A design-based approach for research into deaf children's reading comprehension

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Abstract

Design-based methodologies provide a paradigm for educational research which enables us to see beyond what is or is not working, to develop practices and interventions that 'work better' (Kelly et al., 2008, p3). This paper explains the design-based methodology and explores the use of this approach to research deaf children's reading comprehension in order to make a significant contribution to theory and impact on practice. The research context is presented and current paradigms are reviewed. The issues of researching deafness and reading in a way which takes into account the resources of the individuals and the potential of the context are illustrated and a rationale for using a design-based model is presented. The paper examines and reflects on the use of this methodology for investigating deafness and reading comprehension drawing on a current work in progress into Deafness and Reading for Meaning (DreaM) at the University of Leeds.

Introduction

Research into deafness and reading over the last 40 years has improved our understanding of aspects of deaf children's reading abilities and overall attainment issues (Harris and Marschark, 2011; Trezek et al., 2010; Marschark and Wauters, 2008). To develop this knowledge and move it forward into practice, research into deafness and reading comprehension is needed which accounts for the diversity of individual language experience as well as the range of other factors which influence the learning and acquisition of deaf children's skills in reading for meaning. This will include individual factors relating to deafness itself, learning abilities and motivation as well as the contextual influences of the school and home environments. For the purposes of this paper the term *deaf* is used to refer to any level of hearing loss (mild, moderate, severe or profound) which significantly effects a child's language and literacy development.

In a design-based approach the act of design itself is part of the inquiry which tends to be solution-focused and ultimately concerned with improving learning (Reimann, 2011; Bannan-Ritland and Baek, 2008; Kelly et al., 2008; Barab and Squire, 2004; Cobb et al., 2003; Baumgartner and Bell, 2002; Brown, 1992; Collins, 1992). This methodology is concerned with the dual processes of contributing to theory whilst also contributing to educational practice through active engagement with the environment, which includes the policies; curriculum; people and ethos (Cobb et al., 2009; Sandoval and Bell, 2004; Edelson, 2002). It is an approach which prioritises a focus on research outputs which are contextually relevant and properly shared or communicated and, as such, a methodology which embraces and anticipates the 'rich, complex, and constantly changing environment of the classroom' (Brown, 1992, p.144).

The research context

Becoming a successful reader presents one of the most significant barriers to learning and achievement for deaf young people throughout their school career and beyond into employment (Trezez et. al., 2010; Luckner et al., 2006). The majority of deaf students leave school (at 18 years of age) with a mean reading age of 9 years (Traxler, 2000; Powers et al., 1998; Conrad, 1979), and despite extensive and dedicated research attention to this area of deaf education the levels of attainment are hardly improving (Harris and Terlektsi, 2011; Hendar, 2009; Marschark et al., 2010; 2007; Wauters et al., 2006). Research in this area to date reveals a wealth of information about certain aspects of deaf children's reading abilities and attainment, but leaves many unanswered questions about what leads to successful reading comprehension for deaf children (Mayberry et al., 2011; Wang and Paul, 2011; Wauters et al., 2008). We are still far from understanding the full extent of the challenges that reading for meaning poses for deaf children or indeed how deaf children's reading comprehension skills can be effectively taught and reliably measured

(Easterbrookes, 2010; Spencer and Marschark, 2010; Trezek et al., 2010; Marschark et al., 2009; Luckner et.al., 2006).

This uncertainty can be explained in part by the theoretical perspectives and methodological approaches which have prevailed in this field. Research has tended to focus on isolated literacy variables (Wang and Paul 2011, p.56) rather than consider the full range of processes necessary for successful reading comprehension (Perfetti et al., 2005; Schirmer and McGough, 2005; Kintsch and Rawson, 2005; Gough and Tunmer, 1986). These, according to the 'Simple model', can broadly be described as decoding and language comprehension skills (Gough and Tunmer, 1986). More precisely, the 'Construction Integration model' (Kintsch and Rawson, 2005) highlights the role of readers' prior knowledge in understanding text and emphasises inferencing ability as central to reading comprehension success. With regards research into deafness and reading, certain text-based aspects of the reading process, such as phonological coding and word recognition skills have been emphasised but less attention has been given to reader, task and context variables (Wang and Paul, 2011; Marschark et al., 2009; Marschark and Wauters, 2008). This fragmentation has made it difficult to translate research into 'usable, actionable and adoptable' outcomes for practice and intervention (Bannan-Ritland, 2003, p.24).

A challenging issue for both theory and practice in the field of deafness and reading is the heterogeneous nature of the deaf school population and the diversity of factors influencing reading success. One set of variables to be considered is the nature and level of individual hearing loss and the subsequent impact on a child's communication, learning and social development (Moeller et al., 2007; Goldberg and Richburg, 2004). A second issue is the diverse early language experiences that deaf children encounter depending on whether they have deaf or hearing family members and other home languages (Geeslin, 2008; Swanwick and Watson, 2007; Kaderavek and Palulski, 2007). Added to this, it is estimated 40% of deaf children present additional and complex needs which influence behavioural, cognitive, social, motor and sensory skills and processes (Connix and Moore, 1997). Deaf young people also bring varied language resources to the task of reading such as limited access to speech sounds and experience of another language modality (sign language). This complicates how we collect, analyse and interpret research findings, but offers opportunities to explore original approaches to research for this and other diverse populations.

Research in deafness and reading comprehension has tended to isolate and control variables (such as levels of hearing loss, educational placement, language histories) and focus on sub- groups of deaf children and sub-skills of reading. This means that the research has not always considered the complexities of the reading process and the diversity of the population. For example, many deaf children bring skills in sign language and other spoken languages to the task of reading for meaning (Menendez, 2010; Plaza-Pust and Morales-López, 2008; Niederberger, 2008; Swanwick and Watson, 2007). This multilingual and multimodal dimension brings additional complexities relating to the relationship between

sign language and literacy that have to be considered for deaf children's reading difficulties to be properly understood. We refer here to the challenges posed by the *unmappability* between British Sign Language (BSL) and English because of the different modalities: sign, spoken and written language (Mayer and Wells, 1996). In order to capture and analyse diverse routes to reading success as well as the atypical resources that deaf individuals bring to the task, a methodology is needed which characterises and describes these variables (Freel et al., 2011).

A further characteristic of existing research into deafness and reading is that it has not thus far directly involved the agents who can make a difference in the educational context or that have a strong personal stake in the research. Agents in this context include the practitioners, parents, and the young deaf people themselves, sometimes referred to as 'stakeholders' in the design-based discourse (Reimann, 2011). Practitioners tend to be viewed as end-users of projects and often find that research findings are inaccessible or do not articulate with their practical issues. There is a need for more effective partnerships between researchers and teachers in deaf education and for research outcomes to be effectively applied to the classroom (Spencer and Marschark, 2010; Swanwick and Marschark, 2010).

Projects which involve parents as expert partners are scarce (e.g. Dalzell et al., 2007; DesGeorges, 2003). Deaf children and their parents are more usually constructed as research subjects and are rarely involved in the identification of research questions or design (e.g. DesJardin et al., 2009; Plessow-Wolfson and Epstein, 2005). This appears contradictory since the establishment of close involvement and 'sustainable relationships' between researchers and stakeholders (Nieveen et al., 2006, p.238) would seem to be a highly appropriate objective for research into reading and deafness given that deaf children's experience of reading is largely contingent on the understandings and actions of the adults in the home, (Aram et al., 2008; Stobbart and Alant, 2008) and school environments (Knoors and Hermans, 2010).

The DReaM project

The Deafness and Reading for Meaning (DReaM) project at the University of Leeds adopts a design-based approach to investigating deaf children's reading for meaning, taking inspiration from the influential papers by Ann Brown (1992) and Allan Collins (1992), and the ensuing discussions in the special issues of Journal of the Learning Sciences, 13 (1); Education Researcher, 32 (1) and Educational Psychologist, 39 (4); and edited text books (Barab and Squire, 2004; Edelson, 2002; Kelly, 2003; Reimann, 2011; Walker, 2011). This approach lends itself to seeking new theoretical frameworks which are not reliant on existing models. This is pertinent for the research context and issues described as this methodology allows room to seek solutions to teaching and assessment problems as they

emerge (Barab and Kirshner, 2001) by generating and cultivating rather than confirming hypotheses (Kelly, 2006; Brown, 1992). This enables us to avoid entrenched views of what reading comprehension involves and 'look beyond the obvious' to identify what the real comprehension issues are for deaf learners (Marschark et al., 2009, p. 58).

The DReaM project is concerned with developing appropriate reading assessment tools and intervention strategies for deaf young people. As such, this project seeks to bridge the research-practice gap through the development of intervention and assessment materials or approaches which can be adopted and enacted within the context of the research. The outputs of this research will be tangible tools and materials, as well as assessment and intervention processes which are migratable across contexts (Middleton et al., 2008). In design-based discourse, these outputs are referred to as 'artefacts' (Larson and Dearing, 2008; Brown, 1992). The project has three phases and is now in its third phase.

DReaM 1: Practitioner voices

The first phase of the project was designed to engage practitioners in research into deafness and reading comprehension from the start and to ensure that we 'knew' our research context. We wanted to find out the issues in supporting deaf children's reading development as experienced by deaf and hearing practitioners; their understandings of reading comprehension processes and their particular professional perspectives. We also wanted to extend our knowledge of deaf children's reading experiences and comprehension taking into account their diverse multilingual and bimodal language experience and backgrounds. This starting point involved a full deaf education support team comprising teachers of the deaf, communication support workers and deaf adults from a UK citywide service covering early years, primary and secondary settings. Using a focus group methodology practitioners were asked to consider what reading comprehension involves for deaf learners and identify factors that influence success. Analysis of the focus group *talk* about deaf children's reading comprehension revealed commonalities and differences across different practitioner 'voices' which shape different understandings of the reading comprehension issues. Using teacher interviews we also developed a series of mini case studies of individual deaf children's language and reading experience. The findings (reported in full in Swanwick et al., 2012) provoke discussion of research, assessment and intervention approaches which better exploit the research-practice interface by incorporating the diverse perspectives that practitioners and other agents bring to the process.

DReaM 2: Action research networks

As a result of DReaM 1, many of our practitioner colleagues began to question, challenge and develop their own reading comprehension work with deaf children to engage with

specific research questions within their working context. In response to their request for support we set up some national workshops to explore the use of an action research model that practitioners could use in their own settings to investigate their own questions. This began as a small group of schools and services and some of the early projects are reported in the BATOD Magazine (2012, pp. 40-41) and on the DReaM website www.thereadingrhizome.com. Since then national interest in this way of working has grown and more schools, services and individuals are designing and implementing their own action research projects. The unique feature of this work is that it is practitioner-led and our role as researchers is to sustain the momentum of the activities and lightly hold the shape of the projects. We support individual settings with this work and have also hosted three Action Research Symposiums, which have included participation from European and USA partners. This way of working with practitioners has developed genuine and productive research-practice partnerships and has opened up dialogue both nationally and internationally about new ways of envisioning the interface between research and practice in deaf education.

DReaM 3: Assessment and intervention design

Phase 3 is on-going and takes the DReaM work forwards into the development of a design process for a framework for reading comprehension intervention. This responds directly to the concerns of the deaf education practitioners in our developing research network. The research problem at the centre of this phase of the project is how to design a reading comprehension intervention artefact which builds on established home and school practices and expertise; contributes to theory development and improves learning. The work done so far illustrates that practitioners and parents are already tackling many of the issues associated with deaf children's poor comprehension skills with a good understanding of the complexities and realities of the research context, but that they are not addressing the full range of comprehension skills. This is not surprising given that our review of the international literature found no existing evidenced-based intervention programmes that cover the full range of comprehension skills and processes. Against this background we seek to develop a method for developing a reading intervention artefact which is informed by and elaborated from established expertise and practices at home and school, and is:

- Robust: mapped onto to the comprehension competencies
- Relevant: sensitised to the schools and services population
- Flexible: able to be matched to individual pupil profiles
- Ecological: includes the range of experiences and adult roles at home and at school, and changing learning contexts throughout development.

We have a adopted a collaborative methodology for this phase of the project so that we can effectively trial a process for developing a whole school approach to reading comprehension intervention. This entails establishment of a research partnership through the secondment of two practitioner-researchers (PRs) from two deaf education settings (one school for the deaf and one inclusive service) to work with the two university investigators (UIs). The steps through the project are designed to exploit and combine the different skills, expertise and perspectives that researchers and practitioners bring to the problem (see Fig. 1).

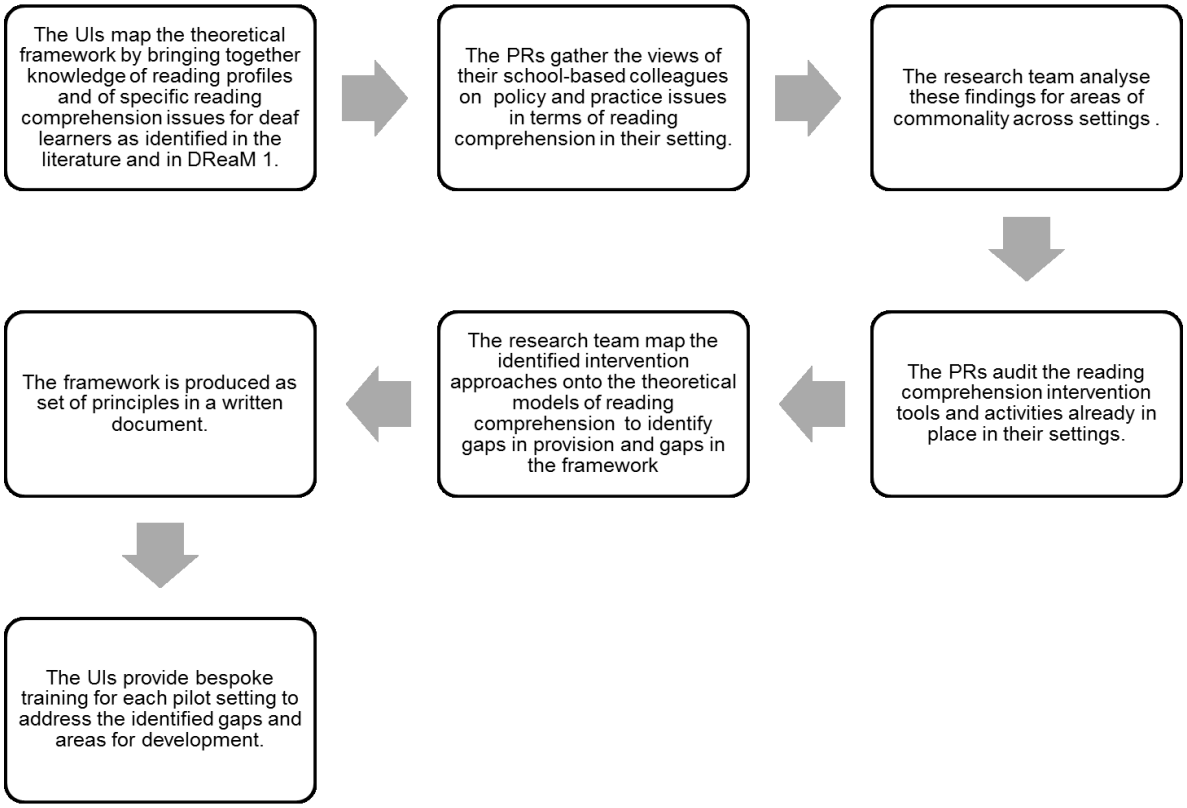

Fig. 1: The steps through the intervention design process

Integral to this project is an evaluation of the process of developing an intervention that is fit for purpose (i.e. valid for the context), but which also has sufficient rigour. This evaluation will particularly focus on the transaction between theory and practice to develop intervention approaches. As part of the evaluation we will be revisiting and revising the theoretical framework. We will also systematically collect and record the developments and activities involved in the process, from research and practice perspectives. This is a self-critical and reflective aspect of the project, characteristic of design based methodologies.

Discussion

The final section of this paper provides a synthesis of what has been learnt from the DReaM project so far considering the design-based methodological principles of theory development, project design, the development of artefacts and research impact.

Contribution to theory

The theoretical basis of the DReaM study is informed by current understandings of deaf children's reading experience and achievement and pertains to methodological approaches to reading research with this population. These are synthesised with the research context to challenge conventional approaches and perspectives to expose different ways of looking at deafness and reading. This paradigm shift is the major contribution to theory achieved by the DReaM project. It is born out of dialectic between empirical, contextual knowledge and perspectives from theory.

Design knowledge

The DReaM project design draws on two types of knowledge: theories about the reading and assessment process from research and the personal and professional experience of the stakeholders involved. The cycle of trial and evaluation built into the design provides the opportunity for prospection (forward) but also necessitates reflection (backward) as responses to the tools and materials are repeatedly tested (Dede, 2004). The research environment thus becomes in itself an ecology of learning. This term reflects the intrinsic interaction and influence of agents, contexts and constraints (Cobb et al., 2003). The research terrain is multilayered and shifts over time as policies, practices, technologies and agents change and evolve.

Development of artifacts

In the DReaM study practitioners, parents and young deaf people are involved in developing artefacts i.e. tools and approaches in reading assessment and intervention. This is achieved through an action research cycle of innovation, trial and review. This empowers practitioners to develop reflective approaches to implementing novel interventions. This simultaneously creates an ongoing cycle of evidence and new questions about reading comprehension and deafness.

Impact

The DReaM project brings research closer to practice. Impact is thus realised at grass roots (home and school) and at policy level. This is enacted through engaging agents with the research questions and consulting them regarding the planned methodology. The wider outcomes of the research entail the development of an educational culture which encourages individuals to become critical and gain agency over their development. Phase one of the project established professional networks and a fledgling research community through the project website, seminars and workshops and action research centres www.thereadingrhizome.com.

Conclusion

Whilst design-based approaches strive for 'novelty and usefulness' (Edelson, 2002, p.118) they are not atheoretical. They are driven by, and test, theory with the goal of generating new theories or ways of looking which are contextually valid. This approach to developing warrantable knowledge is ideally suited to the development and evaluation of innovations within an educational environment where there is willingness to work towards improvement, and a commitment to collaboration and change (Stoker and John, 2009). Although design-based methods have been in development since the 1970s, this approach offers a new way to bring theoretical questions into the domain of practice in deaf education. It is an approach which is responsive to the population concerned and delivers outputs quickly into the hands of practitioners and policy makers, and as such provides a means of achieving a warranted contribution to theory and an impact on educational practice.

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