachers explaining to the student participants the difference between describing something and explaining it by providing examples followed by a demonstration of how to develop an explanation using concepts and processes from a previous lesson. This was continuously modeled by emphasising the importance of telling how and why, using students own words to do so and connecting the idea being explained to something already known. In both the guided questioning conditions, using examples, students were taught to recognise and differentiate between 'memory' questions and 'thinking' questions. Students were then required to generate their own additional examples. The thinking questions were further classified into comprehension questions and connection questions, by explaining that comprehension questions check how well something is understood in the lesson by, for example, asking for an explanation in one's own words. In contrast, connection questions required the linking of two ideas from the lesson together. Students were provided with prompt cards with question stems. Students were then assigned to dyads to practice asking and answering questions.

In the first guided questioning condition, the students were trained to generate lesson based questions which intended to induce the construction of knowledge by facilitating connections among ideas in the lesson only. In the second condition, students were trained to generate questions which required connections amongst lesson based and experience based concepts, requiring assimilation. This explicitly related the lesson material to students' prior knowledge and experience, that is material learnt in a previous lesson or their general knowledge of the world. For example, "explain how the circulatory system is similar to a tree" (King, 1994, p340). The third condition served as a control; students did not receive training on question generation.

The study used a sample of twenty eight fourth graders and thirty fifth graders in a suburban elementary school in southern California. The students were randomly assigned to one of the three conditions. To analyse effects, in addition to pre and post lesson comprehension tests, knowledge mapping, metacognitive self-monitoring, student perception questionnaires using a 7 point scale and the collection of students' verbal interactions were collected and compared across

groups. The authors therefore used a dual approach to collect data (Dowling and Brown, 2010) involving both qualitative and quantitative techniques.

Overall, the results indicated that students could be trained to generate questions which led to answers which elicited greater knowledge construction, particularly those requiring the connection of ideas and experience. This effect was most prominently supported by the analysis of the students' verbal interactions. A coding scheme administered by a coder blind to the condition reviewed the lesson which had been filmed and coded student questions according to what they asked for, which were categorised as either factual questions, comprehension questions or integration questions. ANOVAS on the data followed by Fisher post hoc comparisons supported the notion that the level of questioning used may induce the level of knowledge construction taking place.

> "Not only did the control group operate at the lowest level of questioning, asking mostly factual questions, but also their statements were primarily at the lowest level of knowledge construction…..In contrast, experience based questioners operated mostly at the highest level of questioning and knowledge construction…These findings suggest that when students ask integration and comprehension questions they are more likely to engage in complex levels of knowledge construction, and when they ask factual questions they are more likely to engage in knowledge restating, the lowest form of knowledge construction" (King, 1994, p355)

Other results from attempts to measure effects were somewhat varied. For example, the analysis of the knowledge maps discovered that most maps were simple and at one level. This was attributed to the fact that the students had not learnt how to construct knowledge maps. Interestingly, students' ratings of strategy helpfulness on a 7-point scale found that there were no significant differences among conditions. Student interviews were not conducted, but perhaps would provide further insight into this outcome.

Gillies, Nichol, Burgh, Haynes (2012) compared King's (1994) Ask to Think Tel-Why questioning strategy to the philosophy for children approach (Lipman, 1988). The philosophy for children approach begins with a problematic situation from which the students' curiosity is aroused. This leads to genuine questions which guide the philosophical discussion. Questioning is therefore central to the process. For the students, they learn to ask a range of questions which probe alternative perspectives, investigate causal connections and relationships, pose hypothetical problems in addition to metacognitive questions which challenge them to be more self-reflective and self-monitoring. The teacher facilitates the discussion using procedural and substantive questions. "Procedural questions explore the underlying logic and structure of thinking, encourage reasoning and conceptual exploration, and model the procedure of inquiry. Substantive questions direct discussion in a subtle direction, draw upon and extend knowledge, and add new ideas and content" (Gillies, Nichols, Burgh and Haynes, p93).

Both strategies have previously supported positive effects on learning and reasoning. The authors were motivated to consider if one strategy was more successful than another. To assess this, the study aimed to consider if the strategies contribute to enhanced reasoning, problem-solving, explanatory responses and learning among students during inquiry-based science.

The study involved 35 groups of 6 students from 18 classrooms. Teachers were randomly assigned to one of the three conditions, which included a control group. Lesson 10 in unit one was videotaped and lesson 14 in unit two was videotaped. In the analysis, four categories of verbal behaviors were identified. These were interactive behaviours, helping behaviours, questioning behaviours and problems solving behaviours. Students' responses were coded by a coder blind to the purpose of the study, into one of the four categories. The results were evaluated using Kruskal–Wallis Tests to ascertain between group effects and follow up Mann Whitley U tests were used to describe the direction of the effects. Similarly, teachers mediating behaviors were also coded into either basic mediation, such as giving instructions or asking questions which required minimal responses and extended mediation, such as probing students' ideas, knowledge and assumptions. These were analysed and evaluated. Lastly, reasoning and problem solving measures were used to assess the extent to which students were making connections and building their understanding between information within the lesson

The authors were surprised to discover that the students' verbal behaviours did not vary between groups. This was attributed to the design of the units used in all three conditions which required cooperative and inquiry based learning which placed an emphasis on teaching students to be responsive to other students' questions and provide explanations and justifications for their responses. Similarly, no significant differences were found for the teachers mediating behaviours across the three groups. However, the reasoning and problem solving measure indicated that the students in the cognitive questioning condition obtained higher scores than their peers in terms of reasoning and problem solving than those in the community of inquiry condition who, in turn, obtained higher scores than the children in the comparison condition. This measure was used to indicate how the students were building understandings, making connections, and engaging in higher-level thinking about the information presented during the lesson, "behaviours that Hmelo-Silver (2004) argues are critically important for fostering deep and meaningful learning" (p101).

Similarly, an article by Speizman Wilson and Smetana (2011) analysed a series of studies investigating the use of the 'Questionning as Thinking' framework. The strategy promotes joint negotiation of meaning. Using a review of the studies, the authors asserted that higher levels of comprehension and understanding result from practices that require active knowledge construction and that the questioning framework required students to identify questions based on the relationship between the question and the text and then respond. In the studies reviewed, effects were anaylsed using pre and post vocabulary and comprehension tests. The findings supported the notion that students asking and answering questions leads to higher performance in tests, thereby linking

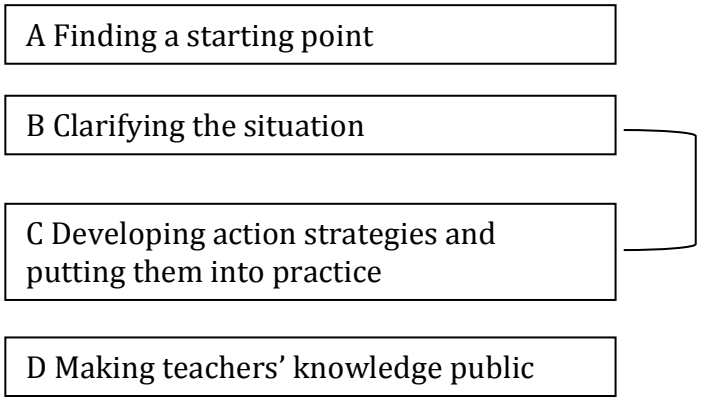
learning to performance. This supports the statement by Watkins (2001) that a focus on performance will decrease performance, a focus on learning will increase performance.

Methodology

The proposed research can be placed within the field of educational research. The empirical setting will be a large comprehensive school in North London. As a teacher employed by the school the teacher-researcher will have access as an employee. To conduct the research, one cycle of action research will be completed.

Action research is an appropriate methodology for the research since the approach involves practitioners actively seeking to effect transformations in their own practice (Dowling and Brown, 2010). It therefore effectively "bridges the divide" between research and practice (Somekh, p340, 1995) and rejects the concept of a two stage process in which research is carried out first by researchers which is then applied by practitioners, instead the two processes become integrated (Somekh, 1995). This achieves direct relevance and answers the concern that "there are questions asked by the educational community about the extent to which educational research meets criteria of practical relevance – for example, questions concerning the contribution of educational research to the formulation of educational policy or the improvement of educational practice" (Carr, p271). Similarly, Vanderline and Van Braak (2009) found that teachers judged educational research as unclear and were generally unconvinced, only valuing practical and applicable research, achievable with action research.

Action research can be reduced to a four stage process.



(Somekh, 1995)

To begin, action research involves surveying the current situation to identify a problem or a concern from everyday work to find a starting point. For this research, from existing literature and from my own experience as a performance manager, it is proposed that questioning strategies employed by both teachers and students are often passively used to check student understanding, reflecting an outdated and ineffective conceptualisation of learning.

The teacher-researcher will explore, refine and clarify this problem by considering student conceptions of learning and the use and purpose of questioning. Data will be generated through observation, note taking and interviews with students in a GCSE PE class. As the teacher of this class this represents an opportunistic sample (Dowling and Brown, 2010). Interviews will be conducted with a sample of 4-5 students and will take the form of a conversation using an unstructured interview format, using a loose set of guidelines in addition to probes and prompts. This will allow the researcher to explore the world from the perspective of the interviewee (Dowling and Brown, 2010), thereby gaining insights into student perceptions of learning and their experiences and beliefs about the role of questioning. In exploring the meaning of learning and the purpose of questioning, it is important to consider the initial stimuli within the context of the interview. "As a rule it helps to move from the particular to the general as interviewees often find abstract questions difficult to address (Dowling and Brown, 2010, p81), such as ones conceptualisation of learning. Therefore initial questions will require students to recall activities completed in previous lessons and questions that they had been asked and asked. Students will be guided to consider the outcome of the activities in terms of what they had learnt as a result. Following this, students' conceptions of what constitutes learning will be pursued. Recordings will be transcribed.

The ethical guidelines for educational outlined by BERA research will be followed with the students sampled. Access to the setting will be obtained from the Headteacher as the gatekeeper of the school. Following this, informed consent from the selected student volunteers will be sought in a written agreement, which will also outline the participants right to withdraw. The participants will know the processes involved and why their participation is necessary. The researcher will recognise and uphold the participants right to confidently and anonymity which will be achieved by removing the participants names. Although "children who are capable of forming their own views should be granted the right to express their views freely in all matters affecting them" (BERA, 2011, p6), additional guardianship consent will also be sought in line with the schools own policy.

It is important to consider and plan for possible difficulties and problems that may be experienced with the sample of students. Potentially students may withdraw from the research, could change class as a result of setting, may be absent from school due to a prolonged period of illness or students may leave school. Should this occur, alternative students will be found.

Data analysis will begin when generation starts in a "continual intermeshing process of data collection and analysis" (Glaser and Strauss, 1967, p73). Drawing on the processes associated with grounded theory, the teacher-researcher will use systematic coding, by noting categories and their properties in the data, and be aware of emergent categories and their subsequent reformation. This will involve the constant comparison of the incidents to generate theoretical properties of the category. As the process evolves, it is expected that the "constant comparison of incident with incident to comparison of incident with

properties of the category that resulted from initial comparisons of incidents" (Glaser and Strauss, 1967, p108) will occur. It is the researcher's aim that data will be collected until theoretical saturation is achieved. This will be indicated when incidents for the same category have been coded a number of times, which do not lead to new aspects (Glaser and Strauss, 1967). It is hoped that this will actually reduce the amount of data required, and avoid wasting time. Any theories generated by the data will fully emerge from the research.

Action research is characterised by a continual process of data collection, reflection and analysis, interpretation, action and evaluation. Therefore, following clarification of the problem, action research requires the design and implementation of an innovation. Using the findings of the data generation and analysis and findings from the research literature, the proposed research will create a questioning strategy to train students to answer and generate questions.

Finally, action research involves the evaluation of the outcomes to consider the impact of the innovation. These outcomes will be considered in interviews with the initial sample of 4-5 students and a whole class discussion to identify if changes in conceptions of learning and purpose of questioning have occurred. "Time for research is always limited, since the primary responsibilities of the action researcher are those of a working practitioner" (Somekh, p341). Although most action research involves several cycles, due to the limitations of a Masters Dissertation and my primary role as a teacher as opposed to researcher, a second subsequent cycle is unlikely. The findings of action research are then ultimately fed back directly into practice with the aim of bringing about change (Somekh, 1995). I intend to not only improve my own practice as a result, but also disseminate good practice in my role as teaching and learning lead practitioner at the school.

One potential problem of action research, which differs from most research methodologies that try to reduce their impact on the participants, is that it actively aims to affect change which lead to improvements. Therefore, opinions on what constitutes 'improvements' may affect access to a setting (Dowling and Brown, 2010). However, the school actively supports the development of pedagogy and a culture of 'risk taking' in trialing new strategies and pedagogy.

A limitation of action research is that the impact of the innovation is highly local to the research setting (Dowling and Brown, 2010). However, "no piece of research is of any value as research at all unless it does impose upon the way in which you interpret the world on subsequent occasions" (Dowling and Brown, p151). In addition to the delineation of outcomes to the whole school staff, it is intended that the research will contribute to and extend the current body of literature supporting the strategy of students generating and answering questions to enhance learning viewed as knowledge construction within a socio-constructivist paradigm.

Bibliography

BERA, (2011) Ethical Guidelines for Educational Research, London: s.n

Dowling, P. and Brown, A. (2010) Doing Research/ Reading Research Re-interrogating Education, London: Routledge

Gillies, R, Nichols, K, Burgh, G and Haynes, M (2011) The effects of two strategic and meta-cognitive questioning approaches on children's explanatory behaviour, problem-solving, and learning during cooperative, inquiry-based science

Glaser, B. and Strauss, A., (1967) The discovery of grounded theory: strategies for qualitative research, Mill, Valley, CA: Sociology Press

King, A. (1994) Guiding Knowledge Construction in the classroom: effects of Teaching Children How to Question and How to Explain, American Educational Research Journal, 31(2), p338-368

King, A. (2010) ASK to THINK-TEL WHY: A model of transactive peer tutoring for scaffolding higher level complex learning, Educational Psychologist, 32(4), p221-234

Somekh, B. (1995) The Contribution of Action research to Development in Social Endevours: a position paper on action research, British Educational Rseearch Journal, 21(3), p339-355

Speizman Wilson, N. and Smetana, L. (2011) Questioning as thinking: a metacognitive framework to improve comprehension of expository text, Literacy UKLA, p84-98

Watkins, C., Carnell, E. and Lodge, C. (2007) Effective Learning in Classrooms, Sage Publications

Vanderlinde, R. and Van Braak, J. (2009) The gap between educational research and practice: views of teachers, school leaders, intermediaries and researchers, British Educational Research Journal, 36(2), p299-316

Friere, P. (1970) Pedagogy of the Oppressed, Penguin

Wells, G Dialogic Inquiry in Education: Building on The Legacy of Vygotsky in Lee, C. and Smagorinsky, P (eds) Vygotskian perspectives on literacy research, New York: Cambridge University Press (p51-85)

Vygotsky, (1978) Mind in Society, Cambridge, MA: Harvard University Press

Watkins, C. (2001) Leanring about learning enhances performance, INSI Research Matters, 13, 1-9