



*education*Undergraduate

Children's Perceptions of Collaborative Learning

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Abstract

Collaborative learning is a widely used practice in primary schools and its benefits include improvements to learning and enhancement of social skills. The prominence of this type of learning is reflected in the layout of many classrooms which are designed to accommodate group seating and most schools use group and paired work as a regular component of their teaching strategies. Children's views of learning strategies offer insights and perceptions that are often overlooked in studies that are concerned with measurable outcomes and quantitative data. This study provides an overview of the effectiveness of collaborative work in schools through the accounts of children. These accounts were collected during semi-structured interviews with sixteen children from the same Year 5/6 class in a medium sized suburban junior school. A combination of open and closed questioning was used to establish trends and explore individual views respectively. The findings suggested that the children were generally in agreement that collaboration was useful for their learning but they were divided in their views on issues about its structure and organisation. The strongest theme that emerged from the study was the importance of peer relationships to children and the way that they saw collaborative work as essential to making and maintaining friendships.

Introduction

Collaborative learning is a strategy that has been the subject of much educational research. Studies have focused on the skills that children need to be able to cooperate with each other and the kind of tasks and environments that support group based learning. The effectiveness of different strategies has been measured in terms of behaviour frequencies and learning outcomes. Many researchers have shown that group work benefits children both academically and socially and their findings have had a major influence on classroom practice and organisation. The National Curriculum emphasises the importance of speaking and listening and the National Literacy and Numeracy Strategies (DfES 1998 and 1999) recommend that children take control of their learning by working with peers. In spite of all this supportive evidence it appears that collaborative work as a strategy is underused in primary schools (Hastings and Chantrey-Wood 2002) and some teachers claim that it is unworkable in their classrooms (Blatchford and Baines 2006). Clearly it is a complex subject that requires further inquiry to fully understand all the issues involved.

This study attempts to gain an insight into the effectiveness of group learning situations in the primary classroom by investigating the views of the children themselves. Semi structured paired interviews were carried out with sixteen Year 5 and Year 6 pupils in a medium sized suburban junior school and their responses were analysed and discussed. The small scale of this study and the fact that all the children interviewed were members of the same class are factors that may have limited the scope of the findings. However, the fact that the children all had similar exposure to group learning could be seen as a strength because it reduced the effects of one of the variables. This allowed the research to focus on the individual differences in response

to these experiences rather than the quality of the environment in which they took place.

Literature review

In 1967 the Plowden Report recommended the grouping of children within the primary classroom for two main reasons; firstly it was seen as an effective strategy to maximise the teacher's time and secondly it was considered to confer social benefits. Since then, most primary school classrooms have been arranged with the desks in group formations to encourage collaboration between children. These social aspects of the learning process are well documented and Vygotsky (1978) states that children can be helped by their peers as well as by adults. In a group situation children support each other through their zone of proximal development and contribute to each others' understanding. In practice, however, the physical grouping of children does not always ensure that collaborative activities take place. Hastings and Chantrey-Wood (2002) made this point when referring to several observational studies of primary school children in England and Scotland. They concluded that although they sit in groups, children do not naturally work as a group and most interactions take place between pairs. Group collaboration is rare and does not occur spontaneously without direct teacher intervention. Hastings and Chantrey-Wood's review highlights the importance of structure in group learning and focuses on classroom management and organisation.

Subsequent studies by Gillies (2003a) also concentrated on differences in learning outcomes between structured and unstructured group work. Primary school children were divided into two groups; one which had received training in cooperation and one in which there was no training given. The trained groups were observed working on structured tasks that required them to help each other and the untrained control groups were observed working together but on individual tasks. Gillies found that the structured groups improved their understanding, used higher thinking skills to solve problems and were engaged more frequently in cooperative behaviours than the unstructured groups. This would suggest that structure plays an important part in the success of peer group learning. What is not clear, however, is whether it was the social skills that the children had learnt or the type of task that they performed that made the difference to their learning. In another similar study using children aged 13 – 14, Gillies (2003b) addressed this problem by observing the same kind of group tasks performed by both the experimental and control groups. The participating schools were categorised as having either a structured or an unstructured approach to the use of peer group learning and the outcome was measured in terms of knowledge and understanding and use of higher order thinking skills. The results showed that the structured school groups engaged in more complex interactions with each other and worked more cooperatively than the unstructured groups. In spite of this there were no significant differences in increased knowledge and understanding between the groups with both benefiting equally from the task. These findings tend to suggest that it is the structure of the task that is more important in terms of effective learning outcomes than the ability of the group to work well together. This conclusion is disputed by Blatchford and Baines (2006) whose research on group work found that the main reason why it failed to be effective in the primary classroom was the children's lack of social and communication skills. Their observations were backed up by teachers' claims that collaborative work was difficult to manage and costly in terms of their time because the children had not been trained to work together in groups. More evidence that communication skills are central to achieving effective group learning is found in

research by Garton and Pratt (2001) which compared the performance of children on their own with their performance in peer assisted situations. They studied mixed age groups and one of their findings was that the performance of low ability children was improved significantly by working with higher ability older children. One conclusion drawn by Garton and Pratt was that the older children were able to contribute to the understanding of their younger peers with their advanced language and communication skills. The younger low ability children not only improved their performance on the joint task but were also said to have made progress in subsequent individual tasks as a result of this collaboration.

Studies like Gillies (2003a and 2003b) and Garton and Pratt (2001) are difficult to compare with the study conducted by Blatchford and Baines (2006) because although they cover the same issues their methods of inquiry and measurement of outcomes differ. Gillies (2003a and 2003b) and Garton and Pratt (2001) used field experimental conditions to generate numerical data on behaviour frequencies and learning outcomes whereas the work of Blatchford and Baines (2006) involved a long term quasi experiment in real classrooms, some of which operated effective group learning strategies and some of which did not. It is easy to see that some dissimilarity in findings may occur through the different methodologies used in these studies and this explains why the results may appear to contradict one another. What is also possible, however, is that there is validity in all of these studies which indicates that there is more than one factor influencing group learning. Having the right social skills and the right group orientated task appear to be integral to achieving a successful outcome and so interdependent that the effects of one may be difficult to isolate from the other.

Participant variables are always a consideration in research on learning outcomes and exact conditions can never be replicated. Studies like Blatchford and Baines (2006) which identify issues, such as the inability of children to work together without training, are making generalisations about learning based on large numbers. In contrast, case studies like Dekker et al.'s (2006) can pinpoint individual differences which seem to contradict the findings of large scale research. Dekker et al. (2006) looked at the interactions of one pair of 8 year old children as they worked together on a maths task and found that they were able to intuitively monitor their partnership and work constructively without instruction or intervention. What this study suggests is that the ability to collaborate is an innate personal attribute and that individuals can vary in proficiency. While Dekker et al. (2006) findings differ from Blatchford and Baines (2006) they are not incompatible because their methods and aims are so different. The case study's intention was to gain insights by focusing on detail whereas the large scale research was designed to identify trends and patterns.

The variation of individuals was also an issue that was raised in a review of studies of peer effects on group work by Wilkinson and Fung (2002). They concluded that it was the combination of individuals and their relative skills and academic abilities that determined the effectiveness of the group. One of their most significant findings from the research programmes that they studied was that the balance of academic ability within the group affected the learning outcome. Individuals in groups that consisted entirely of low ability children performed less well on collaborative tasks and displayed more disruptive behaviour than children of a similar level in mixed ability groups. They also found that medium ability children did not appear to flourish in mixed group settings and performed better when in a dedicated medium ability group. Additionally it was discovered that a mixture of high and low ability children was of benefit to all.

The high ability children gained deeper understanding from the act of explaining and the low ability children received individual tuition that was relevant to their needs. This evidence from Wilkinson and Fung (2002) leads to the conclusion that individual variations and group composition are also significant factors in the effectiveness of collaborative learning.

The studies in Wilkinson and Fung's review placed the children in categories such as their academic ability, race or gender. Other personal qualities such as peer status were used to differentiate the individuals in the groups but no reference was made to the children's attitudes to group working situations. This is an area that seems to have been overlooked in the field of research into group effectiveness. The majority of studies have been concerned with learning outcomes that are linked to classroom management strategies or activity planning and the views and perspectives of the children are not usually taken into consideration. There is growing evidence to suggest that this is an area of research which should not be neglected as Pollard (2002:122) states:

They [the children] have to be involved in the process of learning and they have to appreciate that the effort that is required of them is worthwhile.

Consulting children about their views on their learning is the subject of an article by Ruddock and Flutter (2000) which acknowledges the importance of children's perspectives in directing decision making in schools. Their paper examines the reasons for listening to children's views and some of the problems associated with obtaining them. They state that children should be regarded as consumers of education who are unlikely to be committed to the school's strategies unless they feel that they are of benefit to them. Ruddock and Flutter also make the argument that giving children greater autonomy in school helps to prepare them for their future roles in society. Using children's views is, however, problematic because of their limited experiences. It is not easy for children to evaluate and comment on what happens in their learning when they have nothing else to compare it with. Children can also struggle to articulate their thoughts and are often unable to generalise and extend their views beyond specific events. In spite of these limitations children's views are a useful source of information and can provide insights into how different teaching strategies are perceived in terms of their value to the individual.

Cooper (1993) also studied the effects of education on individual children and concluded that children's behaviour and motivation to learn is influenced by how they perceive themselves in the context of their environment. His article focused on the learning of children with special educational needs but the principles of his argument are relevant to mainstream education as well. Cooper concludes that consulting children about their learning is an essential component of evaluating teaching strategies because it adds depth to the process of research. Studies which are largely concerned with measuring learning outcomes are useful in making quantitative judgements but add little to our knowledge of the quality of learning. This view is confirmed by Howard et al. (2002) who state that the failure to consult children during educational research may have already led to false assumptions of their enjoyment of activities. In neglecting to ask children about their learning, researchers are ignoring the testimony of 'expert witnesses' and risk losing touch with what is actually happening in classrooms.

Most research on collaborative learning appears to have concentrated on measurable outcomes to evaluate the effectiveness of strategies. Few studies have included children's perspectives of group learning and even fewer have made it the focus of their investigation. Gillies (2003b) evaluated pupils' changes in attitudes as part of a study on group learning and found a few differences over time. An increase in positive attitudes to collaborative work of the structured groups was recorded but may have been accounted for by the children's desire to give the researchers what they wanted. The participants in the structured groups may have been aware that their performance was under scrutiny and this may have affected their responses. Hyde (1993) carried out a more focused enquiry into participants' views in a study of young foreign language students. Hyde conducted interviews with twenty students on the subject of collaborative language learning in pairs. Hyde's findings presented a challenge to standard practices with some mixed reviews of pair working from the participants. Some students reported difficulties in working with the opposite sex or with particular personalities. Others found the obligation to speak with a partner to be intrusive and not suited to their preferred way of learning. Several themes were identified in this study that could be useful in evaluating the effectiveness of this strategy and the extent to which it is used. Although this research has a bearing on the mainstream primary classroom's use of collaborative work it has distinct features which set it apart from most school situations. Firstly, the participants are all adults with very different social and cultural backgrounds and secondly the study is based on only one activity, language learning. To obtain a more comprehensive evaluation of collaborative learning from a participants' perspective, other age ranges and activities need to be explored.

The field of research on collaborative learning shows that the way that activities are structured, the composition of groups and the skills and personalities of the participants are all important determinants of success. These findings have been instrumental in informing practice and shaping the organisation of classrooms over the years. Other researchers have highlighted the importance of considering children's views of themselves and their learning in conjunction with other methods of inquiry. This study analyses children's perspectives of group learning with an emphasis on their individual experiences. It attempts to discover insights into the use of group work in primary schools that may have been overlooked in previous studies which rely on learning outcomes as measures of success.

Methodology

The children who took part in this study were all members of the same year 5/6 class in a medium sized suburban junior school. The school operates a positive approach to collaborative learning and actively encourages teaching strategies that support group work and cooperation. The researcher was granted permission by the school to carry out interviews with a sample of sixteen children; eight boys and eight girls ranging in ages from nine to eleven years. All interviews were conducted in accordance with recommended ethical guidelines (Cohen et al. 2000) and with the consent of the participants.

The data were collected using annotated schedules from interviews with pairs of children. Children were not interviewed singly for two reasons, firstly to increase the sample size in the time allowed and secondly it was agreed between the researcher and the class teacher that they would be less reticent if they were in pairs. The interview

format was chosen over other methods such as questionnaires because it relies less on the literacy skills of the participants. Interview questions are also less likely to be ambiguous than those in questionnaires because the researcher can reword or explain them if necessary (Bell 2005).

Before the study began, the researcher conducted a pilot using a structured interview with closed type questions. This particular design was chosen initially because it provides data that can be easily comparable and is a technique that reduces the interview time needed (Cohen et al. 2000). The questions were asked by the researcher and the answers recorded on a prepared schedule. During the course of the pilot, it became apparent that a choice of fixed responses was not sufficient to reflect the participant's views and the interview technique was modified. The new format retained some of the questions from the pilot but also introduced open questioning and a much less structured style. The unstructured interview is particularly useful in a study that concentrates on views and perceptions because it is flexible and produces insights into a subject (Bell 2005). However, some framework is needed to prevent the data from becoming unfocused and in this study a check list of areas to be covered was used. The participants' responses were recorded on a question schedule and brief notes were taken of additional comments or opinions that were expressed. The researcher used a form of shorthand to indicate types of comments and more detailed notes were added at the end of each interview. The decision to take notes during the interview rather than record it may have resulted in some data loss and lack of detail. It was felt, however, that this disadvantage would be outweighed by the children's increased freedom of expression. Bell (2005) comments that tape recording can affect results by inhibiting participants from answering questions honestly. The questions were organised into the following three main areas of inquiry:

- Do children think that collaborative work is useful?
- What do children think about the structure of collaborative work?
- How important do children think group skills are for collaborative learning?

The purpose of dividing the questions up was to aid the process of analysis by classifying the responses into themes. Qualitative data like this can be interpreted by separating it into units of meaning which help the researcher to draw conclusions from the frequency of their occurrence (Cohen et al. 2000). Inevitably, decisions have to be made by the researcher about the interpretation of data and care has to be taken to avoid bias during this process (Cohen et al. 2000). To reduce this risk the closed questions were worded to polarise the responses so that they could be more accurately categorised. The raw data were summarised and the additional information from the open questions was used to qualify and add depth to the short responses.

The researcher's role in the classroom during the time period when the interviews took place was as a trainee teacher. This dual identity may have affected the results as the children may have been reluctant to openly discuss school strategies with a member of the teaching staff. How the interviewer is perceived by the interviewee can affect the outcome of the research (Bell 2005) and the possibility of bias in this instance cannot be ruled out completely. The location of the interviews may also have contributed to this because although they were held in a quiet area outside the classroom, there were often staff members and other children working nearby. To counteract some of these effects the researcher collected most of the data in the early part of the placement

before the role of trainee teacher had been fully established and the interviews were carried out at times when there were fewer disturbances.

Presentation and analysis of findings

Do children think that collaborative work is useful?

This table presents a summary of the 16 participant's responses to the following questions:

	Yes	Not sure	No
Does working with others help you to understand new ideas?	9	5	2
Do you think you achieve more when working with others?	5	6	5
Does working with others help you to make friends?	12	4	0

The results in the above table show a mixed response from the children on whether working with others actually helps them in their learning. Although most children thought that collaboration helped them to understand a task or new topic, less than a third stated that they achieved more in a group or paired situation than they would if working alone. One of the most common reasons given for a negative or unsure response was the problems they had encountered when working with partners and groups who were not committed to the task or who were distracting. Some children also said that working in groups was too noisy and they found it difficult to concentrate. Overall the impression was given that they believed that collaborative work could be useful but problematic in practice. Even the children who responded in a positive way reported some collaborative learning experiences that had not been beneficial. Of the sample interviewed only two children responded negatively to both of the questions about learning benefits. The reasons they gave were a combination of personal preferences for working alone and external factors such as other children's failure to contribute to the task.

In some aspects the results from this line of inquiry were unexpected as the school promotes collaborative work and a more positive view of the learning benefits was predicted. A large number of the responses to the closed questions indicate that the children were not sure about what they gained from working with others. This may have been because they were unaware of the benefits or their definition of collaboration was too narrow and restricted to formal organised group work. The study carried out by Dekker et al. (2006) found that children helped and scaffolded each other's learning in ways that they may not have been aware of and was a process that was observed to occur naturally between two children as they worked together. The children in this study may also have been the recipients of learning benefits when working with others in ways in which they too were unaware.

Although the children were divided in their opinions of the learning benefits they were more certain about the role of collaborative work in making new friends. The above table shows that 75% responded positively to this question and not one child expressed the view that it was not useful in this way. Some children went on to say that they felt that working with others in the classroom was the best way to make friends and was

more important than playtime for forming social bonds. They also commented that existing friendships often did not survive when individuals were separated into different classes and that friends were nearly always same gender classmates who sat and worked together. This strongly positive response to the question about working together and friendship relates to the assertion of the Plowden Report (1967) which states that significant social benefits are gained from grouping children. The children's views on friendship formation in this study would tend to support this earlier theory and indicate an area where research and perceptions are matched.

What do children think about the structure of collaborative work?

This table presents a summary of the 16 participant's responses to the following questions:

	Yes	Not sure	No
Do you prefer to work with your choice of friends?	10	4	2
Do you think groups work better if they have a team task?	11	3	2

This table shows that more than half or 63% of the children thought that they should be allowed to choose who they worked with. The reasons stated were the importance of being able to get on with other group members and the desire to avoid certain individuals who were seen as difficult to work with. The children who were not sure or who thought that the teacher should choose referred to the potential for unfairness in the selection of group members and highlighted how hurtful it could be to children who were never chosen by their peers. Another argument raised against self selection was that groups would always stay the same and there would be fewer opportunities to make friends and mix with new people.

The preference for selecting the individuals you work with was also uncovered in Hyde's study (1993) of the views of foreign language students. Hyde found that one of the requests of his participants in collaborative learning was to have the freedom to choose the people they worked with. They, like the children in this study, expressed concerns over the problems that could arise from personality clashes and differences of working style between individuals. They also raised the issue that they felt that having to work with weaker students would be a disadvantage. This point was not mentioned by the sixteen participants of this study as they were more concerned with group unity and cooperation than academic ability. Another area that the participants in this study did not highlight was the importance of group composition to successful learning. The review by Wilkinson and Fung (2002) stated that the mix of high, low and medium abilities within a group determined its success and some combinations of ability groupings would produce a poorer performance than others. The children's failure to recognise this and other issues relates to the research conducted on the use and limitations of pupil perceptions. Ruddock and Flutter (2000) state that children's accounts of their learning tend to focus on specific events and experiences and are not generalised into fully formed opinions about strategies and their effectiveness. This would explain why the majority of the responses and comments are focused on interactions with peers and not learning outcomes.

The views about the type of task that was suitable for groups came out strongly in favour of team goals. Almost 70% thought that the outcome of collaborative learning was improved if the group had one common purpose rather than individual ones. Examples were given, in explanation, of successful collaboration where the task could only be completed if everyone worked together. Science experiments and large scale artworks were cited to illustrate this point. Other less successful group tasks were said to be maths work where they had to help each other but each produce a finished piece of work. Problems with this type of activity were reported as children copying from each other and the refusal by some to cooperate. Gillies (2003a and b) studies of the effects of task structure on collaborative learning outcomes also supported the use of team goal orientated work. It was found that these kinds of tasks produced benefits to knowledge and understanding and helped with group cohesion. These effects were quantified as measurable learning and behavioural outcomes in Gillies work but similar results have been obtained in this study in terms of the children's perceptions of the success of group working strategies.

How important do children think group skills are for collaborative learning?

This table presents a summary of the 16 participant's responses to the following questions:

	Yes	Not sure	No
Do you think that group skills are important?	12	1	3
Can people be taught how to work well in groups?	4	10	2

This section of questions produced some interesting insights into children's perceptions of group skills and their importance for successful collaboration. During the interview the children were asked what they thought was meant by group skills and they demonstrated a good knowledge of the range of qualities needed for cooperation. Their suggestions included being a good listener, taking turns, being fair and valuing each others opinions. Some children also said that it was important to have a strong leader who was respected by the other group members. Comments about the desirable attributes of partners in paired work were also stated along similar lines with listening and sharing qualities mentioned most frequently. Not surprisingly 75% of the children thought that group skills were important and only three individuals responded negatively to this question. Of the three individuals only one was prepared to explain their choice and expressed the view that group skills were of no use because people behaved the way they wanted to regardless of what was correct or fair in group situations. The fact that most children recognised the value of group skills is supported by Blatchford and Baines (2006) whose study of primary school classes revealed that basic cooperative skills were vital to the success of collaborative learning.

The second question in this section produced a result that seems incompatible with the views associated with the first. Many of the children who were so positive about the benefits of group skills were not sure that they could be learnt or improved upon. Only 25% of the children were sure that people could be trained to work cooperatively with others and the majority (63%) were not convinced. The main reasons given for this were variations on the belief that personal attributes such as good listening skills and the ability to share fairly were intrinsic aspects of personality. One child said that

trying to teach group skills would be a wasted effort because *'you can only change what people know and not the way that they act.'* Other children commented that some people were uncooperative by choice and would resist any attempts to retrain their behaviour. An interesting point is that all the participants regarded themselves as having good social and group skills and only attributed negative references to others. At no point did any of the children in this study reflect on their own performances in groups or pairs in a negative light. These views possibly indicate that some of the children had difficulty understanding the concept of social or group skills. This could be because most social behaviour is learnt by observing others and takes place at an early age (Keenan 2002). Or it could indicate that the guidance that these children had received in collaborative work did not encourage self awareness of interpersonal skills.

Conclusions and implications

This study found that a positive school approach to collaborative learning does not guarantee that the children will be uncritical of its benefits. Although the majority of children were supportive of group work as a strategy, there were many responses that indicated the opposite. In general, however, the interviews revealed some interesting trends. Most children thought that collaboration helped them to understand new concepts and ideas although they did not always produce their best work in groups. They also preferred self selection as a method for determining group composition and identified team goal activities as the tasks that were likely to produce the best results. The individual skills needed for collaborative learning were identified and valued by the children although they were less sure about the benefits of being taught these skills.

One of the strongest findings in this research was the children's view that working together is an important way for them to establish and maintain friendships. During the interviews and within the three areas of inquiry the recurring theme was the issue of friends and relationships within groups. This emerged as the major preoccupation of this sample of children with regard to their experiences of collaborative work. It affected the way that they thought groups should be structured and operated and was, from their point of view, the deciding factor for successful learning. This finding is supported by the research which has identified the value of group harmony for effective outcomes (Gillies 2003, Garton and Pratt 2001) and classroom practice which has shown that poor relationships within groups actually inhibit learning (Blatchford and Baines 2006). Where this study departs from the other research is in the discovery that the children believe collaborative work to be important for friendships. The original question was posed to establish the existence of this link but with the emphasis on the collaboration. What the children actually believe is that friendships depend on regular opportunities to work together and cannot be maintained without them. This could have implications for the way that teachers organise working partners and groups for children, especially those who do not make friends easily. It may also have a bearing on the decision to move children within the classroom or the reorganisation of regular group compositions.

Another finding from this study that provided an insight was the children's perception of group skills as innate personality traits. The problem with holding this view is that it could label some individuals as socially inept and deny them any hope of being able to improve. Awareness of group skills and an ability to recognise and identify them do not indicate any understanding of their origins. If teachers are aware that children

think in this way they can target these misconceptions with sessions designed to illustrate the developmental nature of social skills; perhaps by showing the class a video clip of very young children's interactions to reinforce the idea that social competence is an ongoing lifelong process.

Further research to follow up this study could concentrate on one of these core issues to focus on and establish the reasons for children's views and their implications for educational practice. A closer look at the importance of friendships to the functioning of effective group work would perhaps reveal why it plays such a major role in children's perceptions. A comparison of random and friendship groups would demonstrate the similarities and differences in their interactions and learning outcomes. A larger scale replica study involving schools with different approaches to collaborative learning would also provide more reliable evidence of the impact that this practice has on the learners themselves.

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The Vocabulary of Key Stage 2 Mathematics

Rebecca Hopkin

Abstract

Perhaps contrary to logical perceptions, the relationship between language and mathematics is inherent and definitive. Constructed upon a framework of highly specialised technical vocabulary, mathematics, and hence mathematical education, is rendered futile without words. However, despite publicised recognition within national educational policy, the issue of mathematical vocabulary lies as a principle void within contemporary educational research. In conducting a comprehensive investigation into the levels of knowledge and understanding of technical mathematical vocabulary, as held by children reaching the end of the primary education system, the present study therefore addresses this issue, providing key steps towards the void's fulfilment. Based primarily upon the questionnaire methodologies of veteran 1970s investigations, supplemented with processes of unstructured group interview and non-participant observation, the study rigorously analyses the knowledge and understanding of Key Stage 2 technical mathematical vocabulary held by fifty average-attaining Year 6 pupils. Addressing only fifteen technical mathematical words, and pupils from two closely located schools, the elicited data holds specific limitations; however, within the constraints of the methodology the study argues that concerning findings are revealed. Despite encouraging levels of familiarity with Key Stage 2 technical mathematical vocabulary, a substantial deficit in understanding, and abundance of misunderstanding, is displayed by participants. These findings reiterate the elementary conclusions of restricted recent research within the field; hence mathematical vocabulary is established as a key cause for concern. In light of the findings it is suggested that before a secure foundation in numeracy for each child may be achieved, a greater emphasis upon the identification and resolution of semantic mathematical difficulties is essential.

Introduction

I have forgotten the word I intended to say, and my thought, unembodied, returns to the realm of the shadows – Osip Mandelstam. (Vygotsky 1962: 119)

Where would the world as we know it be without words? The answer is simple: it would not. Imagine for a moment a world without vocabulary. Mandelstam's provocative quote in Vygotsky (1962: 119) provides an insight into what this world would be. With no words to articulate them, thoughts remain simply shadows. With no thoughts on which to found it, knowledge fades into oblivion. And with no knowledge, is there even such a thing as education? In the consideration of vocabulary in education, the mind instinctively turns to the literacy hour: spelling, composition, morphology and literature. However, on deeper inspection it is clear that, in acting as an emissary for thought, vocabulary pervades, and in fact forms the basis of, all aspects of education. As stated by the DfES (2003: 1), vocabulary 'lies at the heart of teaching and learning... across all subjects'. Perhaps the last subject to which the issue of vocabulary would be pertained is mathematics, traditional views on this curriculum area inciting images of numbers, symbols and graphs. It is therefore easy to overlook the fact that 'vocabulary plays a central role in the learning of mathematics' (Ernst 1987: 10). Although often un-encompassed within perceptions, mathematics 'begins and proceeds in language' (Durkin 1991: 3), many theorists proposing that

fundamentally mathematics is a language in itself (Aiken 1972; Oldfield 1996; Preston 1978). This notion becomes clear in the analysis of vocabulary adopted within the questions and discussions of mathematics lessons, much of which is highly specialised and subject-specific, such words being defined as 'technical' mathematical vocabulary (Raiker 2002: 52). The following question is taken from a Key Stage 2 Mathematics test paper, and portrays a standard example of the mathematical questions faced daily by children:

Shade in two squares to make a symmetrical pattern. (QCA 2003a: 9)

Within this single question, the technical mathematical words 'square' and 'symmetry' take a central role. For an individual 'fluent' in mathematical vocabulary the meaning of the question is clear; however, with no understanding of the language of mathematics it would be impossible for a child to even attempt to answer such questions, and hence to advance their mathematical development. This concept is perfectly encompassed by Raiker (2002: 50), who states that 'the understanding of mathematical words is fundamental to the development of mathematical thinking'. In recent years the government has begun to recognise the significance of mathematical vocabulary, taking steps to ensure its consideration within national policy. In October 2000, the DfES released a supplement to the Primary National Numeracy Strategy entitled 'Mathematical Vocabulary': a comprehensive register of the mathematical words to be introduced at each stage of primary schooling. Within this document the DfES (2000: 1) emphasise the vital role of mathematical vocabulary, stating that 'mathematical language is crucial to children's development of thinking'. However, despite these great leaps in recognition, it is clear that releasing a document does not automatically generate a surge in understanding, or even widespread awareness, of the issue. Indeed the limited recent research in the field of mathematical vocabulary verges on the suggestion that despite the neoteric emphasis on the issue, competent levels of understanding of mathematical words are not being achieved in the primary classroom (Mayow 2000; Raiker 2002).

In light of this issue, the present research proposed to directly address the notion of mathematical vocabulary, providing greater scope to the limited academic research currently in existence. Although conducted only on a small-scale, the study aimed to investigate the levels of both knowledge and understanding of technical mathematical words, as held by children reaching the end of the primary education system; hence specifically addressing the following key research questions:

- Do Year 6 pupils hold a comprehensive knowledge of Key Stage 2 technical mathematical vocabulary, as outlined within the National Numeracy Strategy vocabulary list?
- To what extent do Year 6 pupils understand the meaning of this vocabulary?

A close analysis of the insight provided by past research acted as the first step towards achieving this aim, as outlined within the following chapter.

Literature review

The educational issues surrounding vocabulary, although only recently reaching the forefront of government initiatives in mathematics, are far from contemporary. As early as the nineteenth-century, Russian philosopher Leo Tolstoy began to explore the

acquisition and development of vocabulary, reaching the conclusion that 'children often have difficulty learning a new word, not because of its sound, but because of the concept to which it refers' (Vygotsky 1962: 7). Tolstoy's thoughts were highly visionary for his time, and it was not until the 1960s, and the research of psychologist Lev Vygotsky, that his conclusions were expanded. As reported in his publication 'Thought and Language', Vygotsky conducted substantial research into the notion of vocabulary, concluding that each word is comprised of two key elements: the physical entity and the meaning, 'neither of which, taken separately, possesses the properties of the whole' (Vygotsky 1962: 119). Vygotsky (1962: 83) expanded this conclusion in the proposition that the development of these elements is a gradual and fluid process, a connection between word and meaning 'originating, changing and growing' over time. The relevance of Vygotsky's (1962) proposals to mathematics was soon recognised by the pioneering mathematician Richard Skemp, who, within his text 'The Psychology of Learning Mathematics', reported that 'the distinction, and association, between a mathematical concept and its name is an essential one' (Skemp 1971: 23).

In a series of 1970s investigations, the proposals of Vygotsky and Skemp were soon applied to the classroom. Of these investigations, the most widely reported was a quantitative survey executed by educationalists Otterburn and Nicholson (1976). Within this study the researchers composed a register of thirty-six technical mathematical words commonly used within CSE examination papers. The vocabulary was then presented, in a questionnaire format, to a sample of three-hundred CSE pupils, who were asked to indicate their knowledge of each word, and then to provide written and pictorial definitions. The aim of the survey was to analyse pupils' levels of both knowledge and understanding of mathematical vocabulary, in order to evaluate the potential impact of these issues upon examination results. In fulfilling this aim, the controversial conclusions drawn were that 'there was a considerable lack of understanding concerning words which mathematics teachers and examiners might well assume were completely comprehensible' (Otterburn and Nicholson 1976: 18), hence highlighting a substantial flaw in mathematics educational practice.

Despite the valuable insight provided by Otterburn and Nicholson's data, the potential implications of this research were limited by questions regarding the data's validity. Primarily, 'there are significant dangers in using children's ability to explain as an absolute measure of their understanding' (Gibbs and Orton 1994: 96); as acknowledged by Otterburn and Nicholson (1976: 19) 'some pupils may have returned a blank response ... because they have not been able to think of how to express whatever ideas they have'. In order to address this issue, Nicholson (1977) conducted a supplementary survey in which CSE pupils' knowledge and understanding of mathematical vocabulary was tested using two alternative questionnaires. The underlying rationale behind the reformed methods was that understanding may be more accurately measured by providing a context for the words, and asking the children to apply their knowledge. However, this reformed methodology unveiled new limitations; as stated by Earp and Tanner (1980: 34), 'the use of context is a powerful skill in gaining comprehension of unknown words', suggesting that within Nicholson's investigation, pupils may have produced correct responses, despite lacking semantic understanding. Within this limitation, Nicholson (1977: 18) concluded that CSE pupils 'have significant difficulties understanding some of the mathematical terms in common use', a conclusion parallel to those of Otterburn and Nicholson. In their display of concurrent validity, the opposing methodologies therefore provided cogent support for the notion that

mathematical vocabulary was a significant cause for concern within the education system.

Despite together providing deep insight into the field of mathematical vocabulary, the Otterburn and Nicholson (1976) and Nicholson (1977) studies shared two significant restrictions. Firstly, in both cases the samples were limited only to secondary school pupils, hence providing no indication as to the status within the primary sector; and secondly, as the studies were conducted prior to the fundamental educational changes induced by the National Curriculum and Strategies, findings could not be generalised to the contemporary school. These restrictions acted as a persistent inhibitor, since, as identified within a review of mathematical vocabulary research (Hargreaves and Shorrocks-Taylor 1999), in the late twentieth-century a significant drought of research within this field occurred. The limited research evidence which was documented within this period in fact began to suggest that mathematical vocabulary was not of great consequence. Within a small-scale observation of six five-year-old children's development of the concepts 'more', 'fewer' and 'less', researchers Thorburn and Orton (1990: 19) noted that 'lack of sophistication in language did not prevent children from carrying out activities ... what did impede children were the cognitive skills required'; hence concluding that, rather than language, 'the central issue is cognitive development'. The reliability of Thorburn and Orton's suggestions is however brought under considerable question by the restricted nature of both the sample, and the mathematical terms investigated; the results could not be accurately generalised to a broader sample, or mathematical register.

It was not until 2002, and the research of educationalist Andrea Raiker, that substantial findings within the field, applicable to the contemporary classroom, were established. Acting as a participant observer Raiker (2002: 47) 'adopted discourse analysis to interpret the spoken language used in the numeracy hour', in order to provide evidence as to the significance of mathematical vocabulary. Based upon observations within six distinct classrooms, a key conclusion drawn from the data was that 'there were obvious problems with the vocabulary ... children were familiar with the language, but many of them did not understand the meaning' (Raiker 2002: 51); a result bearing deep resemblance to those of the nineteen-seventies CSE investigations. This worrying conclusion was compounded by the observation that without understanding of the lesson's key vocabulary 'the learning objective could not be fully understood, leading to the development of misconceptions' (Raiker 2002: 55). An example perfectly encompassing such findings was held within a co-ordinates lesson, in which a lack of understanding of the term 'origin' resulted in the majority of children being unable to achieve the lesson objectives and confidently plot co-ordinates (Raiker 2002: 54). Raiker's results thus provided evidence to suggest that the nineteen-seventies mathematical vocabulary issues had continued beyond the Numeracy Strategy, and into the twenty-first century primary classroom; in addition, contrary to Thorburn and Orton's (1990) conclusions, that these issues were taking a substantial impact upon children's mathematical development.

Unlike the results of Thorburn and Orton (1990), the reliability of Raiker's (2002) suggestions was inferred by the concurrent conclusions of a case-study investigation of the National Numeracy Strategy's educational impact (Mayow 2000). In the role of participant-observer, Mayow (2000: 16) evaluated the problems faced by a seven-year-old child within the daily numeracy hour, reaching the conclusion that the comprehension of mathematical vocabulary is 'crucial in bridging the gap in

mathematical understanding'. With reference to the target child, Mayow (2000: 17) explained that 'it became clear that he was uncertain about the different vocabulary', specifically the underlying vocabulary of basic binary operations, and hence 'often failed at the first hurdle because he could not understand what questions were asking'. These results therefore reiterated the notion that mathematical vocabulary continued to lie as an area of weakness in education; the observation that this defect impeded the comprehension of mathematical questions compounding the findings of Raiker (2002).

Although the research of both Raiker and Mayow brought the issue of mathematical vocabulary forward into the twenty-first century primary classroom, the utility of these studies alone is severely limited. In contrast to the data collated in the 1970s (Nicholson 1977; Otterburn and Nicholson 1976), this recent research failed to produce any kind of quantitative analysis of children's understanding of a precise range of technical vocabulary. Both recent studies relied on subjective observations of unspecified registers of terminology, and hence lacked the rigour and expanse of those conducted by Otterburn and Nicholson (1976) and Nicholson (1977). As outlined within the following chapter, the present study therefore conspired to fulfil the disparities in research within this field: addressing the key research questions through a rigorous quantitative analysis of Year 6 pupils' knowledge and understanding of technical mathematical vocabulary, hence providing a comprehensive indication as to the current status of this issue within the primary sector.

Methodology

Although individually holding methodological limitations, the investigations conducted by Otterburn and Nicholson (1976) and Nicholson (1977) together generated a comprehensive analysis of the mathematical vocabulary of CSE pupils. With the principal target of extending awareness of primary school children's levels of knowledge and understanding of technical mathematical vocabulary, the present study therefore replicates the questionnaire methodologies of both earlier investigations, eliciting the leading features of each. In light of the pioneering approach of Otterburn and Nicholson (1976), the questionnaire constructed for the present study firstly presented the sample with a list of technical mathematical vocabulary. For each term the participants were required to answer two key questions: 'do I know this word?' and 'do I understand this word?', establishing the extent of their knowledge and perceived understanding. By requesting the participants to draw and describe the terms, the genuine levels of semantic understanding were subsequently established. Parallel to the methodology of Otterburn and Nicholson (1976: 18-19) responses to this final element were divided into three categories:

- Correct: The pupil understood what the word meant, as indicated by a verbal description or diagram.
- Confused: The pupil confused the word with another or displayed misunderstanding.
- Blank: The pupil made no attempt to describe the word.

Categorisation was based upon definitions outlined within the QCA (2003b) Mathematics Glossary; only those responses categorised as 'correct' indicated a true understanding of the terminology. As outlined by Kumar (2005: 126) questionnaires may only elicit valid results if the questions are 'clear and easy to understand'; hence, this multi-faceted element of the survey was presented in table format, headed with

succinct instructions and a coherent example. Parallel to the Otterburn and Nicholson (1976) study, the validity of this primary methodology was questioned by the proposition that children's ability to explain does not accurately represent their semantic understanding (Gibbs and Orton 1994: 96). Based upon the methodology adopted by Nicholson (1977), the questionnaire was therefore supplemented with a secondary component, which exemplified each of the mathematical terms within a single incomplete sentence. By identifying the missing naming word in the sentence, in appropriate cases with a diagram to assist, the participants were required to display understanding through contextual application, hence overcoming the potential shortfalls of the primary methodology. However, cues provided by the contextual nature of these questions left the methodology highly susceptible to the confounding variable of guesswork (Earp and Tanner 1980: 34): potentially measuring participants' ability to create suppositions, rather than their true levels of understanding. In light of this potential invalidation, the results of the initial methodology were adopted as the primary focus for analysis, the secondary component acting as a supplementary validation.

In contrast to the 1970s investigations, the target sample for the present study comprised ten to eleven-year-old pupils, undertaking the final year of primary schooling. The sample frame for locating this target comprised a large outer-city junior school, and a village primary school: schools within closely located Local Education Authorities, and both holding a proportion of free school meal entitlements below the national average. Obtained through convenience sampling, the sample frame itself holds significant limitations, since 'choosing things based upon convenience runs counter to the rigour of scientific research' (Denscombe 2005: 17). Within the sample frame however, a process of purposive sampling was conducted: twenty-five Year 6 participants from each school purposely selected based upon their predicted SAT (national test) attainment. By eliciting only pupils expected to achieve level four, the national average, within their impending mathematics SAT, the confounding variable of mathematical achievement was constrained; hence increasing the validity of the data obtained. The selection of a sample of fifty participants reflected the investigation's restricted time scale, yet provided sufficient evidence to allow the application of Wilcoxon Matched Pairs Signed Rank and Spearman's Rho statistical analysis techniques (Clegg 2003), generating more certainty in results (Kumar 2005: 168). In order to accurately reflect the contrasting sample and twenty-first century context of the present research, the vocabulary lists within the replicated questionnaires were entirely reconstructed: fifteen key technical words being elicited from the DfES (2000) mathematical vocabulary directory. The suitability of the register of size fifteen was established through comprehensive piloting, which ensured an appropriate questionnaire length and eliminated any deficiencies in wording and structure (Bell 2005: 147). The piloting process additionally established an effective questionnaire distribution procedure: personal delivery, within an isolated classroom setting, to groups of a maximum of five pupils; hence allowing immediate resolution of difficulties and minimising the confounding variables of noise and collaboration (Walliman 2005: 282).

The distribution of questionnaires offered the significant advantage of 'supplying a considerable amount of standardised data' (Denscombe 2005: 159), hence producing reliable quantitative findings. However, the structured nature of the questionnaire methodology limited the 'scope and flexibility of responses', producing 'possibly unsophisticated data' (Cohen et al. 2000: 245). Therefore, directly following the

questionnaire, subjects participated in an unstructured group interview, in which key difficulties were openly addressed. The adoption of this secondary methodology acted to 'yield rich material and put flesh on the bones of questionnaire responses' (Bell 2005: 135), hence providing a deeper and qualitative insight into the issues in question (Denscombe 2005: 167). Despite its clear advantages, the qualitative data produced through interviews did hold significant limitations, a primary example of which was held in the unsolicited focus on 'what participants say not what participants do' (Denscombe 2005: 190). In the group interview context pupils may have lacked willingness to disclose difficulties, responding to the situation rather than offering genuine responses (Cohen et al. 2000: 287), thus producing 'unreliable and inconsistent data' (Cates 1985: 97). However, Kumar (2005: 131) suggests that to some extent this problem may be overcome by 'supplementing interview responses with information gained from observation', a methodology with the advantage of revealing 'whether people act differently to what they say' (Walliman 2005: 287). Acting as a non-participant observer during questionnaire completion, the researcher therefore directly observed both verbal and non-verbal behaviour, gaining a subjective insight into the true areas of difficulty. In conducting the trilogy of questionnaires, interviews and observations, both an objective and subjective overview of children's knowledge and understanding of mathematical vocabulary was provided. The establishment of triangulation therefore not only balanced out the weaknesses of each method (Gray 2004: 33), but also produced different kinds of data, from several perspectives, enhancing the validity of the investigation.

In the collation of data it is essential that researchers 'respect the rights of participants', following a specific set of ethical guidelines (Denscombe 2005: 134). Specifically, in undertaking research with children the British Educational Research Association (2004: 7) states that 'researchers must seek the collaboration and approval of those who act in guardianship'. Hence, comprehensive details of the research were issued to the participants' guardians, and written voluntary informed consent gained prior to participation. Within this briefing process guardians were informed of the anonymity and confidentiality of the investigation, which the British Educational Research Association (2004: 9) states 'must be recognised by researchers', and was ensured through the anonymous collation and analysis of findings, as summarised within the following chapter.

Presentation and analysis of findings

The central aim of the process of investigation was to fulfil the key research questions, and hence identify the levels of both knowledge and understanding of a specific register of technical mathematical vocabulary, as held by Year 6 pupils. In the presentation and analysis of findings, the purpose of the present chapter was therefore to address these research questions, providing concrete evidence to fulfil the substantial inadequacy of modern research within this fundamental field.

Displayed in descending rank order of 'correct' responses, Table 1 presents the findings of Part 1 of the questionnaire: the replication of the Otterburn and Nicholson (1976) methodology, and hence the primary element of investigation. Thus, for example, 100% of participants claimed both knowledge and understanding of the term sphere, with 92% displaying genuine understanding within their drawings and verbal descriptions.

Table 1: Questionnaire Part 1 Raw Data (Expressed as Percentages of the Full Sample)

	School Year of Introduction (DfES 2000)	Do I Know this Word? (%)		Do I Understand this Word? (%)		Part 1 Result (%) Evidence-Based Levels of Understanding		
		No	Yes	No	Yes	Blank	Confused	Correct
Square	Reception	0	100	0	100	0	0	100
Cube	Reception	0	100	2	98	0	0	100
Sphere	Reception	0	100	0	100	0	8	92
Cuboid	Year 1	0	100	0	100	2	14	84
Hexagon	Year 2	0	100	2	98	0	20	80
Pentagon	Year 2	0	100	6	94	6	26	68
Quadrilateral	Year 3	8	92	26	74	22	16	62
Perimeter	Year 4	8	92	18	82	22	24	54
Rectangle	Reception	2	98	4	96	4	66	30
Polygon	Year 4	20	80	70	30	74	16	10
Radius	Year 4	52	48	72	28	66	26	8
Oblong	Year 4	30	70	74	26	68	28	4
Diameter	Year 4	38	62	76	24	74	24	2
Perpendicular	Year 4	48	52	86	14	80	18	2
Congruent	Year 5	80	20	100	0	98	2	0

Do Year 6 pupils hold a comprehensive knowledge of Key Stage 2 technical mathematical vocabulary, as outlined within the National Numeracy Strategy vocabulary list (DfES 2000)?

The key source of evidence in addressing the initial research question was held in responses to the inquiry 'do I know this word?', which provided a clear indication as to participants' familiarity with each word, as a separate entity to its meaning. Based only upon this initial evidence an optimistic picture was presented: two-thirds of the register of terminology being known by at least 80% of the sample, with six of the list of fifteen terms being familiar to 100% of the Year 6 pupils. This optimistic finding was supported in the process of observation, through which it was recognised that pupils frequently commented on the simplicity of the range of vocabulary when initially presented with the questionnaire. Thus both qualitative and quantitative support was provided for Raiker's (2002: 52) conclusion that within the contemporary primary classroom 'children are often familiar with mathematical vocabulary'.

Nevertheless, it could not be overlooked that for a small selection of the terminology a high proportion of children lacked knowledge. A clear example of such unfamiliarity was held in the word 'congruent', a term recognised by only 20% of participants, and the persistent area of difficulty established within group interviews. In light of the fact that the DfES (2000: 30) suggest the introduction of this word within the fifth year of primary schooling, a full year prior to participants' involvement in the investigation, this result alone casts a large shadow over the data. Lying as the only Year 5 term within the tested register, the proposition is raised that pupils only hold comprehensive knowledge of terminology introduced during the early years of schooling, a proposition supported by the corresponding limited awareness of the Year 4

vocabulary. Within this proposition however, a substantial constraint of the methodology was emphasised: the limited tested register of fifteen mathematical terms failing to provide sufficient evidence to support the suggestions.

To what extent do Year 6 pupils understand the meaning of this vocabulary?

The shadow cast by the concerns regarding knowledge continued to expand in the consideration of the second research question, and hence children's understanding of the terminology. Responses to the question 'do I understand this word?' (Table 1) indicated that, as proposed by Vygotsky (1962: 83), knowledge and understanding of vocabulary are not necessarily synonymous: children declaring understanding of the vocabulary they recognised in only 79% of cases.

However, the validity of the question 'do I understand this word?' as a measure of genuine understanding came under significant question in light of the descriptions and diagrams produced by respondents. As summarised in Table 2, those participants who answered yes, and hence believed they held understanding, failed to produce supporting evidence in 28% of cases. This astounding result therefore supported the notion proposed by Austin and Howson (1979) that children often believe they hold understanding, when actually they do not.

**Table 2: Perceived and Evidence-Based Levels of Semantic Understanding
(Expressed as the Total Number of Individual Question Responses)**

Part 1 Result Evidence-Based Levels of Understanding	Do I Understand This Word? (Total Number of Responses)	
	No	Yes
Blank	247	11
Confused	18	126
Correct	3	345
Total	268	482

In breaking down the results of children's efforts to describe or draw the terminology (Table 2) it became apparent that the impact of this incorrectly perceived understanding extended far beyond the bounds of this research. In a considerable 92% of cases, those participants who incorrectly believed they understood the terminology offered a confused drawing or description of the term; hence implying not only a lack of correct understanding, but also the possession of incorrect understanding of the term. A key example of such was presented in the term 'polygon', which one-tenth of the participants believed defined a shape with a specific number of sides. The alarming implication of these misconceptions is construed by the findings of Austin and Howson (1979: 182), which note that such inconsistencies 'too frequently pass un-noticed'; hence acting as a consistent barrier to mathematical achievement.

As recognised by Gibbs and Orton (1994: 96) however, an alternative explanation for the large percentage of confused responses may have been held in methodological flaws, rather than misconceptions. The lack of context within which the terminology was presented may have rendered subjects unable to express their understanding, hence confounding the results. This suggestion however was addressed, and dispelled, in the analysis of the results of Part 2 of the questionnaire, which parallel to Nicholson's

(1977) methodology required a display of understanding through the application of words in context.

Presented in Table 3 is a summary of the correct responses, and hence displays of understanding, submitted by participants within both the first and second questionnaire components. Considering each term independently, a certain degree of disparity between the two data sets was clearly evident, thus indicating that the introduction of context perturbed participant's terminology comprehension. The most discernable of these disparities was found in the term 'quadrilateral', correctly understood by 6% of participants in the contextual Part 2, in stark contrast to the 62% who provided a correct description in Part 1. Close analysis of this specific example indicated that when presented in context 38% of participants confused the terms 'quadrilateral' and 'square'; hence directly contradicting the propositions of Gibbs and Orton (1994: 96), and suggesting that the provision of context may have served to generate, rather than dispel, confusion.

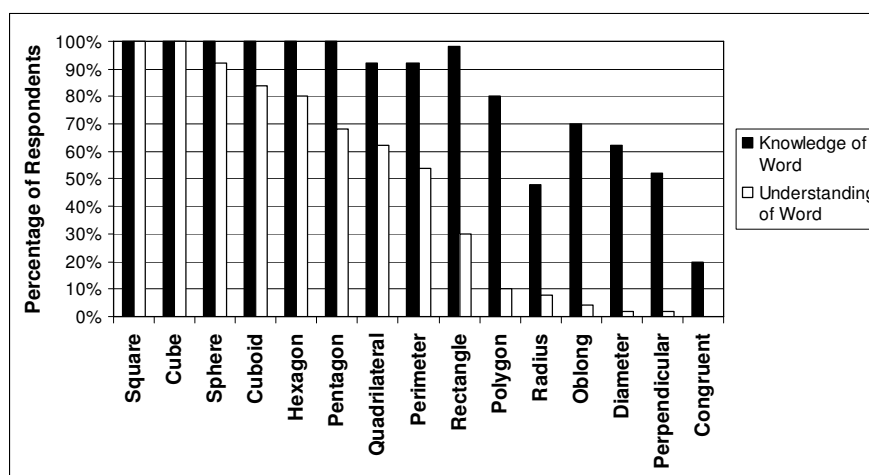
Table 3: Contextual and Non-Contextual Displays of Semantic Understanding (*Expressed as Percentages of the Full Sample*)

	Part 1 Correct Responses (%) <i>Non-Contextual Understanding</i>	Part 2 Correct Responses (%) <i>Contextual Understanding</i>
Square	100	100
Cube	100	88
Sphere	92	70
Cuboid	84	88
Hexagon	80	72
Pentagon	68	76
Quadrilateral	62	8
Perimeter	54	66
Rectangle	30	6
Polygon	10	2
Radius	8	32
Oblong	4	20
Diameter	2	20
Perpendicular	2	8
Congruent	0	2

Nevertheless, considering the data sets as a whole, the disparity between Part 1 and 2 responses appeared less profound: a large proportion of the terms ranking in the same position for both components. Concrete support for this notion was provided by the results of a Wilcoxon Matched-Pairs Signed Ranks Test ($N=14$, $T=50$; two-tailed hypothesis), which at the $p=0.01$ level determined an insignificant disparity between the data sets: the provision of context did not have a statistically significant impact upon the number of correct responses. In light of this finding the use of the non-contextual Part 1 results as a valid measurement of understanding was supported. Thus, in uncovering the relationship between children's knowledge and understanding of the key mathematical vocabulary, the display of evidence-based understanding within Part 1 of the questionnaire, combined with interview and observation evidence, remained the primary focus for analysis.

Figure 1 visually presents the percentage of respondents holding knowledge of each individual term, and the corresponding percentage holding understanding, as established by Part 1 of the questionnaire. Based upon Figure 1, a positive correlational relationship between knowledge and understanding is suggested: the highest percentages of understanding being displayed for the most familiar terminology, and correspondingly low percentages of understanding for the least familiar terminology. Key examples of this relationship are presented in the terms 'square' and 'cube', for which 100% of participants confirmed both knowledge and understanding; and the term 'congruent', the least familiar of the register, correspondingly understood by none of the participants. However, in order to hold comprehensive understanding of a term, familiarity with the physical entity is essential: a pupil cannot understand a word if they do not recognise what it looks like. Hence to a certain degree the positive correlational relationship was inherent. The significant question was therefore held in whether the relationship was causal: did knowledge of a word directly induce understanding?

Figure 1: Levels of Knowledge and Understanding of Technical Mathematical Vocabulary



The answer to this question was portrayed in Figure 1, which, parallel to the results of Raiker (2002: 51), indicated that for a high proportion of terms familiarity was held, but with little understanding of meaning. Results of Part 1 of the questionnaire displayed that in the majority of 52% of cases children failed to hold comprehensive understanding of the terms which they were familiar with, a result reiterated by observation during questionnaire completion, in which participants frequently exclaimed frustration in being unable to identify meaning. A primary example of such is provided in the term 'diameter', recognised by 62% of participants but understood by only a single individual, 58% of those familiar with the term returning a blank response for its definition. This profound absence of a causal relationship between word knowledge and understanding therefore strongly supported Vygotsky's (1962: 120) proposition that the word as a physical entity and its meaning should be considered as two distinct components.

Considering understanding as a distinct component of word therefore, the slight optimism established with regard to Year 6 pupils' knowledge of technical mathematical vocabulary is substantially dampened. Two-thirds of the register of terminology was understood by less than 70% of the sample, and an astounding 40%

of the register understood by 10% or less. A primary example of such limited understanding was held in the term 'perpendicular', to which 80% of participants returned a blank response, and only 2% displayed true understanding. These concerning results acutely echoed Otterburn and Nicholson's (1976) 1970s findings, in which 78% of the tested mathematical register was understood by less than 70% of the CSE participants. Within the limitations of the methodology, the present investigation therefore provided support for the results of Mayow (2000) and Raiker (2002), suggesting that the nineteen-seventies concerns regarding the understanding of mathematical vocabulary have continued beyond the National Strategies and into the twenty-first century primary classroom.

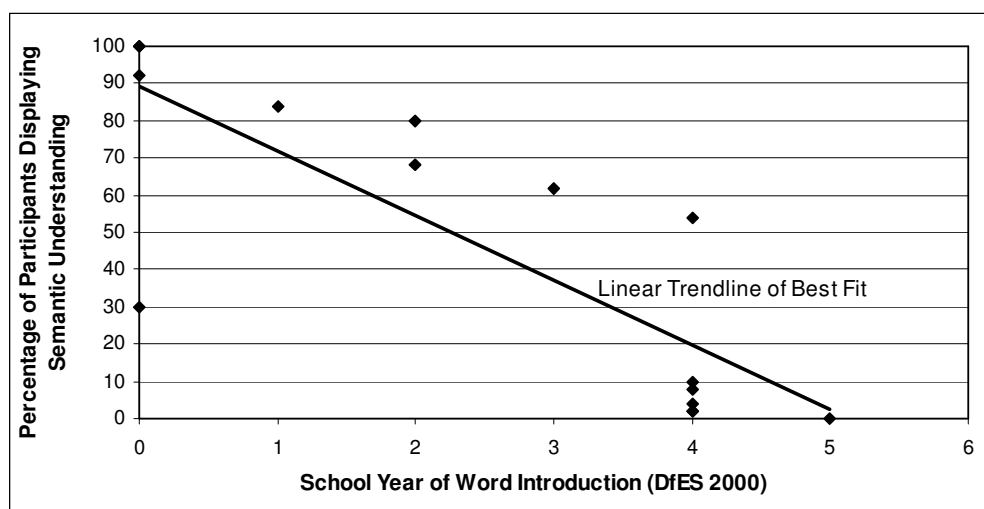
In addition to highlighting a general lack of understanding of Key Stage 2 technical mathematical vocabulary, the questionnaire results offered a key indication as to a potential cause of this incompetence. The scattergram presented in Figure 2 displays the percentage levels of understanding of each term, plotted against the school year in which the term is introduced (DfES 2000), with a linear trendline of best fit. Together the scattergram and trendline clearly suggested a negative correlational relationship between levels of understanding and school year of introduction: a relationship confirmed to be significant at the $p=0.01$ level in the conduction of a Spearman's Rho correlation test ($p=-0.78661$, $N=15$; one-tailed hypothesis). Hence, within the limitations of the methodology, the results of the investigation provided significant evidence to suggest that the development of word understanding is an incremental process, enhanced and consolidated over time. The lack of understanding, primarily of words introduced in the later years of schooling, may therefore have reflected not incompetence, but a process of development. This proposition lies parallel to Vygotsky's (1962: 119) claim that a connection between word and meaning 'originates, changes and grows' over time.

The notion of incremental development of understanding came into question however in light of the Otterburn and Nicholson (1976) results, which strongly indicated that the understanding of mathematical vocabulary remains a problem as children complete their secondary education. Returning to the key example of 'perpendicular', tested within both the present and nineteen-seventies investigation, only 35% of secondary school pupils displayed understanding of the term; an increase of just 33% across 5 years of schooling. These comparisons begin to suggest that the cause of the limited understanding of technical mathematical vocabulary lies far deeper than simply stages of development. However, the extreme transformations in education in the thirty years ensuing the Otterburn and Nicholson (1976) investigation leave any comparison with present-day findings highly invalid. In order to rigorously evaluate the notion of progression it is clear that a contemporary longitudinal study would be required.

In the consideration of the correlational relationships between word understanding and both knowledge and school year of introduction, a consistent anomaly was found in the term 'rectangle'. Listed as a term to be introduced in the reception year of schooling (DfES 2000: 10), and recognised by 98% of participants, the patterns present within the data suggested that the Year 6 pupils would hold a comprehensive understanding of 'rectangle'. However, Part One of the questionnaire revealed that only 30% of participants comprehensively understood the term, a result reiterated by the Part Two findings, in which a minute 6% were able to locate the sentence exemplifying the rectangle's meaning. In addition, a 96% response of 'yes' to the question 'do I understand the term rectangle?', combined with a 66% 'confused'

response to Part 1 of the questionnaire, strongly indicated that rather than failing to hold understanding, pupils held a misunderstanding of the term's meaning.

Figure 2: The Relationship between School Year and Level of Semantic Understanding

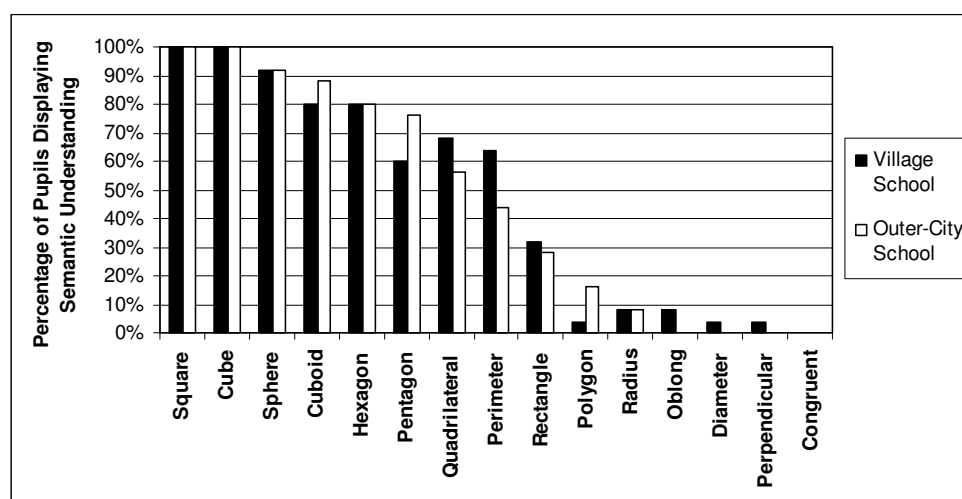


As defined within the QCA (2003b: 32) Mathematics Glossary, a rectangle comprises any 'parallelogram with an interior angle of 90°'; hence, the term encompasses both oblongs, with unequal adjacent sides, and squares. However, close analysis of Part 1 responses revealed that the majority of participants perceived the terms rectangle and oblong as synonymous: 60% of participants providing the definition of an oblong when asked to describe a rectangle. This misconception was reiterated within group interviews, in which participants consistently failed to acknowledge the square as a special kind of rectangle. Specific investigation of past research subsequently revealed that understanding of the term 'rectangle' has been identified as a consistent gap within children's mathematical knowledge: substantial research (Kerslake 1979; Monaghan 2000; Patronis and Dimitris 1991) concluding that pupils often conceive only the non-square rectangle form, hence validating the findings of the present investigation.

Based upon the evidence of past investigations, educationalists have offered a plethora of explanations for the recurrent misconceptions of the term 'rectangle' (Hanley 1978; Kerslake 1979; Patronis and Dimitris 1991; Pimm 1987). Evidence for the most frequent of these explanations was provided in the results of an investigation into teaching materials, which suggested that this misconception 'stems from the way students are presented with a particular orientation of rectangle' (Monaghan 2000: 187). This suggestion highlighted the concerning proposition that the cause of misconceptions in mathematical vocabulary, as identified by the present study in both the term rectangle and the mathematical register as a whole, could potentially lie in shortfalls in teaching. However, the validation of such proposals would require substantial investigation of teaching methodology, in addition to the levels of understanding of mathematical vocabulary held by teachers themselves: investigation far beyond the scope of the present study.

Although failing to rigorously analyse teacher understanding and methodology, in the conduction of research within two distinct educational settings the present investigation provided an insight into the impact of the teaching institution upon understanding of the mathematical register. Presented in descending rank order of the total number of correct responses, Figure 3 visually displays the percentage of respondents who, based upon Part 1 of the questionnaire, displayed semantic understanding of the vocabulary within the village and outer-city schools. The closely corresponding results within Figure 3 strongly suggested correlation between the levels of understanding held by pupils within the two schools: a suggestion confirmed in the conduction of a Wilcoxon Matched Pairs Signed Ranks Test ($N=9$, $T=19$; two-tailed hypothesis), which at the $p=0.05$ level determined an insignificant disparity between the data sets.

Figure 3: Level of Semantic Understanding Displayed by Participants Within the Village and Outer-City Schools



The results of the statistical analysis offered elementary evidence to suggest that the limited levels of understanding of technical mathematical vocabulary, as identified within the present study, were not simply a consequence of institutional inadequacies. The directly corresponding levels of understanding held within the distinct schools supported the disconcerting proposition that technical mathematical vocabulary may stand as a national, rather than institutional, problem. However, based upon the results of the present study this notion cannot move beyond the primitive stage of proposition: the limited sample of fifty pupils, within only two convenience-sampled schools, providing insufficient evidence to support such a substantial claim. Although providing a solid foundation in awareness of the issue of mathematical vocabulary, it was therefore essential that the limitations of the present analysis were acutely recognised in the establishment of conclusions and implications, as presented within the following chapter.

Conclusions and implications

In the publication of a national primary mathematical register, the DfES (2000: 1) conjured a potent message: 'mathematical language is crucial to children's development of thinking'. In the field of education however, to simply conjure a

message is far from sufficient. As outlined by the philosopher Martin Heidegger, the key to education is to 'let learn' (Bonnett 2001: 58): even the most potent message remains insignificant until it has echoed through professional practice and reached the learners at the core. In directly addressing two key research questions, the present study therefore aimed to evaluate the impact of the government's message upon this core: fulfilling a void within the field of academic research and closely investigating levels of both knowledge and understanding of technical mathematical vocabulary, as held by pupils reaching the end of the primary education system.

Based upon the questionnaire methodologies of Otterburn and Nicholson (1976) and Nicholson (1977), supplemented with qualitative analysis through observation and interview, evidence was provided to suggest predominantly high levels of familiarity with technical mathematical vocabulary, despite certain omissions in knowledge. Parallel to the results of Raiker (2002: 52) however, this suggestion was dampened by data which highlighted that knowledge far from induces understanding: those participants holding knowledge of vocabulary failing to display corresponding understanding in the majority of cases. Participants' responses indicated not only a considerable lack of understanding, but additionally the concerning possession of substantial misunderstandings: many pupils' perceived levels of understanding being undermined by a failure to produce accurate definitions.

These troubling conclusions provided substantial evidence to suggest that despite the government's publicised recognition of mathematical vocabulary's significance, this message is failing to reach the learners at the core. The unacceptable levels of understanding of mathematical vocabulary identified within the 1970s (Nicholson 1977; Otterburn and Nicholson 1976) appear to have continued beyond the introduction of the National Strategies, penetrating the twenty-first century education system. The disturbing significance of these findings becomes vivid in the consideration of their classroom implications. 'Language is the means by which mathematics is taught and learned' (Turner and McCullough 2004: viii); hence with insufficient understanding of vocabulary, mathematical progression is severely inhibited. Such problems are compounded within the current examination-centred climate of education: the measurement of performance through language-based examinations meaning that achievement is restricted by understanding of the mathematical register (Hargreaves and Shorrocks-Taylor 1999: 131).

In the consideration of the significance of the present study's results however, the presence of substantial limitations within the investigation could not be overlooked. Although resolving key methodological deficits through triangulation and dual questionnaire techniques, significant restrictions within the sample remained unresolved: fifty participants, selected from a convenience sampling-frame of two closely located schools, failing to provide a reliable representation of the national situation (Denscombe 2005: 17). Additionally, the selection of only fifteen technical mathematical terms, from a comprehensive national register, enforced substantial restrictions upon any generalisations which could be made. Within a reproduction of the study, marked improvements in reliability could therefore be imposed through a significant increase in scale: extending the range of both the participants and the technical vocabulary addressed.

Within the limitations of the methodology however, the present study undoubtedly reiterated the propositions of the restricted recent research within the field (Mayow

2000; Raiker 1990), establishing mathematical vocabulary as a key cause for concern. Regardless of the extent of the problems, it is clear that a greater emphasis upon the identification and resolution of semantic mathematical difficulties is required, at both the institutional and national level. It is within the resolution of difficulties that a substantial field of vital extended research is held, since the key to an effective solution lies in comprehensive understanding of the nature, and hence cause, of the problem (Dewey 1933: 109-111). Based upon the results of the present study, two key roots of the difficulties have been proposed: firstly the progressive nature of semantic development, and secondly deficiencies within teacher methodology. Insufficient evidence for the confirmation of either proposition has been provided within the bounds of the current investigation, however these phenomena would certainly seem worthy of further analysis. Thus, the conduction of longitudinal studies addressing semantic development, and the rigorous analysis of teacher awareness and methodology, lay as key future developments within the field. Only when these propositions have been addressed, and the root of the problem identified and eliminated, may educationalists truly work towards providing each child with the 'secure foundation in numeracy' (DfEE 1999: 1), which the present British government essentially require.

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The Impact of an Intervention Programme on the Development of the Social Skills of an Autistic Child

Susan Albrighton

Abstract

This study was conducted over a period of twelve weeks and investigated the impact an intervention programme using turn taking and interaction tasks had on the social skills of an autistic child. Data was gathered from observations, questionnaires and self-assessments. The results showed an improvement in social skills during paired activities which were transferred to the classroom setting, however little or no improvement was seen in group activities. A major finding of the study was that during group work, the target child co-operated more in mixed ability groups as opposed to similar ability groups. The results suggest that children with autism can improve their social skills if appropriate social situations are made available to them.

Introduction

The aims and purpose of this study were to use an intervention programme of interaction and co-operation tasks coupled with turn taking tasks to determine the impact it had on the development of an autistic child's social skills. An autistic child in Year 4, who demonstrated poor social skills compared to his peers, was chosen for this study as he found paired and group work difficult to cope with. He displayed dominant and unco-operative behaviour in these situations and frequently expressed a preference to work independently. Literacy and Numeracy lessons were used as a focus for this research as the settings for these classes maintained the same group of children.

Research indicates that simply placing an autistic child in a mainstream setting will not suffice for that child to develop socially appropriate behaviours (Connor 2002). A common theme that also runs through much of the research in this area is that work intended to help the target child involves other children. An intervention programme of interaction and turn taking tasks was chosen for this research as this involved other children. This study created an opportunity to build on the child's social skills in a small group setting and for any impact this had on his social skills to be evaluated. Different methodologies have been used in research into the development of social skills in differing situations. Work carried out by Canney and Byrne (2006) on 'the merits of Circle Time' and an evaluation into 'the impact of R time' by Trimmingham and Osborn (2005) for the Educational Psychology Service in Leicestershire, are two recent studies that have influenced this action research project. Both of these studies concentrated on developing social skills through group situations with contrasting sets of children and resulted in differing findings. For this project, aspects of both studies were combined with the focus being placed on paired and small group situations to target a child with autism.

This study has had several limitations, firstly due to time constraints; both the action and a following observation had to be implemented during Literacy or Numeracy on three out of four mornings each week because of working hours. This made observations of small group work in the classroom very limiting as the researcher had very little input in the planning of these activities. This led to large variations in the

observation opportunities available and therefore the data collected were difficult to compare. Secondly, it was difficult to locate a suitable area to perform the tasks away from the classroom where the target child would feel comfortable and not be distracted. This also limited the activities carried out, as tables and chairs were not always available or sufficient space vacant to use drama or role play. Thirdly at the beginning of the second phase, the whole school took part in a TASC (Wallace 2002) week with children placed in different classes and Literacy and Numeracy lessons being abandoned. This had an impact on the whole of the week as the target child's regular partner was in another class and a literacy or numeracy observation could not take place and had to be replaced by an observation involving older children during an art activity. Furthermore, the target child's regular partner was absent from school for several days at the start of phase three which forced a temporary change of partner part way through the project.

Literature review

Spence (1980) describes social skills as 'appropriate social behaviour within a particular social situation.' This broad definition covers the features which determine the effectiveness of everyday interactions (Canney 2006). Rustin and Kuhr (1989) split these features into four categories: foundation skills such as gesture and eye contact; interaction skills such as initiating conversation; affective skills such as recognising your own feelings and those of others' and cognitive skills such as problem solving and negotiating. Canney (2006) believes that to be socially skilled requires complex interactions between a number of different behaviours.

The poor social skills and the inability to adequately and appropriately interact with others in the environment is often a hallmark of autism, noted during early childhood and maintained through adolescence and adulthood (Loveland 1997). Deficits in communication vary in scope and severity and may include any or all areas of the triad of communication of form, content and use (Preis 2007). Connor (2002) believes that much of the behavioural style can be explained in the terms of a lack of 'Theory of Mind' as autistic children commonly fail to appreciate how other people may have opinions, attitudes or knowledge which differ from their own and are likely to assume that they share their perspective. This is a view shared by McIntyre (2003) who adds that there is often avoidance of eye contact and little understanding of give and take. This can cause children offering friendship to feel rebuffed, leading to a failure to establish a meaningful interaction.

Mead (1934) and Vygotsky (1978) both highlighted the importance of social interaction in terms of enabling the individual to reflect back on the self and scaffold social learning. Thomson (1993) however, feels that the quality of the social exchanges is important following his study involving children with and without learning difficulties where children with the learning difficulties were found to have less influence on decision-making.

Through her research Canney (2006) concluded that social skills are rarely taught, as much of the learning in this area is done through modelling and behaviour shaping; however for some children this may not happen naturally. This view is shared by Connor (2002) who believes that there is a consensus in research literature that simply placing an autistic child in a mainstream class will not suffice for that child to develop socially appropriate behaviours.

Much research has been carried out into the development of social skills in differing situations and using various methodologies, however there is a limited amount of published material specifically relating to minority autistic children in a mainstream setting. Connor (2002) however, claims that a common theme in much of the research carried out about social skills is that work intended to help target children needs to involve other children to at least some extent, concluding that if a problem is 'social', then the action needs to be 'social'.

Recent research looks at the benefits of peer tutors, Circle Time and R time, a published intervention programme, in the development of social skills. Whitaker (2004) carried out a study on fostering communication and shared play between mainstream peers and children with autism. His research was set in a school where autistic children were taught for the majority of the day in a self-contained unit and integrated with mainstream children during playtimes and at lunch time. He selected and trained peer tutors from year six to interact with specific autistic children during these times on a weekly basis. He found that the majority of peer tutors found the project rewarding and were able to engage the autistic children. The level of requests made by the autistic children was seen to increase three-fold, however no increase in the level of joint behaviours was observed. Roeyers (1995) on the other hand expresses concern for the use of peer tutors claiming that interventions that foster a predominantly directive role for peers can lead to an intrusive and 'adult-like' interaction style. Although interactions may be increased, Roeyers warns that evidence suggests that this is associated with reduced levels of spontaneous interaction with untrained peers.

Research carried out in larger groups of children with special educational needs includes work by Canney and Byrne (2006) on the merits of Circle Time to support social skills development of students with mild intellectual disability. This study was implemented by 15 teachers with groups of around 11 children across all classes in a special school. At the end of the study, Canney and Byrne found that the teachers had mixed perceptions about Circle Time with those with more experience having the most positive views. All teachers involved agreed that Circle Time offered an effective means of promoting social skills development; however there were concerns that some teachers experienced difficulties with pupils who had emotional and behavioural difficulties. This finding supports the view of Mosley (1993) who believes that some children are not ready for Circle Time and suggests that they might benefit from 'smaller therapeutic Circle Times'. Furthermore, Lown (2002) recognises that the lack of clarity around the definition of Circle Time will affect any research endeavouring to investigate outcomes.

A further significant study was carried out in 2004 by Trimmingham and Osborn (2005) for the Educational Psychology Service in Leicestershire into the impact of R time on social inclusion. The research was carried out in 8 mainstream schools where weekly R time sessions were delivered using structured random pairing activities for a period of six months. The study found that children felt R time gave them the opportunity to improve their social skills such as eye contact, working in teams and being more polite. Teaching staff reported an increase in social skills, manners, sharing and co-operation in classroom activities. Furthermore the study encouraged children to expand their social circles, however no reference was made to the impact it had on children with special educational needs.

In contrast to these studies which focused on interactions with other children, Parsons (2002) carried out a study on the potential of virtual reality in social skills training for people with autism. By using computer programmes he found that although some success was achieved, there was a failure to generalise learned behaviours to new environments. Powell (1997) however, emphasises the value of computers in facilitating shared activities and shared attention. Moyes (2002) believes that the ability to be accepted socially can be a huge predictor of a child's success in later life. She claims that children on the autistic spectrum can become very aware of their differences and will therefore need, throughout their school life an age-appropriate social skills curriculum to help them address their weaknesses and enable them to meet with success.

Research method

The problem of an autistic child finding paired and group work difficult to cope with in a mainstream setting was identified and used as a focus for this project. An Action Plan was designed in order to ensure the project ran smoothly. Action research which was developed by Lewin (1946) was chosen as the mode of study as this allows action to be planned, carried out, evaluated, and adjusted in a series of cycles to gain a greater understanding, therefore improving practice over a period of time. As Cohen (2001:226) claims 'Action research is a powerful tool for change and improvement at the local level'.

Before the research was started, the ethics of the project were considered. The British Educational Research Association believes that, 'researchers should ensure that all participants in the research are fully informed of the process and are asked for their consent with the right to withdraw at any time' (BERA 2004). A letter was sent to the parents or guardians of all the children in the class concerned, four weeks before the action was planned to be implemented; this outlined the proposed study and reassured them of confidentiality. Parents were given two weeks to clarify any issues, express any concerns or to withdraw their child from the project. Although there was only one target child, the involvement of other class members was critical for the implementation of the action; it was therefore ethical to send the letter to all parents, furthermore this would avoid singling out the target child. In addition, this created a back-up in case it was considered beneficial to include more children in a later cycle of action or the target child was ill and the research needed to be adjusted.

The project ran for 12 weeks with initial bench line assessments being made using a self-esteem questionnaire, an informal interview and an observation during Literacy. Action which followed was carried out in three phases and comprised of two tasks each week: an interaction/co-operation task plus a turn taking task as these were areas highlighted as weaknesses during bench line assessments. These activities were delivered away from the classroom in order to help maintain the focus of the target children and defer from distracting the rest of the class. An additional weekly observation following the tasks was also carried out in the classroom setting during a paired or group activity during Literacy or Numeracy to monitor the impact the action was having on the target child's social skills in the classroom. The action for the first phase was carried out by the target child and the same partner in two separate sessions on different days and lasted between ten and fifteen minutes. The partner selected by the researcher was from the target child's table, was of similar ability, fairly confident and demonstrated good social skills. This child was chosen as he was considered to be a

good role model and there was no evidence of a personality clash. Furthermore it was felt that this pairing would create a safe and comfortable initial environment to help the target child to build on his social skills. The tasks for the second phase of action were carried out in the same way but new partners were introduced. The same partner was used for the turn taking tasks, however for the interaction tasks; a partner was selected from the rest of the class at random by the target child using names put into a bag. The action was changed in this way in order to keep the familiar and comfortable environment of working with the same partner, but extending the social circle to include other members of the same class. The third phase of action saw the tasks again remain the same, however for the turn taking activities the same partner was chosen plus an additional random partner. For the interaction tasks, two random partners were selected. The action was again changed to incorporate a comfortable familiar environment but extending the social circle further by increasing the group size to three. Following the action, the same self-esteem questionnaire was completed along with an informal interview as before the action. This was to evaluate any impact the action had had on the child's social skills.

Both quantitative and qualitative forms of data were collected during different stages of the project. For the base line and following action assessments, a quantitative method was used in the form of the basic self-esteem questionnaire and score table and qualitative in the form of an informal interview. Structured assessment sheets were used by the researcher and the target child during interaction tasks. This form of data collection was chosen as it could practically be completed and gave quantitative data recording whether the child used various social skills. Furthermore, it also gave qualitative data as general observations were also recorded by the researcher on the sheet. In addition, this choice of data collection gave the opportunity to directly compare the self-assessment of the target child to the assessment of the researcher, in order to gain a deeper understanding of the child's social awareness.

Observations carried out during turn taking tasks and lessons were recorded in a research diary giving qualitative data. This method was chosen as it was considered to be the most beneficial; as each lesson needed to be treated independently due to the groupings, pairs and work being different. It was felt that recording data in a quantitative manner may distort the information. This form of data collection however, relies on the researcher's version of what is seen. The researcher will have their own particular focus and interpret significant events in their own way (Bell 1999).

There were drawbacks in the methods chosen. Firstly, the research chosen relied heavily on both the target child and the regular partner being present throughout all sessions and illness could have caused the whole project to be abandoned. It was also felt that because the project spanned the Christmas holiday, this may have had some impact on the action for phase three. It may have been better to have either started the project sooner or to have shortened each phase by one week to have accommodated this. Deficiencies were also found in the data collected during the study. The data collected by the target child himself may not have been reliable as Moyes (2002: 121) claims that it may be that a child with autism has 'information-processing difficulties which may be interfering with his perceptions of what is actually going on in his peer group.' The observations during lessons were also problematic as the researcher had no control over the activities or groupings the class teacher planned to use. This resulted in large variations in situations leading to data that was therefore difficult to compare. It may have been more beneficial to choose a static activity involving the same children such as

guided reading which may have given a more reliable comparison. It was felt that video recording the task sessions could have been of benefit as the actions of the target child and researcher could have been analysed in far more depth and later sessions compared to earlier ones. Furthermore, Koshy (2005) claims that video evidence can also be viewed by colleagues at a later date to aid with the validity of the data. However, due to the school policy on videoing, this may not have been possible, furthermore videoing was not detailed in the letter sent to parents requesting permission and would therefore not have been ethical. The project also lacked a control group with which to make reference. Opie (2006) claims that it is critical that as close a match of both experimental and control groups is made prior to commencement of any experiment, however due to the nature of this research it was not possible to find such a match.

Findings and analysis

Before any action was implemented, the baseline assessments identified the target child as having a fairly negative attitude towards interactions with other children in the school; this was reflected in a low score of 9 out of a possible 30 marks in the self-esteem questionnaire. The informal interview also highlighted this as he explained that he found it difficult to focus when working with a partner as they 'distracted' him. He also said that he often felt 'invisible' when working in a group. The lesson observation showed minimal interaction between the target child and his partner during a paired activity.

During Phase One, the target child assessed himself as meeting all of the social skills during the interaction tasks as shown in Figure 1.

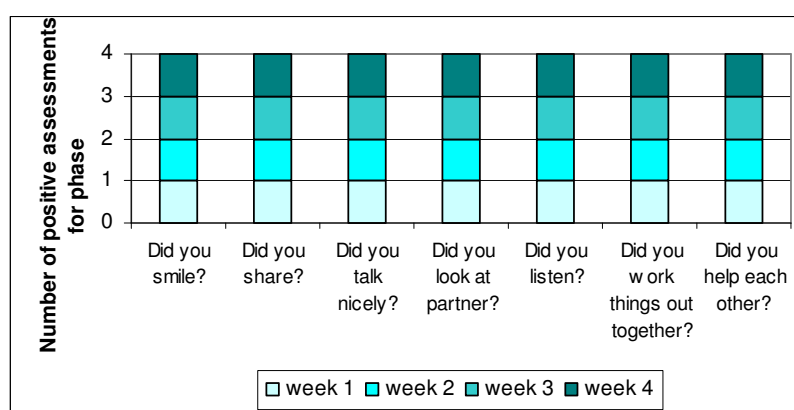


Figure 1. Target Child's self-assessment during interaction tasks – Phase One.

It can be noted that the researcher's assessments as shown in Figure 2, differ considerably from those recorded by the target child, where incidents of using eye contact, listening, enjoyment of being together and supporting each other were not frequently observed.

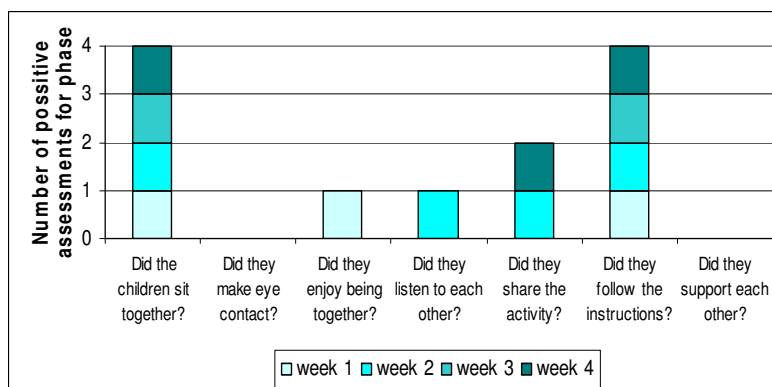


Figure 2. Researcher's assessment during interaction tasks – Phase One.

During Phases Two and Three, the target child's self-assessments were not as positive with drops in his opinion of sharing and helping his partner as shown in Figures 3 and 4.

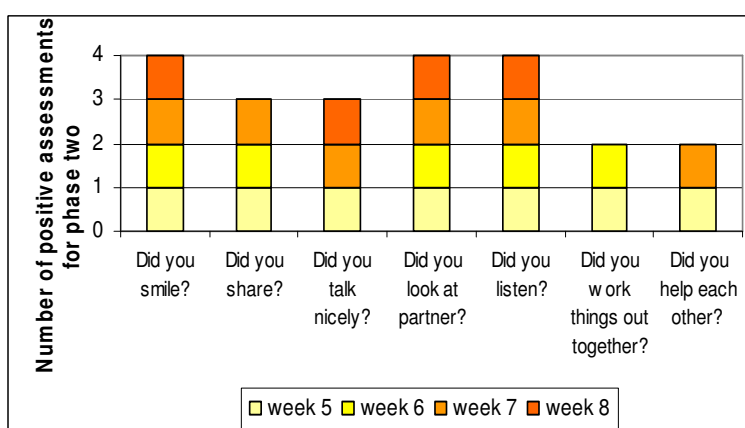


Figure 3. Target Child's self-assessment during interaction tasks – Phase Two.

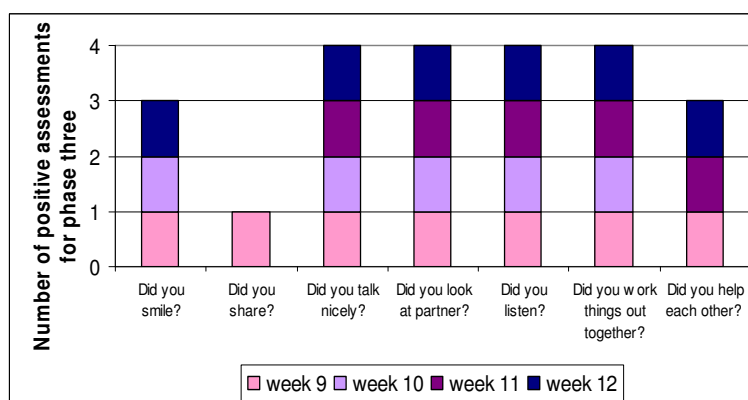


Figure 4. Target Child's self-assessment during interaction tasks – Phase Three.

Assessments carried out by the researcher during the same sessions are shown in Figures 5 and 6 and show an improvement in social skills compared to the results recorded in Phase One and show similar assessments to those of the target child.

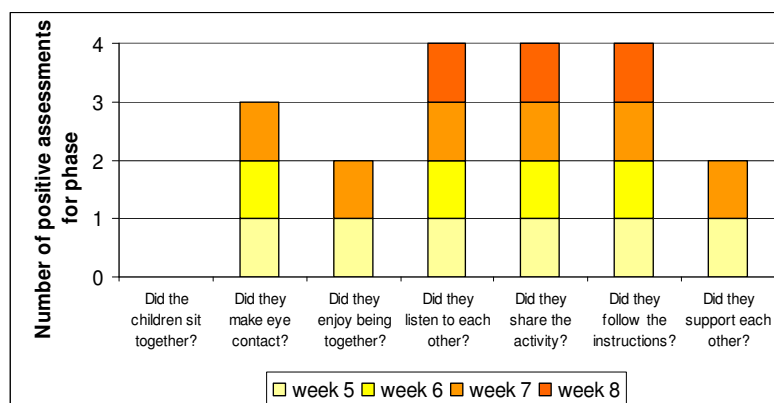


Figure 5. Researcher's assessment during interaction tasks – Phase Two.

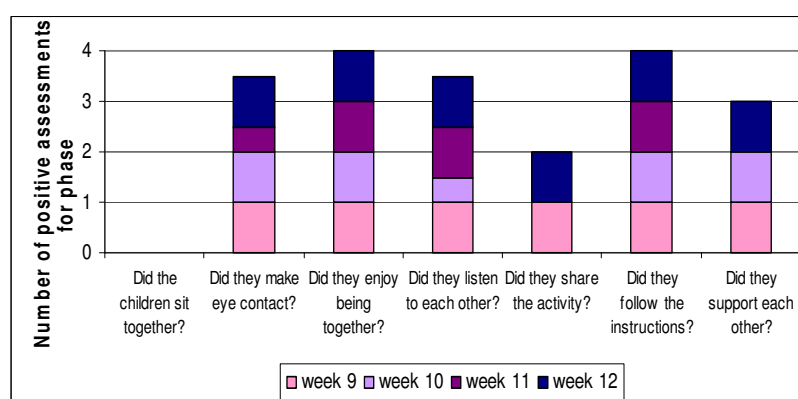


Figure 6. Researcher's assessment during interaction tasks – Phase Three.

Moyes (2002) considers that a child with autism may have information-processing difficulties which could interfere with the child's perception of what is actually going on in his peer group. This could account for the positive self-assessment of his social skills in Phase One, however in the subsequent phases the child's assessments were closer to that of the researchers as shown in Figures 3 to 6 and therefore questions this theory. In contrast it may indicate that the child became more familiar with the assessment and as a result was more able to complete it accurately in later phases. On the other hand, if it represents a true reflection of how the child sees his social skills it may demonstrate that following the action he has become more aware of socially acceptable behaviour. Due to the inconsistency of the results however, this does question the validity of the data collected from the child.

Observations made during the interaction tasks indicate that in Phase One the target child dominated the activities, participating in very little interaction with his partner. Notes recorded during the interaction tasks in Phase Two show that in the initial part

of the session the target child did not interact, however as the task developed he became more involved with his partner and started to co-operate.

In Phase Three however, a significant drop in the assessment for sharing was recorded by both the target child and the researcher as shown in Figures 4 and 6. Observations from the sessions show that the target child interacted with the other children, particularly the boys and was seen to try to dominate and not share the activities during these sessions.

It is difficult to draw a conclusion as to why a dip in sharing was observed as there are several factors that could have provoked this change. Connor (2002) considers that autistic children have a resistance to change with a preference for sameness. This theory could account for the altered behaviour but the actual criteria causing the 'change' could be one of several. Firstly, although the style of the tasks remained consistent along with the time and place in which they were carried out, the target child's regular partner was replaced with a random partner and therefore the familiar environment was removed. Secondly, the group size was increased from two to three children. Cullingford (1988) claims research indicates that when a triad is formed, this may allow two pupils to 'gang up' on a third, particularly when there is a male majority, with the problem being further exacerbated if the third child is a girl. Thirdly, Canney (2006) feels that it is not possible to control the child's experiences outside of the group sessions and how this might impact on their learning. It cannot therefore be ruled out that other influences such as experiences in the playground or at home could have had an impact on his behaviour during the sessions.

Turn taking tasks showed that in Phase One the target child was very impatient, did not wait his turn, refused to let his partner start a game and was very sulky if he lost. In Phase Two, the target child agreed to let his partner start some games, only occasionally interrupting his partners turn, used more eye contact and was less sulky if he lost. In Phase Three, he was happy to start alternate games, patiently waited his go, was much more interactive with the other children, using more eye contact and accepted defeat without sulking. These results show a clear improvement in the social skills of the target child and it was also noted that he appeared to enjoy the sessions much more as the project progressed.

Lesson observations during Literacy and Numeracy however, showed varying results. During Phase One, the target child was often dominant when the activity involved group work, however during paired activities there was very little interaction with his partner and he continued to work independently. During Phase Two, he was still fairly dominant during group work, however in paired activities he interacted more with his partner, appearing to listen but not always responding. In Phase Three, the target child was often dominant during group work but in paired work he interacted and worked sensibly with his partner, listened more to his partner's point of view but insisted they use his ideas to work on. This data showed an improvement in social skills in the classroom over the three phases when working in pairs; however, the data collected indicates that there were minor improvements during some group work but this was not evident in the majority of the sessions.

This reflects the findings made from the data recorded for the interaction tasks where gradual improvement was seen over Phases One and Two but when the group size was increased to more than two children in Phase Three, the target child's social skills often

deteriorated. In contrast, a marked improvement was seen in his social skills during the turn taking tasks in all phases, even when the group size was increased by similar proportions in Phase Three. It must however be noted that when the group size was increased during these turn taking activities, the target child's regular partner was in the group. This therefore questions whether it was the size of the group; the activities carried out; the partners involved or a combination of these factors that had an impact on the target child's social skills. Seach (2002) claims that many people with autism find that they experience a sensory 'overload' in certain social environments. This could therefore account for the target child's inability to interact in a group with two random partners as opposed to coping with a group consisting of one random partner and his regular partner. The mere presence of his regular partner could by Phase Three have the effect of turning the situation into a safer more familiar one.

Furthermore, Goldstein et al. (1988) found that peer mediated techniques have been found to consistently increase the social skills of children with autism. Although the regular partner was not individually trained to interact with the target child prior to the study, by the time the programme reached Phase Three he would probably have developed his interaction skills with the target child. Roeyers (1995) however, warns that although peer mediators can be successful in increasing the levels of interaction between the child with autism and the peer mediator, this is associated with reduced levels of spontaneous interactions with other peers.

Furthermore, a study carried out by Parsons (2002) found that people with autistic spectrum disorders failed to generalise learned social behaviours to novel environments. These theories could explain why increased social skills were only noted in the turn taking tasks and not observed in other areas of the project, however cannot be proven from the data collected.

Following the action, the self-esteem questionnaire showed an increase in score from 9 to 20 out of 30. The target child gave nine more positive answers than before the action as shown in Figure 7 and no answers given were more negative.

Questions with differing answers before action to after	never	Sometimes	always
Do you like to do well at school?		✓	✓
Do the others in the class listen to you when you have a suggestion?	✓	✓	
Do your parents like to hear about what you are doing at school?		✓	✓
Do you often feel lonely at school?		✓	✓
Does pleasing the teacher make you try harder?		✓	✓
When you close your eyes can you imagine yourself being really good at something?	✓	✓	
When you try hard at school do you get better?		✓	✓
Do you enjoy doing maths?	✓	✓	
Do you like to join in when there are group games in class?	✓	✓	
✓ = Before action ✓ = After action			

Figure 7. Self-esteem questions which were given different answers before the action to after the action.

The results show a clear increase in self-esteem following the action. Psychologists are largely of the view that an impaired view of 'self' will also result in a lack of awareness of thinking about others (Seach 2002). This change in self-esteem could be responsible for the change in behaviour towards others during this project, however, as previously discussed there is a question of validity with data recorded directly by the target child due to possible information-processing difficulties; familiarity with the assessment sheet or external influences. Therefore the validity of the two questionnaires must be considered.

In the informal interview following the action, the target child expressed the opinion that he sometimes enjoyed working with others as he could bounce ideas off them but then preferring to work independently as he found it difficult to concentrate with others around. These comments indicate a more positive approach to working with others but again form a possible link with the claim that autistic children sometimes experience a sensory 'overload' (Seach 2002).

A major finding during this research was that the target child appeared more dominant when working with a group of children of similar ability than when he worked in mixed ability groups. At the beginning of the study the impact of different groupings was not the main focus as the researcher had little control over the groups and tasks the child was involved in during Literacy and Numeracy. As the project unfolded however, a common theme was seen to emerge and became more apparent in the later stages when the child was seen to exhibit much more co-operative behaviour when working in mixed ability groups than in similar ability. On these occasions the target child's regular partner played no part in any of the situations and could therefore not have had any direct impact on the interactions.

Alexander's work claims that it has been recommended that teachers impose pupil grouping by similar ability (Alexander 1992). This form of grouping, according to Piaget, produces the most effective social interaction between peers (Tzurriel 2007). This research project however, challenges Piaget's theory as the results show that the target child was involved in more social interaction when in mixed ability groups. Webb (1989) also challenges this claim believing that low ability pupils rarely have the range of cognitive insight to challenge other's ideas or elaborate on their own ideas. In this study, the target child was placed in a low ability group when working with similar ability children. This hypothesis could therefore perhaps go some way in explaining his behaviour as the others in the group may not have challenged his conduct, therefore allowing him to dominate proceedings.

Barrett (2000:1) states that: 'in every situation, children will need an attentive listener who responds to them.' This statement questions whether the different types of groupings and therefore the different levels of speaking and listening skills that the target child was subjected to, had an impact on his own ability to be an attentive listener. As the target child demonstrated more developed social skills in mixed ability groups it indicates that he is able to interact with others, however in some situations this was not observed. When the children were grouped by ability however, the lower ability group generally consisted of the same children each time, whereas a much larger variety of children were involved when in mixed ability groups. The fact that the target child was more accustomed to working with the lower ability children could have given him more confidence and therefore had an effect on his self-esteem in this environment. However, as the focus of the study was on the social skills of the target

child, there is insufficient evidence on the behaviour of other individuals to validate these claims and more research into the effect of different groupings would therefore need to be carried out.

Conclusion and recommendations

The study was to find out what impact an intervention programme using turn taking and interaction tasks would have on the development of an autistic child's social skills. The results show that the target child's self-esteem increased during the action with a development in social skills noted during the turn taking tasks. During the interaction tasks a gradual improvement in social skills was observed during Phases One and Two, however a decrease in sharing was noted when the group size was increased to three children during Phase Three.

The study also looked at whether the skills developed in the intervention programme were transferred into the classroom through observations during Literacy and Numeracy. The evidence shows an improvement in the social skills of the target child when working in pairs; however these skills were not always evident when the group size increased to three or more as the child's social skills often deteriorated. This finding reflects that of Canney's (2006) who, during the study 'The merits of circle time', concluded that some children are not ready for larger groups.

The data collection methods used could be questioned as data recorded by the child may not have been reliable as Moyes (2002:121) claims that it may be that a child with autism has, 'information-processing difficulties which may be interfering with his perception of what is actually going on in his peer group.' Furthermore, the data collected by the researcher relied on personal opinion and as Bell (1999) believes, the researcher will have their own particular focus and interpret different significant events in their own way. In addition, the classroom observations were problematic as the researcher had no control over the tasks or groupings leading to data that was difficult to compare.

A major finding of the study was that during group work, the target child co-operated more in mixed ability groups as opposed to similar ability groups. In order to support the needs of the target child and to scaffold the development of his social skills, this finding will be used to inform classroom management and therefore influence practice.

As the evidence indicates an increase in social skills during paired work, the interaction tasks and turn taking tasks will be continued using random pairs to increase the target child's social circle and to encourage co-operation when working with others. To promote the transfer of skills into the classroom, the activities will focus on preparation for tasks planned for the class during the subsequent days. This will however, require excellent interaction and communication between the researcher and the class teacher for this to be effective.

As the evidence from the study indicated that the child finds working in similar ability groups the most challenging, this finding could also be used as a focus for further action research. As the group tasks and groupings were out of the control of the researcher in this project, finding a suitable situation would need to be a priority. As Connor (2002) considers, autistic children have a resistance to change with a preference to sameness. Therefore by using an activity such as guided reading with a small group,

the task, the children, the setting and time could all remain constant. This would allow the researcher to monitor the behaviour of the other children in the group in order to analyse the influence this had on the social skills of the target child.

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Teachers' Perceptions about Teaching the Holocaust in Primary Schools

Jackie Perceval

Abstract

This research project looks at primary school teachers' views on using the Holocaust of World War 2 as a vehicle to teach key skills in Religious Education in primary schools. The teaching of the Holocaust has not been used widely in the past in primary schools in England due to its sensitive nature. To date, there has been no research into teaching the Holocaust in primary schools in England. However, it has been used in Scotland by primary school teachers as a vehicle for teaching key skills such as empathy, reflection, analysing and interpreting information. It is also taught in year 9 in secondary schools in England. While on a visit to the Beth Shalom Holocaust Centre in the second year of a BA (Hons) Primary Education with QTS degree course, I had the privilege of listening to a Holocaust survivor, but was faced with many questions. One question had a personal significance: was there a particular reason why teachers in England do not teach children about the Holocaust? The aim of this research was to delve deeper into teachers' views and attitudes. I used individual interviews and focus groups in order to get a qualitative insight into how teachers feel about using the Holocaust to teach key skills in Religious Education. Conclusions suggest that teachers may feel comfortable using the Holocaust as a vehicle for teaching key skills in Religious Education. However, this would only be possible if the content was age appropriate, they did not have to uncover the full horrors of the Holocaust, and they received appropriate training.

Introduction

The aim of this research was to find out how primary school teachers felt about teaching the Holocaust of World War 2 to primary age children. It is not common practice in England for primary schools to use the Holocaust as a vehicle for teaching key skills in Religious Education (RE). However, children in Scotland have been learning both about and from the Holocaust for a number of years with a great deal of success.

Cowan and Maitles (2004) discuss how children can raise their attainment in Citizenship by learning about the Holocaust and argue that evidence shows how children's knowledge and attitudes/values improved through learning about the Holocaust. Davies (2000) and Schweber (2004) both agree that there are many advantages to children learning from the teaching of the Holocaust. This then poses the question: if primary age children in Scotland have benefited from learning from the Holocaust why then do teachers not use it in England? Having chosen RE as my subject specialism, I was very aware of how the skills we teach can enhance children's learning in other areas of the curriculum and help children to respect people's views even if they are different to their own.

Totten (2000) argues that teaching children of primary age about the horrors of the Holocaust would be folly and telling these children the "real story" would constitute miseducation. Short (1991a, cited in Davies 2000) argues that children's attitudes to Judaism highlight the need to teach about it accurately and sympathetically; he warns that learning about Judaism will not necessarily diminish anti-Semitism. Indeed, if

taught badly, it could exacerbate it. As a parent, I introduced my children to the Holocaust at a young age and I believe that it has helped my children to question intolerance, injustice and inhumanity.

The Agreed Syllabus for Rotherham Local Authority states that Religious Education "challenges pupils to reflect on, consider, analyse, interpret and evaluate issues of truth, belief, faith and ethics and to communicate their responses" (Rotherham 2004). Therefore, I wanted to understand why it is not taught in England when clearly, evidence shows how children can practice skills such as reflection, empathy, application, interpretation and expression which are vital to children's understanding of sensitive issues which in turn will arm them for life. I wanted to find out if teachers' perceptions of teaching the Holocaust at primary school would be to introduce them to the full horrors or if their perceptions go deeper and they are able to see it as a vehicle for teaching key skills.

Literature review

Exploring the literature into teaching about the Holocaust has been limited due to a lack of research into this area. However, some research has been done in primary schools in Scotland and in secondary schools. In addition, I have undertaken interviews with experts in the field of Holocaust education in primary schools; I feel it is important to understand how they feel about teaching the Holocaust at primary level.

Short and Reed (2004) argue that "the most compelling reason for learning about the Holocaust is to help secure the future against further violations of human rights, whether based on ethnicity, religion, gender, sexual orientation or disability". Cowan and Maitles (2004) agree that Holocaust education "provides opportunities for developing positive values of empathy, awareness of antiracism, and an understanding that the individual can make a difference". A head teacher that I interviewed, whom I shall refer to as Mr Anderson, discussed how he felt it was a necessary part of the curriculum and he chose to teach primary school children about the Holocaust because he feels that if you scratch any society there will be racism underneath it. Brown (2006) agrees stating that many children have picked up racist and negative attitudes way before they are ten. Nottingham police state that 70% of issues of racism that they have to deal with are from primary schools and unfortunately raising such issues in school with young people aged 13 and 14 could be a little too late. This is quite a startling statistic and thus it is necessary to find out if primary school teachers are aware of racial incidents in their schools and whether learning from the Holocaust would aid the elimination of racism. Cowan and Maitles (2004) agree that:

Holocaust teaching 'perhaps more effectively than any other subject, has the power to sensitise them (pupils) to the dangers of indifference, intolerance, racism and the dehumanisation of others'. Short and Reed (2004:3) state that learning about the Holocaust "highlights the dangers of allowing the growth of an incipient xenophobia to go unchecked.

The DfES (2004) promotes the importance of Religious Education stating that "Religious Education provides challenging questions about the ultimate meaning and purpose of life, beliefs about God, the self and the nature of reality, issues of right and wrong and what it means to be human". Research indicates that the Holocaust would be a valuable vehicle for providing children with the skills and knowledge that will help

them achieve the objectives set out in the framework for Religious Education in England. Davies (2000) argues that "Teaching about the Holocaust is one of the most important things a teacher can do. It is also one of the most challenging". This might explain why teachers are reluctant to use the Holocaust as a context for teaching skills in Religious Education.

Cowan and Maitles (1999) believe that:

The primary school is a particularly important place to teach the Holocaust, unlike secondary school, due to it offering opportunities for a cross curricular approach. Primary school teachers spend more time with their pupils and develop a greater rapport, which helps them to deliver sensitive content. They can also be flexible with their time-table to allow time for reflection.

Anderson (2006) has linked the teaching of the Holocaust with art stating that:

It's not really looking at the art but the nature of the art. That is something we have done with the older ones [years 5 and 6] which is quite abstract really and quite a high level thing to do. People think that looking at pictures is quite an easy thing to do but it's actually quite a high level thing to do.

Cowan and Maitles (1999) revealed, from their research into teaching the Holocaust in primary schools in Scotland, teachers felt that it could easily be fit into many areas of the curriculum for example PSHE and drama. Teachers who taught the Holocaust said that it had been a very positive experience and those that taught it for the first time said that they were keen to teach it again. It is important for us to consider this. If in Scotland teaching about the Holocaust or learning from the Holocaust in Religious Education is such a positive experience for both teachers and children why are most children in England not benefiting from the same input?

Cowan and Maitles (2004) believe that "As the education for citizenship and democracy proposals are developed in schools, these areas of content become central to pupils' understanding of living in a multicultural, multi-ethnic, democratic society". As citizenship is a priority in education today it will be important therefore, to note if teachers of primary age children can link citizenship as a context for children learning from the Holocaust. Anderson (2006) has also used Literacy as a context for children learning from the Holocaust, with a great deal of success, in the form of a book called *Rose Blanche*: "It is an interesting book about a little girl, which is another reason why it is good. It is about a very nice little German girl, so straight away, you are addressing thoughts of, 'those nasty German people', your in to people are people and there is good and bad in most folk, it's a question of degree."

Brown (2006) advocates the teaching of the Holocaust to primary age children but at an appropriate level. He discusses that you can talk to children of 7 and 8 years of age about persecution, discrimination and bullying but what you do not do is talk about concentration camps or the horrors and he is convinced that children aged 9 and 10 would benefit. Anderson (2006) agrees and stresses the importance of teaching the Holocaust, which is age appropriate. Evidence seems to suggest that an important element of teaching the Holocaust to primary age children is that the content is age appropriate and should be planned for very carefully. Therefore, it is important to consider how teachers feel about delivering the content even at an appropriate level.

Anderson (2006) discussed how some of his staff were cautious about teaching the content due to the sensitive and horrific nature. However, after quite a lot of training and discussions with all staff they realised how important it was in our current climate and decided it would benefit the children with lessons for life. Brown (2006) states that they have a number of days at the Holocaust Centre, Beth Shalom, that are specifically designed to help primary school teachers deliver age appropriate content. This is called 'Teaching the Holocaust at Primary Level', delivered by two experts of Holocaust education in primary schools, and colleagues from Scotland and from Devon. It would be interesting to find out if primary school teachers had the opportunity for training whether their perceptions would change. Anderson (2006) asserts that "you are teaching the children that they should never make assumptions about people because this is another aspect of it: that we make judgements about people and they tend to be very black and white and kids especially do that".

Although the majority of my reading has been about the positive effects the teaching of the Holocaust can have on children of primary and secondary school age, there have been some points to consider that may have an impact on teachers' perceptions of teaching the Holocaust at primary level. "Your efforts must never produce learned monsters, skilled psychopaths, educated Eichmanns. Reading, writing, arithmetic are important only if they serve to make our children more humane" (Head-teacher from an American school cited in Cowan and Maitles 1999). Davies (2000) asserts that if teachers are not equipped to teach it well then they would be in danger of exacerbating anti-Semitism. Brown (2006) agrees saying you have to be very careful how you teach the Holocaust because you may be in danger of reinforcing racism. The head teacher I interviewed holds that "You can very easily forget that, in trying to address racial stereotyping you can be guilty of stereotyping yourself. This is the danger of teaching the Holocaust and why schools should always be cautious and not go into it without thoroughly looking into what it actually entails". For these reasons it is therefore necessary to see if these anxieties about teaching the Holocaust to primary school children are mirrored by the primary school teachers. A Holocaust survivor whom I interviewed, who will be referred to as Dr Katz to maintain anonymity, believes that there is a danger in teaching the Holocaust to young children in that there are people who see evil and admire it. He goes on to discuss not exposing his own children to it for that reason and how when they went on a visit to Auschwitz his children appeared nonchalant. After considering this for a minute he concluded that perhaps if he had spoken to them earlier they might have demonstrated empathy or reflection. Anderson (2006) believes that it would be disrespectful to ask children to empathise with the Holocaust.

Totten (2000) states that "To even attempt to teach one aspect of the above in a way that is understandable to a five, six, seven, or eight year old would be folly. To do so by telling the 'real story' with all of its hatred, abuse, ugliness, and murderousness would constitute miseducation". Sepinwall (1999 cited in Totten 2000) believes that Holocaust education is important for children to "learn tolerance and respect for others who are different." She believes that children should be provided with the opportunity to practice skills for resolving conflicts peacefully. Totten (2000) rejects this idea, stating that the purpose of Holocaust education should focus on teaching students the history of the Holocaust. This means a focus on what happened and why it happened. If it neglects to focus on the history, then what is the purpose of Holocaust education? Katz (2006) states that he would be against the teaching of the Holocaust if it was done in such a way as to give children life long nightmares. However, if it was age appropriate

and aided the eradication of prejudice you can achieve a great deal without exposing children to the horrors. It would be important to cater for the most vulnerable in the classroom.

Kochan, Novick and Kinloch (cited in Short 2003) question the social and moral significance of Holocaust education. Short (2003) contends that the Holocaust does contain useful lessons, not only for individual students, but also for the educational system as a whole. It is necessary, therefore, to take note of a comment made by a young person after visiting Beth Shalom Holocaust Centre:

My visit to Beth Shalom made me come to the reality that the Holocaust was not just an extremely sad story; these horrific tales are about abuse and discrimination that affected the lives of millions. It also made me see that this discrimination is still around today, in our everyday lives; we ignore it or may even join in, but it really mustn't go on. I hope to make a very conscious decision to make sure that I myself never become even a small part of discrimination against others (Stevie Brown, age 15 cited on Beth Shalom website).

This may go a long way to explaining the importance of teaching the Holocaust to children. Although this was a secondary age student his comments are still very relevant. However, Cowan and Maitles' (1999) research into teaching the Holocaust in primary school in Scotland revealed that: "Children showed commendable respect for minorities representing them and in all categories there was some improvement over the position they held before they learned about the Holocaust."

It is important therefore, to consider the above when asking teachers about their perceptions on teaching the Holocaust to primary school children. Are teachers' perceptions of teaching the Holocaust about death camps and horrors or are teachers' perceptions wider and focused on teaching children about respect and tolerance. All these things have been considered when undertaking this research project.

Methodology

This is a small scale research project. When planning this research it was necessary to get the logistics right because of the time of year the research was being conducted. Due to there being limited research into this area three interviews, with professionals of Holocaust education in primary schools, were undertaken to add current views in this field in the hope that they would enhance understanding.

It was important to consider what sort of data was needed, for example, qualitative or quantitative and what method would be most effective. It was also important to consider the validity and reliability of each method. A vital part of research is to first consider whether your research is ethical. Therefore, permission was sought and granted from the head teachers of all schools involved. In addition, an explanation of what the research was about was given before the interview commenced in order to eliminate any unethical practice. Macintyre (2000) states that in order to observe protocol it is important to give everyone who is involved as clear a picture as possible of the research topic, the action plan and other people who will be involved.

There appears to be some debate regarding the best kind of data to collect. Some authors regard quantitative data the best method due to it being numerical and

objective and others prefer a qualitative approach because the data is richer and has more meaning. However, there is a danger that qualitative data can be subjective (Eichelberger 1989). Nevertheless, due to the nature of the research question the data collected inevitably will be subjective. Scott (2003) discusses that research into these differences have shown they are no longer two separate paradigms but both can be used in the same investigation. Gorard (2001) and Best (1981) both hold that there is no useful distinction between the two. Gorard (2001) argues that "there is a danger for qualitative research conducted in isolation from numeric approaches, in that it could be used simply as a rhetorical basis for retaining an existing prejudice." Therefore, this research is both qualitative (due to the data being collected through individual semi-structured interviews, focus groups and telephone interviews) and also quantitative (due to the measurement of attitudes between teachers).

Through the triangulation of individual semi-structured interview, telephone interview and focus groups there is greater validity and reliability. Macintyre (2000), Walford (2005) and Best (1981), all advocate multiple methods or triangulation being the best way of collecting data which adds validity, helps to eliminate error and reduce bias. As this research is looking at teachers' perceptions, that is, their opinions and views about teaching the Holocaust, it is important to gather quality data and by using different types of interview: I was able to achieve this.

Best (1981) holds that a greater degree of validity is achieved when an interview is carefully structured. Cohen and Manion argue that "the structured interview leaves little freedom to make modifications whereas the unstructured interview is an open situation having greater flexibility and freedom" (Cohen and Manion 1980 cited in Radnor 2001:60). Bell (2002) argues that the best kind of interview is somewhere in the middle of structured interview and unstructured interview allowing respondents the freedom to discuss what is important to them but with some structure to ensure all the topic is covered will eliminate some problems associated with structured interviews.

Wellington (2000), Bell (2002) and Walford (2005) all agree that although interviews are very good they have many problems. They believe questioning is very important during interview and people have a tendency to lie. Wellington (2000) calls this 'romancing', when an interviewee invents an answer due to their lack of knowledge or as a way of satisfying the interviewer. One of the ways of avoiding problems during interview is to pilot it, which I will discuss later. May (2001) argues that the focus group is a valuable way of collecting data when you wish the participants to engage in a conversation. This is why I chose to use focus groups.

Bell (2002) also suggests using a schedule alongside the interview to note down attitudes towards questions which help during the analysis. As I am a novice interviewer and I wanted to get the most out of the interviews I prepared a schedule to use during the interviews. Radnor (2001) agrees and discusses how the interview schedule used alongside the taped interview is very useful. I used semi-structured interviews to collect data, due to this research focusing on teachers' perceptions, together with an interview schedule and a dictaphone.

Walford (2005), Radnor (2001), Best (1981) and Macintyre (2000) are all supporters of the tape recording of interviews. It is convenient and inexpensive; it prevents one having to write everything down during the interview, which can be distracting. However, there are things to be aware of when using a dictaphone. According to

Macintyre (2000) "nothing is more off putting to the interviewee than to be halted mid-stream because the machine is not working properly." In view of this I have asked for a second tape-recorder as back-up in case something goes wrong. I gained permission to use the tape-recorder from the respondents before commencing the interview, for ethical reasons.

Macintyre (2000) and Gorard (2001) advocate piloting and redrafting which will help to eliminate problems during interview, and I engaged in this process. Bell (2002) states that "if you have strong views about some aspect of the topic, be particularly vigilant. If someone else asked the same question, would they get the same answer?" This was always on my mind while devising the schedule but my own views are biased and I found this very difficult. Bell (2002) discusses the importance of the interview questions, preparation and piloting which, in turn will give rich data. Macintyre (2000) and Best (1981), both agree that open-ended questions are the best type of question which provide a greater depth of response. The interview questions and schedule were redrafted after feedback from my practice focus group. It is also important to be aware, during the interview, not to get involved in the conversation; this helped me to avoid revealing my own bias. Bell (2002) holds that whenever possible the transcripts from the interviews should be verified with the respondents. Time was allocated for taking the transcripts back for verification.

Gorard (2001) discusses how different types of samples can affect the results of the research. Although random sampling has many advantages, for example, it is free of bias and it allows you to estimate probability, it was eliminated from this project due to time constraints. I chose to use a clustered sample. Clustered sampling gave me the results required without having to travel far. Bell (2002) argues that one of the problems with interview is the time wasted caused by travelling and interruptions. Verma and Mallick (1999) agree that one of the biggest problems with interviews were what many post-graduate students referred to as 'dead time'. In order to avoid this, the schools that were chosen were with five miles of each other thus eliminating any time wasted travelling. However, Gorard (2001) argues that a disadvantage of using a clustered sample is an increased risk of bias. However, as previously established, the data in this case is inevitably biased because it is based on the individual teachers' perceptions/views and opinions.

Three schools were contacted regarding interviews and a small sampling of teachers from an infant school for a focus group (school A) and a small sampling of teachers in a junior school (school B) for a second focus group were arranged. Another reason for choosing cluster sample is that I had been involved with the schools chosen and they were familiar with me. Macintyre (2000) states that student teachers carrying out research in an environment in which they feel comfortable provides benefits akin to being given support in carrying out the research. A third focus group was arranged with teachers that had experience of teaching the Holocaust at primary school. However, this did add a variable. Best (1981) states that, variables cannot be ignored and must be accounted for. For that reason, I removed the variable and added the data from this third group to the literature. Some of the participants are teachers who had been teaching for many years and some had only been teaching for a couple of years. It was important to analyse the data collected from teachers of differing experiences and differing views in order to obtain a broader understanding of teachers' perceptions. It was also important, during the focus groups, that the freedom to discuss their views is crucial to the research findings therefore, semi-structured interviews were the most

appropriate method to use. Although, I am aware that these posed problems when analysing the results with the help of the schedule this was minimised.

Wellington (2000) discusses the daunting task of analysing transcripts from interviews. One suggested method is to read and re-read and eventually the researcher will begin to categorise and organise them in their own minds. Radnor (2001) takes this a step further and discusses categorising data using ICT. During a lecture entitled 'Qualitative Analysis' (Woolley 2006) I had to practice categorising a cut up transcript in order to classify and make sense of it. I found this very useful, which backs up Radnor and Wellington's ideas. Bell (2002) warns that typing up transcripts can be time consuming and for every hour of tape you will need ten hours. Although I agree that typing transcripts can be time consuming, I have secretarial skills which helped me significantly.

I transcribed the tapes and categorised the responses. Wellington (2000) states that the most common and rational approach to categorising data is that some categories will be pre-established and other categories will be derived from the data. I agree that this was most appropriate for my research. While typing the transcripts I had pre-established categories which helped make sense of the data, but I also was looking out for other categories that arose. The pre-established categories were:

- positive attitudes to teaching Holocaust;
- negative attitudes to teaching Holocaust;
- cross-curricular links and initial reactions to teaching the Holocaust.

As Wellington (2000) suggests, I also analysed other categories as they arose.

Although the sampling was too small to generalise, I felt it would be interesting to compare teachers' positive attitudes with teachers' negative attitudes and put these into a graph: this helped me to see how teachers felt.

Analysis of findings

A small cluster sample of teachers was chosen and two focus group interviews were conducted. Initially, I had planned to use three focus group interviews but one of the schools backed out due to staff training. However, one of the teachers from this school contacted me and I undertook a short telephone interview. Another teacher heard about the research and contacted me to voice her views. Therefore, the sampling consists of ten teachers with various years of experience and knowledge of the subject.

Short and Reed (2004), Cowan and Maitles (2004), Anderson (2006) and Brown (2006) all agree that children of primary school age should be taught the Holocaust due to the skills children can learn from it. They all agree that teaching the Holocaust can go a long way to eradicating racial stereotyping and discrimination and children are able to develop skills such as empathy and an awareness of antiracism. Out of the 10 teachers that were interviewed, six of them reflected these ideas and thought that the Holocaust could be used as a vehicle for teaching skills in RE, two felt that they had very little knowledge of the Holocaust and felt they were not equipped to teach it and two of teachers felt it would be unsuitable and they would be uncomfortable teaching the Holocaust at primary school.

Cowan and Maitles (2004), Brown (2006) and Anderson (2006) all believe that children in primary school are already influenced by negative attitudes and racism before they get to secondary school. Therefore, it may be argued that teaching the Holocaust at primary school could only have a positive effect on the children. This is reflected in the views of three teachers, and it is interesting that two of these were RE co-ordinators in their schools.

Initial reactions to teaching the Holocaust

It is interesting to note that initially teachers' perceptions of teaching the Holocaust in primary schools were that they would have to teach the full horrors and atrocities. This reflects Katz's (2006) ideas about not inflicting life long nightmares by teaching about the full horrors of the Holocaust at such a young age. This was met with negative views from seven out of ten participants interviewed. However, once the conversation turned to a cross-curricular approach, attitudes to teaching the Holocaust changed and it was perceived by all participants as a good way of teaching children respect for others. This reflects the ideas of Cowan and Maitles (2004) that primary school is more appropriate because it lends itself to a cross curricular approach.

Cross-curricular approach

Out of the teachers interviewed, nine out of ten agreed that the Holocaust could be taught by using a cross-curricular approach; mainly through Citizenship and PSHE. This reflects the views of Cowan and Maitles (2004). Teachers had very positive ideas about this approach. Eight of participants interviewed felt that if they had to teach the Holocaust they would approach it in a cross curricular way and make it age appropriate.

Negative attitudes to teaching the Holocaust

Out of the ten participants interviewed, two had very little knowledge of the Holocaust:

It may be that if you don't know a lot about it yourself and there wasn't a lot of resources available then you wouldn't know how to broach it. Like I said, I have heard of it but I don't know a lot about it.

and

I didn't do anything about it at school, I have heard of it but I don't know anything about it either. I'd be very uncomfortable teaching it.

One of the ten participants felt very strongly against teaching the Holocaust to primary school children stating:

In the 80s there were a lot of documentaries on the TV about it and they were quite shocking, that's why I don't think children should learn about it. It disturbed me then and I was in my teens, so I don't think children should know they should be allowed to hold onto whatever childhood they have for as long as they can.

Although this teacher disagreed with Brown (2006) who advocates teaching the Holocaust to primary school children, they did agree with him about not talking to children about concentration camps or the horrors until children are older.

All three of these respondents had very valid reasons for not teaching the Holocaust at primary level. However, the two participants with little knowledge agreed that with the right training and resources it would be a good vehicle for teaching skills in Religious Education. This mirrors the views of Anderson's (2006) staff when they had to teach it and they agreed that with the right training it is important that it is done. It is interesting to note, out of all the participants interviewed, the two teachers with very little knowledge of the Holocaust were both teachers in their 20s.

Positive attitudes to teaching the Holocaust

Although Katz (2006) has some concerns about teaching the Holocaust at primary school, he does believe that if it aids the eradication of prejudice then you could achieve a great deal without exposing children to the horrors. This view is mirrored by nine out of the ten participants. They agreed that they would feel more comfortable teaching it if they did not have to expose the children to the full horrors of the Holocaust:

If I had to teach it that's the way I would teach it. I would probably have a P4C [Philosophy for Children] session, all the children giving their opinions and each child respecting each other's opinions.

It could be done as a sensitive issue, for learning the skills not to go into any great detail about the atrocities but learn from it about racism and prejudice and that. It's a bit like sex education, isn't it? You just give them enough that they can cope with.

It is interesting that the participant who categorically did not think that primary school children should be taught about the Holocaust thought that you could use it to teach respect:

I suppose you could teach children about respect and understanding people that are different but not tell them about the things that happened to people like death camps and murder.

This teacher had strong views about not teaching the Holocaust at primary level but began to waver when she thought about using it as a vehicle for teaching *skills*. It could be argued that perhaps if the participants had known the question before the interview they may have had time to think about it and their responses may have been different.

One participant's experiences of teaching the Holocaust is reflective of Cowan and Maitles (1999) research in that both have experienced a change in children's respect for others after they learned about the Holocaust. All the literature and all the experts who were interviewed agree that the content should be age appropriate. All participants interviewed agreed with this and hold that it would be vital that teaching the Holocaust at primary school should be age appropriate.

Anderson (2006) believes that it would be disrespectful for children to empathise with victims of the Holocaust. This view is not mirrored by one teacher's view that children find it difficult to understand because they have not experienced these things for themselves but they are able to understand and empathise when addressing it from a bullying point of view and so children need to be able to empathise in order to fully understand.

Another issue, identified by two of the ten participants, related to parents/carers. This is something that had not been mentioned before in any of the literature. Anderson (2006) stated that it struck him as strange that some of his parents/carers had not heard of the Holocaust but he did not appear to have had any problems from parents when teaching the Holocaust. Perhaps this is something that could be looked into in greater detail at a later date.

Davies (2000), Anderson (2006), Katz (2006) and Cowan and Maitles (1999) were all concerned about the way the Holocaust should be taught because of the danger of reinforcing the very thing that you are trying to eradicate. Only one of the participants interviewed shared these concerns. It is interesting to note that the participant who shared these concerns was the participant who had experience in teaching the Holocaust at primary school. It could be that the others did not have enough time to think about the full implications of teaching the Holocaust before the interview.

Research problems encountered

Although this has been an enjoyable and very interesting experience I have encountered some problems along the way. I am quite an organised person and in my naivety I felt if I prepared well then everything would go smoothly. However, I now know that no matter how organised you are some things are out of your control when doing research.

The sample of respondents that I chose was from schools in a very similar area which inevitably influenced the views of the teachers interviewed. In hindsight I should have chosen schools with different socio-economic groups in different areas and perhaps with a more diverse religious ethos in order to get a broader picture. This relates to Gorard's (2001) ideas of bias.

Although Bell (2002) holds that the best type of interview is somewhere in the middle of structured and unstructured interview, I believe this maybe true for a more experienced interviewer. In my naivety I wanted an unstructured interview or a conversation between the groups, which, I thought, would give me an insight into their thoughts and views without revealing my own bias. However, I have found it was a very difficult method to use. It would have been better if I had a more structured approach because of my inexperience. I also believe that questionnaires would have enhanced my research and I would have been able to reach more teachers.

Walford (2005), Radnor (2001), Best (1981) and Macintyre (2000) all advocate the use of the tape-recorder. I believe that the tape recorder was the best way of gathering data, however, I did not realise how difficult it can be to type up the transcripts. Although I made sure I had a back up recorder in case something happened to the first one, I did not think I would have problems hearing what the teachers were saying. I did not take

into account background noise and distance from the microphone. I should have practised beforehand and organised a quiet room to conduct the interviews.

After typing up the transcripts I wanted to return them to the participants and interviewees add validity and accuracy, however, I did not consider the length of time it would take these busy people to get back to me. In future I would type up the transcripts straight away and allow at least a couple of weeks for them to be returned.

I agree with Bell (2002) that one of the difficulties with interview as a method is having to use inference to decipher the transcripts. It was very difficult to read into or infer what participants were saying, for example two participants mentioned parents but did not elaborate on this. From this I had to decide what they meant. I decided that they probably meant that they might have a problem with parents/carers complaining if they taught the Holocaust to their children.

Conclusion

The general implications of this research project are that children can learn valuable skills when learning from the Holocaust of World War 2. Although some teachers are concerned about their lack of subject knowledge and are frightened to teach such a sensitive issue without full training, they do feel that it is important for children to learn about the affects that discrimination, racism and bullying have on other people.

Although the majority of the teachers whom I interviewed had positive perceptions of teaching the Holocaust in primary school and believed that children could learn a great deal from it (especially through a cross-curricular approach) this is in no way representative of teachers in general and it cannot be generalised.

It is, however, relevant to my own teaching and especially to my future role as an RE co-ordinator. These findings will encourage me to speak out about the positive effects teaching the Holocaust, at an age appropriate level, can have on children's learning. For example: respecting each other and respecting other people's views when they are different to one's own. As an RE Co-ordinator, it will also be important to consider teachers' lack of knowledge and provide resources and training to help them feel comfortable teaching such a sensitive issue to children.

Recommendations for further research

Since conducting this research it has become increasingly clear that children in Scotland have benefited from learning about the Holocaust in primary school. Many people like Brown, Cowan and Maitles, all experts in Holocaust education, believe that it should be an important part of children's education for them to learn about discrimination and racism in order that these kinds of atrocities are not repeated.

Children begin to learn about the Holocaust in year 9 of secondary school. Brown (2006) believes that this may be too late because children will already have formed their negative attitudes and opinions by then. It would therefore, be valuable to this research, to find out from secondary school children what they think about learning from the Holocaust.

During the course of this research, an opportunity arose which enabled me to interview a group of secondary school children to see what they thought about learning from the Holocaust at primary school. Although, this involved only a very small sample and their views were not representative of all secondary school children, they were in favour of learning from the Holocaust at primary school and felt the skills would have benefits for them in high school. It would be valuable to research this further. My research would also benefit from interviews with teachers from different areas across the country to get a broader and more generalisable insight into teachers' perceptions of teaching the Holocaust at primary school.

I believe that the Holocaust should be taught to children of primary school age. I believe that it is possible to teach it at an appropriate level and children will learn valuable lessons for life. I believe that teaching children about respect at a young age will have a very positive effect on the society in which we live. If children can understand how discrimination makes people feel and what can happen as a result then perhaps it will help us to stop atrocities, such as the Holocaust, from happening again.

Interviews

Interviews were conducted in the autumn of 2006 with a primary school head teacher, a Holocaust survivor and an education specialist who I refer to as Mr Anderson, Dr Katz and Mr Brown to maintain anonymity.

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