USING VIDEO SELF-MODELLING TO TEACH NEW SKILLS TO CHILDREN WITH SOCIAL INTERACTION AND COMMUNICATION DIFFICULTIES

(VOLUME ONE)

BY

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Video self-modelling (VSM) is a behavioural intervention in which an observer views a short video of him/herself engaged in adaptive behaviour. The aim of the intervention is for the participant to learn the adaptive behaviour and to reproduce it more frequently, fluently or appropriately. Previous reviews literature reviews pertaining to VSM have suggested that it can be an effective intervention to facilitate behaviour change, but have mainly been restricted to specific applied domains. This chapter reviews systematically research into VSM. 78 articles involving VSM were identified using electronic and ancestral searches. A range of applications of VSM are discussed, focusing specifically on clinical therapeutic applications, applications with individuals with Autism Spectrum Disorders (ASD), the use of VSM in sport, and the use of VSM to improve classroom behaviour. Limitations and implications of VSM research are identified, and there is consideration of possible mechanisms underlying successful VSM interventions.

CHAPTER THREE

Using Video Self-Modelling to Teach New Skills to Children with Social Interaction and Communication Difficulties

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Abstract

Video self-modelling (VSM) is a behavioural intervention in which an observer views a video of themselves engaged in adaptive behaviour, in order to learn the behaviour and reproduce it more frequently, fluently or appropriately. While research evidence attests to the potential benefits of VSM in a variety of settings, including special education, it has received scant attention within the UK educational psychology community. VSM interventions with two 10-year-old boys with social interaction and communication difficulties are reported. One of these focused on developing anger management skills, and the other on improving writing performance. A mixed-methods approach was used with qualitative information from post-intervention participant and staff interviews being used in addition to experimental outcome measures. Post-intervention behaviour changes were observed in both cases, with fewer negative behavioural incidents, and more words written, respectively, however qualitative feedback raises questions about the effectiveness of VSM for one of the cases. Limitations of the research are discussed, as is the suitability of VSM as an addition to the repertoire of Educational Psychologists' interventions.

CHAPTER FOUR

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1. Introduction to Volume One

The topic for this volume is video self-modelling. Video self-modelling (VSM) is a behavioural intervention that is used to assist the learning of new skills or the development of existing ones. Applying the principles of modelling and observational learning, VSM is based on the assumption that while individuals can learn effectively when they observe others, the potential of observational learning is maximised when an individual serves as a model for him/herself. Thus VSM involves an observer viewing an edited video of him/herself engaged in adaptive or desired behaviour. It is intended that the observer learn the observed behaviour through watching the self-modelling video, and reproduce it more frequently, fluently or appropriately.

The research presented herein was conducted by the author as a requirement for the award of the degree of Doctor of Applied Child and Educational Psychology. However, as a student undertaking professional training in educational psychology, the author was also working as a Trainee Educational Psychologist for a Local Authority Educational Psychology Service. This is a role that involves working in schools and other settings to support children and young people with difficulties, with a contingent need for identification, development and implementation of evidence-based interventions.

Video self-modelling was selected as the topic for this research as it is one such intervention with evidence that it can provide an efficacious means for teaching new skills to children and young people with difficulties in learning, behaviour, social interaction and communication, as well as various other populations. It is, however, an approach that was developed in the United States and has received scant attention in the UK, particularly within applied educational psychology. Thus, there would appear to be merit in research to address the question of whether VSM can be employed effectively within the work of an EP.

Chapter 2 of the present volume comprises a systematic review of literature on VSM. VSM has been reviewed previously on a number of occasions, but most reviews have focused on the use of VSM (and related interventions) within a particular applied domain, such as therapeutic uses of VSM (Meharg & Woltersdorf, 1990), the use of VSM in schools (Hitchcock et al., 2003), and the use of videos to teach students with disabilities (Mechling, 2005). Only Dowrick (1999) has reviewed VSM research across a range of applied domains. It is over a decade since that review, and so there is merit in revisiting the literature to consider more recent research. Hence the literature review presented in Chapter 2 attempts to draw on research involving VSM from various applied fields – including clinical psychology, sports psychology and educational psychology – in order to discuss the range of settings, behaviours and populations to which VSM has been applied.

Also, while Dowrick (1999) proposes that self-observation be viewed as a learning mechanism in its own right, previous reviews of the literature have not examined potential explanations for the efficacy of VSM interventions. Thus this review seeks to examine possible cognitive and learning processes that have been suggested to explain why VSM works. By considering VSM applications from a range of applied fields it is possible to draw from particular domains of applied psychology to offer new insights, or raise new questions, that have not been considered in other domains. For example, research from sports psychology raises questions about imagery processes and the relevance of observer skill level which have hitherto not been identified in the literature on educational and clinical therapeutic VSM applications.

The target journal for the literature review in Chapter 2 is *Applied Psychology: An International Review* (hereafter *Applied Psychology*). The selection of this journal was informed by the breadth of its focus. Given that the literature review represented an attempt to integrate findings from various applied psychology disciplines and to use these findings to inform discussion of psychological processes involved in VSM, a generic applied psychology journal was apposite. The journal's guidelines for authors indicate the aims and scope of the journal: "particularly invited are articles that advance understanding of psychological processes across a range of applied phenomena" (Aims and Scope, and Author Guidelines for *Applied Psychology* are included as Appendix 1). This is a description that can be applied to the literature review presented here.

Applied Psychology publishes articles pertaining to a range of sub-disciplines, including clinical psychology (e.g. (Maddux, 2008; Pat-Horenczyk et al., 2009), counselling (e.g. (Leong and Savickas, 2007), health psychology (e.g. (Luszczynska and Tryburcy, 2008; Plotnikoff et al., 2008), sports psychology (e.g. (Anderson and Lavallee, 2008; Plotnikoff et al., 2008) (Jackson and Beauchamp, 2010), educational psychology (e.g. Boekaerts & Corno, 2005; Cemalcilar, 2010), and industrial/organisational psychology (e.g. (Vancouver & Day, 2005). Moreover, it also publishes review articles, including critical reviews, selective reviews to inform theory development, and meta-analytic reviews (e.g. Bhawuk & Brislin, 2000; Fay & Sonnentag, 2010; Maes & Karoly, 2005; Terborg, 1998; Vancouver & Day, 2005). There is not a standard mode of exposition for review articles in *Applied Psychology*. Some reviews are conducted systematically and present search protocols, whereas others present more selective commentaries without systematic search procedures. Given the aim of the review presented in Chapter 2 was to review systematically literature from different fields, search strategies are included in the presentation of the review. As the target journal has a readership from various applied psychology disciplines, the review is written for an audience with a general knowledge of psychology, rather than for a particular group of practitioners.

Chapter 3 presents original empirical research involving the use of video self-modelling to teach new skills to two children with social interaction and communication difficulties. Both children attended the same primary school, and were identified by school staff as individuals who would potentially benefit

from the use of VSM to teach new skills. The first case, 'Fred'[*], involved teaching anger-management skills using VSM, while the second case, 'Christopher', was focused on the development of writing skills. In both cases, positive changes in behaviour were observed. However somewhat equivocal conclusions are drawn, particularly in Fred's case, where he showed an ambivalent reaction to and perception of the intervention. School staff were involved in implementing the VSM interventions, and their perceptions of the process and its utility are presented, as well as a discussion of some of the challenges associated with implementing evidence-based interventions, such as VSM, from a distance through collaboration with teachers and other professionals.

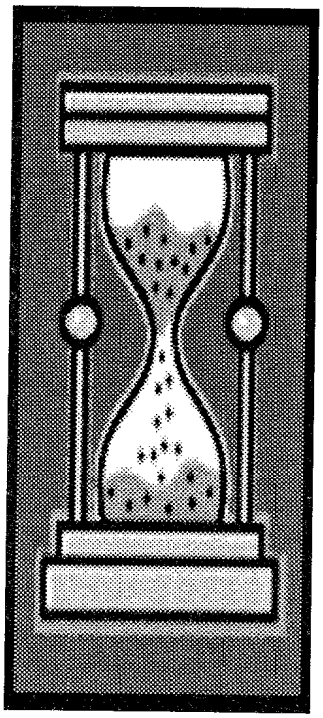
Chapter 3 contrasts with and complements Chapter 2 in that while the Chapter 2 literature review adopts a broad focus and is written for a more generic audience, the research study in Chapter 3 has a narrower focus and is written for a particular group of applied psychology practitioners, namely educational psychologists (EPs). Chapter 3 is thus concerned with presenting a conceptual and evidential rationale for the use of VSM as a targeted intervention to support the learning of children and young people in schools, the outcomes of the intervention within two case study examples, and broad conclusions to be drawn from implementation of the project.

A distinction can be made between research into intervention *efficacy* and research addressing questions of *effectiveness*. While the former is carried

[*] The names of both of the participants in this study have been changed in order to preserve their anonymity.

out under tightly controlled conditions in order to answer the question ‘can it work?’, the latter is concerned with applying evidence-based interventions within real-world settings and addresses the question ‘does it work?’, and includes consideration of contextual variables that may affect implementation (Frederickson, 2002; Kratochwill & Shernoff, 2004).

Figure 1. Hourglass model (from Salkovskis, 1995)



Innovation and initial ideas about technique tested through single case study

Research that conforms to the most rigorous standards of enquiry

Questions about generalisability addressed through externally valid approaches

Roth and Fonagy (1996), while arguing for randomised controlled trials as a “gold standard” for efficacy research, acknowledge that the conditions that create high internal validity evaluating efficacy can, in fact, undermine the external validity of effectiveness research. Salkovskis (1995) presents an “hourglass model” for considering the role of different research approaches in contributing to an evidence base (see Figure 1, above). The top, broad part of

the hourglass represents small-scale research aimed at developing new theory and practices. At the narrow pinch of the hourglass we find research aimed at assessing efficacy. Here internal validity is the priority and controlled research conditions with high standards of methodological rigour are warranted. At the bottom of the hourglass are studies that aim for external validity and address questions about effectiveness, generalisability and application in different settings (Salkovskis, 1995). As Frederickson (2002) emphasises, these different approaches are complementary, and there is a need for research at each of the different stages of the hourglass model in order to develop evidence-based interventions in Educational Psychology.

The research presented in Chapter 3 seeks to address questions of effectiveness rather than efficacy, and positions itself at the bottom level of the hourglass model. It asks whether VSM can be applied within the work of an EP in a school setting to teach new skills. VSM has been judged as meeting criteria for evidence-based practice for use with children with Autism Spectrum Disorders based on a meta-analytic research (Bellini & Akullian, 2007). Thus it is appropriate for research to focus on developing real-world interventions and assessing effectiveness. Being concerned with real-world implementation, external validity is prioritised over tight experimental control.

Thus, while both case studies reported in Chapter 3 employed single-subject within-participant designs, implementation evaluation in terms of outcome measures was supplemented by qualitative staff and participant feedback.

For the intervention to attain ecological validity, it was important that school staff collaborated in the identification of participants, target skills and the intervention implementation. This created the potential for confounding influences that would render the study a poor test of intervention efficacy. Indeed, as is explained in Chapter 3, there were a number of factors involving school staff that led to deviations from an initial plan for implementation. However it is precisely this lack of experimental control that means afforded external validity in presenting a case of 'real-world' implementation, thus presenting research that is relevant to practising EPs.

Given this focus and identified audience, the target journal for the research report in Chapter 3 is *Educational and Child Psychology*. The editorial policy of this journal states that it:

> *seeks to publish papers that make significant and original contributions to the field of educational and child psychology. Approaches should be rigorous, firmly grounded within the discipline of psychology and intended to stimulate and deepen understanding of issues in educational and child psychology for professional applied psychologists.* (see Appendix 2 for full guidance for contributors)

Educational and Child Psychology regularly publishes articles of this genre that employ small-N designs or present case studies that discuss the development and application of evidence-based interventions within school-based and other real world settings. Recent examples include individually-focused interventions such as Baskind (2007), Grandison (2007), Greig and MacKay (2005), Phillips and James (2008) and Pomerantz (2007), as well as case studies of programmes focused on particular groups, such as Chessor

(2008), German (2008), Hutchings et al. (2004) and Ross and Hayes (2004). Also sharing similarities with the research reported in Chapter 3 are studies such as Burton (2008), which employs an emergent design, and Dunsmuir et al. (2008), which discusses the challenges of real world research where controlled procedures are compromised by interventions being implemented idiosyncratically by school staff. The use of quantitative measures and annotated qualitative feedback to inform judgements of effectiveness – as employed in this study – is a common feature of articles in *Educational and Child Psychology* from this genre (e.g. Chessor, 2008; Grandison, 2007; Greig & MacKay, 2005, Hutchings et al., 2004; Ross & Hayes, 2004).

The choice of target journal has informed the mode of exposition insofar as Chapter 3 is written for an audience consisting predominantly of professional applied educational and child psychologists. There is a tacit assumption that the readership has an awareness of both EP practice and the UK educational context.

Chapter 4 complements the foregoing chapters in that it seeks to address more fully that status of the research as a component of a postgraduate thesis for the University of Birmingham. Thus it focuses more specifically on the status of this work as original empirical research, considering the knowledge claims that can legitimately be drawn, as well as identifying ways in which this research affords an original contribution to knowledge and theory development.

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2. Video self-modelling: A review of the literature

2.1 Introduction

Video self-modelling (VSM) is a behavioural intervention in which an observer views a short video (typically 3-5 minutes) of him/herself engaged in adaptive behaviour. The aim of the intervention is for the participant to learn the adaptive behaviour and to reproduce it more frequently, fluently or appropriately.

This chapter presents a systematic review of the literature pertaining to VSM. In this section, previous reviews of VSM are discussed and the rationale for the present review is explained, before describing the methods adopted for reviewing the literature. Following this, a range of applications of VSM are discussed, focusing specifically on clinical therapeutic applications, applications with individuals with Autism Spectrum Disorders (ASD), the use of VSM in sport, and the use of VSM to improve classroom behaviour. Limitations and implications of VSM research are identified, followed by consideration of possible explanations and mechanisms underlying successful VSM interventions.

2.1.1 Previous reviews

There have been four previous reviews of VSM published in peer-reviewed journals. Meharg and Woltersdorf (1990) focused on therapeutic applications

of VSM in clinical and educational settings. They reviewed 27 studies and found VSM to be an effective intervention with studies reporting positive effects ranging from moderate to dramatic and immediate. Twelve of the reviewed studies made comparisons between VSM and other interventions. Of these, ten found VSM to be superior with the other two reporting effects that were statistically equivalent to comparison interventions.

Dowrick (1999) discusses types and categories of VSM and examines the theoretical roots and underlying mechanisms, rather than examining efficacy of different interventions. He distinguishes between two types of VSM: *positive self-review* and *feedforward*. Positive self-review (PSR) occurs where a video is made of an individual in which they perform a target behaviour either infrequently or often with errors. The video is then edited to remove distractions and errors, so that the individual watches a video comprising only their successes. PSR relies on the target behaviour being one that is already in the individual's repertoire and "appears suited to improving the rate of a behaviour that is below its desired level, whether it has not yet reached that level (newly learned) or fallen off (failed to maintain)" (Dowrick, 1999, p. 25).

Feedforward involves using VSM to "depict a skill not yet acquired or not previously demonstrated in a challenging context" (Dowrick, 1999, p. 25). This might involve breaking a target behaviour down into component behaviours, each of which can be recorded and then edited into a sequence showing what it would look like when the target behaviour is successfully realised. Alternatively it can involve producing a video of an individual executing a

behaviour in one situation and editing it with images and cues from another situation (where they have not hitherto performed the behaviour) so that the viewer is able to see what it would be like to perform the behaviour in the new situation.

Within these two types of VSM Dowrick (1999) identifies seven different categories of intervention. These are listed in Table 1. He suggests that the most fruitful VSM applications are those that emphasise an image of future success (i.e. feedforward).

Category	**PSR/Feedforward?**
1. Increasing adaptive behaviour currently intermixed with nondesired behaviours.	PSR
2. Transfer of setting-specific behaviour to other environments.	Feedforward
3. Use of hidden support for disorders that may be anxiety based (i.e. physical or emotional support that is not evident in the video recording, but enables the target behaviour to be performed).	Feedforward
4. Improved image for mood-based disorders.	PSR
5. Recombining component skills	Feedforward
6. Transferring role-play to the real world.	PSR & Feedforward
7. (Re)engagement of disused or low frequency skills.	PSR

Table 1: Seven categories of self-modelling applications designated as Positive Self-Review (PSR) or Feedforward (from Dowrick, 1999, p. 26).

A review by Hitchcock et al. (2003) focused on VSM interventions in school-based settings. They adopted strict inclusion criteria to identify and review

studies where VSM had been used in schools to target academic, functional and behavioural skills. Among these criteria were requirements that: participants were aged 3-18 years and identified as having a disability or at risk of academic or social failure; interventions were conducted in school-based settings; and studies reported quantitative dependent variables. They reviewed 18 studies out of an initial 200 which were identified as involving VSM in some form. Nearly all of the reviewed studies were low-*N*, multiple-baseline across participants or within-participant designs. As with previous reviews, they reported that VSM was an effective intervention, with most studies reporting moderate to strong outcomes. Furthermore, they also assessed studies for maintenance and generalisation effects, as well as for measures of social validity. 15 of the16 studies that assessed maintenance reported that positive effects were maintained following intervention, although in some cases maintenance data were collected as little as two days following intervention (in other cases as much as two years). 13 studies assessed generalisation of effects to different settings, of which ten gave positive results and three gave mixed results. Reliable assessment of the social validity of studies was less common, with only two studies addressing this directly. The most common approach to this was the reporting of anecdotal evidence from teachers, parents and peers attesting to the “real-world” value of interventions.

The most recent review pertaining to VSM also focused on educational applications – namely, for teaching students with disabilities – but its focus was broader inasmuch as it reviewed recent (1999-2003) studies involving a

range of instructor-created video programmes (Mechling, 2005). Thus, as well as VSM, interventions employing approaches such as video feedback (i.e. watching unedited video of past performance), video modelling (watching a video of an adult or peer performing the target behaviour), and interactive video instruction (video instruction that evokes a physical response by the learner) were also reviewed. Mechling (2005) did not make direct comparisons between approaches, but concluded that the range of video programmes could be used successfully to increase the skills and independence of children and young people with disabilities. Regarding VSM in particular, she highlighted a number of questions emerging from the literature, including whether VSM efficacy depends on the type of procedure used, demands of target skill, the participant's age or ability level.

2.1.2 What this review adds

Previous reviews have discussed a broad range of VSM applications (Dowrick, 1999), systematically assessed intervention efficacy in specific domains (Hitchcock et al., 2003; Meharg & Woltersdorf, 1990), and reviewed VSM alongside other video-based interventions (Mechling, 2005). All have reviewed VSM positively, suggesting that it is an effective intervention that can facilitate adaptive behaviour change both quickly and economically, with positive effects that can be maintained and generalised following intervention.

There are two main reasons why a further review of literature on VSM is warranted here. Firstly, more recent reviews have focused on VSM

applications within specific domains. It is ten years since the last review (Dowrick, 1999) that considered the breadth of VSM applications. There is merit in looking again at the literature to see where there have been developments in the use of VSM, consider further evidence relating to its efficacy or otherwise, and discuss implications that can be VSM applications in differing applied domains and with different samples. The second reason for conducting a new review is that previous reviews and studies reporting interventions have raised questions pertaining to learning processes involved in VSM. These have not been addressed directly within the literature.

The aim of this study is to review research literature involving VSM across a range of applied fields and applications. It will seek to address two broad questions:

1. What is the range of settings, applied fields and populations in which VSM interventions have been successfully implemented and reported?
2. What can evidence in the current research literature tell us about learning processes underlying successful VSM interventions?

2.2 Method

The first approach to identifying research articles for the present review involved electronic searches of the ERIC, Web of Science, Medline and Psychoinfo databases. Electronic searches for articles with “self-modelling” (or self-modeling, with or without hyphen) as a keyword or in the article title

were conducted on 27 November 2008. These searches yielded 49 articles. The aims of this review involve focusing on the breadth of the research literature rather than identifying pure examples of VSM or only those studies with particular measures or controls. Thus a somewhat inclusive approach to articles was adopted; the only exclusionary criterion for articles was that articles not relating to VSM or a similar (i.e. video-based or modelling) intervention would not be included (for obvious reasons). All 49 articles did pertain to VSM or a related intervention and thus none was omitted. A subsequent electronic database search on 21 May 2009 identified a further two articles.

Following the initial electronic searches two things were apparent. First, searches had identified fewer articles than those reported in previous reviews (e.g. over 200 in Hitchcock et al., 2003). This was because a narrower range of search terms than by some previous authors. Secondly, the results obtained did not appear fully representative of the range of reported VSM applications. Notably, relatively few articles relating to the use of VSM in sport were identified by initial electronic searches.

Following these electronic searches, additional ancestral searches using reference lists of obtained articles were conducted to obtain articles pertaining to the key focus domains addressed in this review (sport, ASD, clinical/therapy, school behaviour). Also, additional electronic searches of the above-mentioned databases using wider terms (e.g. “sport + self-modelling”; “sport + video feedback”) to identify articles relating to sport. The same

exclusionary criterion as described above was applied. Following these additional searches a total of 78 articles was identified for inclusion in this review.

2.3 Applications of VSM

2.3.1 Clinical therapeutic applications

Ray Hosford pioneered the use of VSM in clinical therapeutic applications. Hosford (1981) reports a number of case studies of successful VSM interventions focusing on reducing stuttering, addressing sexual problems, reducing social anxiety and improving social interaction skills, and treating specific phobias. Various techniques were employed, depending on the nature of the presenting problem. For stuttering the intervention involved editing videos of the client talking in order to remove incidences of stuttering and produce a video of fluent speech. For sexual difficulties clients created videos of themselves engaged in pleasurable activities, while omitting less pleasurable scenes. For social interaction and anxiety, role play was used to enable recordings to be made of the client engaging in adaptive interactions (Hosford, 1981).

Since these formative case studies, further experimental research has been conducted that attests to the efficacy of VSM in reducing mood and anxiety problems. Dowrick and Jesdale (1990) created videos of mildly depressed

and/or anxious adult women engaged in conversations with an interviewer who encouraged lines of conversation that brought smiles and other indications of positive affect. Half of the women were randomly assigned to a VSM group and watched an edited video of their positive responses, while the other half watched videos of pleasant countryside scenery. The VSM group showed improvements on measures of depression and anxiety following intervention, with the greatest improvements coming after the first viewing. A similar study, with clinically depressed middle-school students, compared VSM with cognitive behaviour therapy (CBT), relaxation training and a waiting list control, and found that all of the treatment conditions led to improvements in measures of symptoms (Kahn *et al.*, 1990). While all of the treatments were effective, Dowrick (1999) suggests that VSM has the added benefit of being a quicker working and less effortful approach than the others.

Selective mutism is one particular problem where there have been a number of reports of successful interventions involving VSM (e.g. Holmbeck & Lavigne, 1992; Kehle *et al*., 1998; Olivares Rodriguez *et al.*, 1993; Piggott & Gonzales, 1987). Selectively mute children do not talk in some settings (e.g. school), but do in others (e.g. home). Effective treatment is usually behavioural in nature and involves reinforcement, shaping and stimulus fading (Sheriden *et al*., 1995). VSM interventions have employed these techniques in addition to self-modelling. Kehle *et al.* (1998) report three single-case baseline-intervention (AB) design studies, with two nine-year-old girls and a five-year-old boy, where augmented VSM was an effective treatment for selective mutism. In each case a video was made of a teacher asking

questions that the child would not respond to in a class setting. Videos were also made of parents asking the same questions away from other people where the children would respond verbally. Each child's two videos were edited together to create a video that appeared to show them responding in the class setting. Each child observed their video up to five times over a period of up to five weeks. VSM was augmented with stimulus fading, which involved the child playing a game or engaging in a conversation with one person whom they would talk to, and then being gradually joined by peers and/or staff until they were talking freely among a larger group. In all three cases, interventions were found to be effective and treatment effects were maintained at seven or nine month follow-ups.

Taken together, these studies suggest that VSM can be used effectively in a range of therapeutic interventions. The studies by Dowrick and Jesdale (1990) and Kahn *et al.* (1990) are particularly convincing insofar as they adopted experimental methodologies with control groups and relatively large sample sizes. The same cannot be said for the studies relating to selective mutism. Kehle *et al*. (1998) argue that such features are difficult to achieve for this problem, given that it is relatively rare (affecting approximately 1 in 1000 children). They contend that:

> "due to the historically intractable nature of selective mutism, justifiable claims can be made that the children's selective mutism would have undoubtedly continued into the future if the intervention did not occur. The efficacy of the augmented self-modelling treatment was obvious because the elimination of selective mutism controverts the expected prediction and therefore eliminates threats to the internal validity of the study due to history and maturation, and repeated testing." (p.257)

While the studies on mood and anxiety problems used VSM in isolation, for selective mutism interventions have employed VSM in addition to other techniques, notably stimulus fading. Nonetheless, Kehle *et al.* (1998) clearly attribute to VSM a core role in the explaining the efficacy of their interventions, given the rapid rate of improvement that they observed, citing by way of a comparison the 1995 study by Sheriden *et al.* where 31 treatment sessions were required to treat a six-year-old with selective mutism using stimulus fading alone. Kehle *et al.* (1998) required four to seven sessions of approximately 15-minutes to achieve similar results.

2.3.2 Autism Spectrum Disorders

One of the areas in which applications of VSM is widely reported is in interventions to support individuals with Autism Spectrum Disorders (ASD). VSM is said to be particularly suited to this population as it "integrate[s] a powerful learning modality for children with ASD (visually cued instruction) with a frequently studied intervention strategy (modelling)" (Bellini & Akullian, 2007, p. 266). Moreover, given that individuals with ASD can frequently exhibit attentional, social and language difficulties, such individuals may find accessible a procedure which demands minimal language or social interaction, and relies only on attending to a small spatial area (a television screen) for a period of a few minutes (Sherer *et al*., 2001).

A number of interventions involving individuals with ASD have focused on improving language skills, including spontaneous language production

(Buggey, 2005; Wert & Neisworth, 2003) and responding to questions (Buggey *et al*., 1999; Sherer *et al*., 2001), as well as written language production (Delano, 2007). All of these studies employed 'multiple baseline across participants designs' with the exception of Delano (2007), who used a 'multiple baseline across responses' design, targeting two separate responses (number of words written and number of functional essay elements used), and all reported increases in the target behaviours during intervention phases and during non-intervention maintenance assessment.

The study by Sherer *et al.* (2001) is perhaps more equivocal in its support of VSM. This compared self-as-model with other-as-model, by making videos either of participants or normally developing peers responding appropriately to a set of conversational questions. Each participant viewed two videos alternating on consecutive days: one of themselves responding to one set of questions, and another of a peer responding to another set of questions. During the baseline phase, all five participants made no correct responses to the questions. Only two of the five participants reached the criterion of 100% correct answers for both of the sets of question. One of these showed a preference for self-as-model, reaching criterion for these questions in two trials, compared to 14 trials for the other-as-model questions, while the other participant did not show a preference for type of model. One further participant reached criterion for the other-as-model set of questions, but did not for the self-as-model. The other two participants both showed improvements from baseline, without reaching criterion, and did not show a preference for the type of model. Thus while their data do suggest that video-

modelling is effective, they do not suggest that self-modelling is better (or worse) than peer modelling. This is the only study of this type comparing self- and other-as-model. However, the somewhat unusual procedure, with participants viewing different videos on alternate days, may have caused confusion or otherwise confounded results.

Bellini and Akullian (2007) provide a meta-analysis of 23 single-case experimental studies of VSM and video modelling interventions with participants with ASD. Of these studies fifteen used video modelling, seven used VSM, and one (Sherer *et al.*, 2001) used both approaches. Target behaviours included social-communication skills, functional skills (e.g. purchasing behaviour, personal hygiene routines, food preparation) and behavioural functioning. Intervention effectiveness was assessed using ercentage of non-overlapping data points (PND), that is: the percentage of intervention data points that are higher than the highest baseline data point. They report a moderate intervention effect for studies in the meta-analysis (mean PND = 80%), and also moderate maintenance and generalisation effects, where these were also measured (18 and 7 studies respectively). Regarding comparisons between approaches, they did not find any differences in effectiveness, maintenance and generalisation between VSM and video modelling. They conclude that both interventions meet the criteria set by Horner *et al.* (2005) for evidence-based practice.

2.3.3 The use of VSM in sport

VSM has been used in sport to teach new skills and hone existing ones. For example, VSM interventions have used to improve performance in athletics (Boyer, 1987), powerlifting (Maile, 1985), basketball (Melody, 1990; Bradley, 1993) and rock climbing (De Ghetaldi, 1998). Such studies have, however, tended to be case studies and unpublished dissertations (Dowrick, 1999; Law & Ste-Marie, 2005).

One published experimental study, by Smith and Holmes (2004), compared the effects of imagery modality on golfers' putting performance. 40 skilled golfers were randomly assigned to one of four conditions: VSM, audio self-modelling, written script, and control. The VSM group watched a video of themselves successfully holing a putt, while the audio group listened to an audio recording of them doing the same. The written script group read an imagery script describing their thoughts, feelings and sensations when executing a successful putt, and the control group spent ten minutes reading a golf biography. Participants completed their set activity daily for six weeks, and performed a 15-ball putting task twice a week. All groups showed improvements in their putting, but the VSM and audio self-modelling groups improved significantly more than the written script and control groups.

Two experimental studies (Law & Ste-Marie, 2005; Winfrey & Weeks, 1993) have failed to demonstrate the effectiveness of VSM as a means for improving sporting performances. Winfrey and Weeks (1993) used VSM with female gymnasts to try to improve performance on a balance beam routine.

Participants were filmed while attempting a routine. If they made a mistake, they would repeat the relevant part of the routine, so that the footage of accomplished parts of the routine could be edited into a short video. Participants watched their videos three times a week for six weeks. Before, during and after the intervention they completed a skill test of their balance beam routine as well as a self-efficacy questionnaire, as did a control group of gymnasts who had not received the VSM intervention, but continued participating in their normal instructional programme. No differences were observed between groups in terms of their performance or self-efficacy at any stage of the study.

In a similar study with female figure skaters participants received VSM for a particular jump and their progress on this was compared with that for another control jump, which had not been the focus of VSM, and with a control group receiving regular coaching (Law & Ste-Marie 2005). At each stage of the study the performance of participants receiving VSM was not different from that of controls, nor was performance on the VSM jumps different to that on the non-VSM jumps. VSM was not found to affect psychological variables such as motivation, self-efficacy and anxiety.

In both of these studies participants were intermediate level performers and competitors. They were training regularly during the course of the experiment, and receiving continuous coaching from skilled individuals. This was true both for VSM and control groups. It is possible that given the coaching and training that all participants were receiving, it was unlikely that VSM could produce an

improvement over and above the performance improvements that all participants were making. It is also possible that target behaviours were not sufficiently challenging for significant improvements to have been observed. Though Law and Ste-Marie (2005) predicted that VSM would increase self-efficacy and decrease anxiety, pre-intervention they found that participants were only mildly anxious and relatively highly self-efficacious.

VSM may be an intervention better suited to coaching novices where the gaps between current and target performance are greater. For example, Dowrick and Dove (1980) found that VSM could lead to sustained improvements in swimming in three children with spina bifida, who all felt intimidated by being in the water, but all had the potential to learn to swim as well as most children. The children were videoed while being physically supported by a therapist (hidden from camera) while swimming. Thus they were able to see images of themselves swimming safely and without anxiety, increasing their confidence and enabling better swimming performance (Dowrick, 1999).

There may also be differences in how highly skilled individuals use and interpret self-modelling videos. In Law and Ste-Marie's (2005) study 55 per cent of participants said that they found their videos helpful as a means of pointing out their mistakes. This challenges the core idea of VSM, namely that viewing successful performances of behaviour will result in improved learning. Given the complexity of the movements that these participants were trying to learn, it was not possible to create videos of participants displaying flawless execution, even if videos were edited to try to present the best possible jump.

Winfrey and Weeks (1993) found that, for gymnasts receiving VSM, there was a very strong (0.92) correlation between self-rated and actual performance scores, whereas for the control group there was not, suggesting that VSM may have improved participants' judgements of their own performance. It may be the case that, where participants are striving for perfection (e.g. in the execution of jumps and routines), their attention focuses on comparisons between their own performance and the ideal that they were striving for. While VSM is intended to show what an improvement on the present state would look like, for such groups it instead shows the deficiencies of current performance. Winfrey and Weeks (1993) also suggest that repeated viewing of a pre-experimental video may have adversely affected participants' perceptions of progress, because while their performances of the balance beam routines were improving, the video that they watched stayed the same.

Baudry *et al.* (2006) report that when synchronised self- and expert-modelling videos were used in split screen gymnasts made significant improvements on all phases of a particular skill (a double leg circle on the pommel horse). This procedure allowed them to compare their own performance with that of an expert model executing the target skill. A control group – who practised the skill without additional intervention – did not show significant skill improvements. While this procedure is not "pure" VSM, due to the use of expert models, it may be better suited to participants who are skilled performers striving for a level of excellence which they cannot demonstrate, even with the assistance of video editing software.

The golfers in Smith and Holmes' (2004) study were also advanced performers striving for excellence, and VSM did work for them. However, while the golfers could not complete the putting task without error before intervention (they holed on average around one in three putts), they could nonetheless produce an error-free performance of a single putt which could be recorded and serve as an exemplar to try to reproduce. A similar point could be made for a skill such as free throws in basketball which Melody (1990) found to be improved using VSM. In terms of Dowrick's (1999) types of VSM, this is the difference between PSR (for golf and basketball) and feedforward (for skating and gymnastics), and it may be the case that difficulties in producing an exemplary feedforward model render it inefficacious in the absence of expert modelling where participants are striving for perfection.

2.3.4 Improving behaviour in schools

Hitchcock *et al*. (2003) reviewed 18 studies reporting school-based VSM applications, of which seven (Clare et al., 2000; Davis, 1979; Kehle *et al*., 1986; Lonnecker *et al*., 1994; Possell *et al*., 1999; Walker and Clement, 1992; Woltersdorf, 1992) focused on improving classroom behaviour. All reported effective interventions, which either reduced problem behaviours (e.g. fighting, non-compliance, disruption, out of seat) or increased adaptive behaviours (e.g. cooperative or on-task behaviour). They also all reported maintenance of effects, and all but two reported generalisation (e.g. to other classes or recreation times). Kehle *et al.* (1986) did not address this generalisation, and Davis (1979) found no generalisation to a substitute teacher. Six of the seven

studies reported some measure of social validity, be it teacher, parent or peer report, questionnaire or anecdotal.

One limitation common to these studies is the small sample sizes involved. In the seven studies the total number of participants was 22. Research designs reflected these small samples and were typically ‘multiple baseline across participants’, or ‘single participant withdrawal’ designs.

Since that review, Schwan and Holzworth (2003) have reported an experimental study using VSM to address inappropriate behaviour in elementary school students, which is arguably more methodologically robust than previous studies. 26 students were identified, by teacher report, as showing high frequency inappropriate behaviours. Half were randomly assigned to the VSM intervention with the remainder receiving no intervention. There were equal numbers of VSM and comparison students in each class. Students and teachers identified target inappropriate behaviours and then produced scripts to role play alternative appropriate responses which were filmed. Students watched these 3-5 minute videos six times over a two-week period. They were filmed in class for four half-hour periods before and after intervention. Videos were rated by observers (with inter-rater checks for reliability) to provide measures of inappropriate behaviour. The rate of inappropriate behaviour in the VSM group reduced by over one half, whereas for the comparison group it remained the same.

This study is notable, not only for its robust design, reliability checks and control, but also for the method used to construct the VSM tapes. Many VSM interventions to improve behaviour (e.g. Clare *et al.*, 2000; Kehle *et al*., 1986)) have produced videos of appropriate behaviour by recording the child or young person in school and editing footage to remove instances of inappropriate behaviour. Schwan and Holtzworth (2003) used role play to produce the self-modelling videos, and thus participants were taught to perform, possibly novel, adaptive responses. As such their aim was not simply to eliminate the inappropriate behaviour, but to enable participants to learn to replace it with something better.

Studies by McCurdy and Shapiro (1988), Shear and Shapiro (1993) and Clark *et al.* (1993) have all employed the “edit out bad behaviour” PSR paradigm and yielded inconclusive results. The first two of these studies involved participants aged 9 to 11 and 7 to 12, respectively, attending special schools for students with behaviour disorders. In both studies results were described as “idiosyncratic”, with evidence of improvement for some students and not for others. Clark *et al*. (1993) studied VSM with preschoolers and found no overall effect. They suggest that VSM might be less suitable for preschoolers given their less developed attention, conceptual and linguistic skills compared to older children. Indeed, none of the participants in the studies already mentioned in this section was aged below 5 years.

An alternative explanation for null results is that participants may have lacked appropriate alternative behaviours in their behavioural repertoire. The

behaviours targeted for reduction by Clark *et al*. were aggression and non-compliance. It seems likely that such behaviours could be triggered by environmental cues or social interactions leading to experiences of frustration (or other emotions). Edited videos showing appropriate behaviour may well have shown how children behaved when not frustrated, but not how to react to frustration in an appropriate manner. It may be the case that an intervention, such as that employed by Schwan and Holtzworth (2003), which involved role playing (i.e. PSR & feedforward) appropriate responses would have yielded a more positive outcome for these, and other, participants. A recent unpublished dissertation by Tseng (2008) would appear to support this contention inasmuch as it reports that VSM was effective at improving preschoolers' behaviour when used in conjunction with a behavioural self-management teaching programme.

2.3.5 Other applications of VSM

Pupil behaviour is not the only domain within which VSM has been applied within educational contexts. Studies report using VSM to improve literacy skills, targeting reading fluency as a dependent variable, and using feedforward videos of pupils reading fluently, with pauses and errors removed through editing (Dowrick *et al*., 2006; Greenberg, *et al.*, 2002; Hitchcock et al., 2004). Participants in all of these studies (total N = 17) showed improvements in reading fluency following intervention.

The feedforward approach used for improving reading fluency is somewhat similar to that employed by Hosford (1981) as a treatment for stuttering. Bray

and Kehle (1996) and Webber *et al*. (2004) both describe VSM feedforward interventions for stuttering with adolescents and adults. Following repeated viewings of edited videos of their own stutter-free speech, four of the six participants in these two studies showed reductions in stuttering. In addition to the VSM applications involving individuals with ASD, which are discussed above and focus on language and communication skills, Whitlow and Buggey (2003) report an effective VSM intervention for a child with a language delay.

VSM has been used to teach parenting skills. For example, first-time fathers receiving a VSM intervention were rated as significantly more skilled at fostering cognitive growth in their children (Magill-Evans *et al*., 2007). VSM has also been shown to improve parent-child interactions with parents of 'oppositional' children (Vidair, 2006) and children with developmental disabilities (Reamer *et al*., 1998).

VSM has also been used as an intervention to develop a range of skills in individuals with injuries or disabilities, including hearing impairment (Andersson *et al*., 1995), facial nerve palsy (Coulson et al*., 2006)*, traumatic brain injury (McGraw-Hunter *et al*., 2006), and physical disabilities (Dowrick and Raeburn, 1995).

2.4 Limitations and equivocal findings

The research discussed herein has identified a number of effective applications of VSM. Dowrick (1999) states that over 150 applications of VSM

have been reported in print. This review has identified additional, more recent examples. However, it should be noted that some studies have failed to provide support for the effectiveness of VSM.

As mentioned previously, neither Winfrey and Weeks (1993) nor Law and Ste-Marie (2005) found VSM to be any more effective at improving gymnastics and ice-skating skills than regular coaching and practice. It has been suggested that, in these studies, the lack of positive results was due to limitations with the feedforward procedure employed for these participants, namely that they failed to provide a suitably advanced model of exemplary performance. Also mentioned above, studies by McCurdy and Shapiro (1988), Shear and Shapiro (1993), and Clark *et al*. (1993) all reported inconsistent findings when VSM was used to try to improve pupils' behaviour in school and preschool. For these cases it has been suggested that the PSR procedures employed may not have afforded participants with effective examples of appropriate behaviours, namely responses to frustration or environmental triggers.

In addition to these studies, research by Edl (2008), Murdock (2008) and Deaton (2008) have all reported inconsistent or no effects for interventions to promote reading fluency, to increase verbal initiations by children with ASD, and to modify social behaviour in adolescents with ASD, respectively. In the case of Deaton (2008), five out of eight participants showed significant positive effects as a result of intervention, whereas both Murdock (2008) and Edl (2008) found no positive effect of VSM across participants.

All three of these studies are unpublished dissertations. There may be a publication bias operating that renders positive results more likely to be reported in peer reviewed journal articles, either because they are more likely to be submitted or because they are more likely to be accepted. If this is the case, published reports of VSM are unlikely to be fully representative of all VSM interventions. It is also worth noting that those studies which have reported equivocal findings and been published in peer-reviewed journals are somewhat unusual. Both Winfrey and Weeks (2003) and Law and Ste-Marie (2005) employed experimental designs with control groups, while most of the studies discussed in this review have employed single-subject designs that measure intervention efficacy in terms of within-participant change. Clark *et al*. (1993), McCurdy and Shapiro (1988), and Shear and Shapiro (1993), were the three single-subject design studies pertaining to classroom behaviour with the highest numbers of participants (N= 6, 5, and 6 respectively). This may be merely coincidental, but it is possible that a study requires a more robust design and methodology for a negative result to be considered worthy of publication than if a positive effect is observed. If one, two or three participant studies can only be published if they report positive results, then we should expect the published literature to be skewed accordingly.

2.5 Explaining why VSM works

Research has been reviewed that suggests that VSM can be a successful intervention to effect learning and behaviour change. However the research

evidence is not unequivocal and a number of studies do not report positive results. One step toward designing and implementing effective interventions is to develop an understanding of the mechanisms underlying learning through VSM.

Three linked, but somewhat distinctive, explanations for learning through VSM are identified in the literature. The first, and most commonly cited, involves Social Cognitive Theory (Bandura, 1977a; 1986; 1997), and emphasises modelling, vicarious learning, identification and self-efficacy. A second explanation, with some currency among the literature on VSM in sport, makes reference to the role of imagery in learning and motor behaviour. Kehle et al. (2002) suggest a third, more tentative, explanation that emphasises the role of memory and the potential for creating false or distorted memories.

2.5.1 Social Cognitive Theory

Social Cognitive Theory states that humans have a powerful capacity to learn vicariously, through observation, and that such learning is mediated by cognitive processes (such as attention and memory) and individual beliefs (Bandura, 1986). Observational learning is referred to as forming the theoretical basis for the development of VSM interventions by pioneers in the field, such as Hosford (1981) and Dowrick (1999). For learning to occur, observation alone is not sufficient; an observer needs to attend to the behaviour, retain the behaviour in memory and be motivated to reproduce the behaviour (Bandura, 1977b).

VSM is said to be particularly suited to certain populations because specific cognitive strengths favour observational learning. For example, individuals with ASD can find it easier to learn through visual media, and can encounter difficulties in selectively attending to stimuli and filtering out unwanted information. Thus presenting information on a small screen, without relying on language skills, as in VSM, would appear potentially beneficial (Buggey, 2005; Bellini & Akullian, 2007). Hosford (1981) suggests that imitative learning is a type of learning that is developed very early in life and a particularly important learning mechanism for children. The large proportion of effective interventions involving children identified in review would appear to support the contention that children are another group for whom VSM is particularly well-suited.

The characteristics of the behavioural model can also affect observational learning. For example, research suggests that observers are more likely to learn from a model with whom they identify, and this identification is more likely to occur where the model is perceived to be similar to the observer (Bandura, 1969; Hosford, 1981). Clearly, there can be no model more similar to an observer than in VSM where they are the same person. Moreover, it is noted that observing oneself leads to increased attention and physiological arousal (Hosford, 1981). A number of authors report the apparent motivating effects and enjoyment that participants experienced upon watching themselves on their self-modelling videos (e.g. (Buggey, 2005; Dowrick, 1999; Wert & Neisworth, 2003). Indeed, it has been suggested that observing one's own adaptive behaviour is positively reinforcing (Kern et al., 1995).

The skill level of a model is also relevant. While prestigious and high-status models can lead to better observational learning than those lacking in prestige or status, models who demonstrate mastery or expertise can actually create expectations of inferior performance on the part of the observer, and thereby impede learning (Hosford, 1981). Models who exhibit some task anxiety while learning to cope are more effective than those who display mastery (Hosford, Mills , 1983). Hitchcock *et al*. (2003) make reference to Vygotsky's socio-cultural view of learning. According to Vygotsky (1978), learning occurs best within the zone of proximal development (ZPD) – the area covering the difference between what an individual can do independently and what they can do with assistance. It would appear that a model that performs at a level slightly above that of the observer would facilitate learning within the ZPD, whereas an expert model would not.

A further feature of Social Cognitive Theory that can be used to explain the effectiveness of VSM is the idea of self-efficacy. Self-efficacy refers to an individual's belief in their competence to execute a given behaviour (Bandura, 1977a; 1997). Self-efficacy can be derived from a number of sources, such performance accomplishments, vicarious experience and verbal persuasion (Bandura, 1977a). Most modelling procedures tap into only one of these elements, namely vicarious learning, but where an individual acts as their own model there is the potential for increased self-efficacy both through performance accomplishments and through vicarious experience. This view is consistent with research on interventions where VSM and self-observation

have not been effective. Video feedback interventions where individuals view unedited videos containing non-desired behaviours have sometimes had negative or undesirable results (Hosford, 1981; Dowrick, 1999). These could be attributed to the negative effects on self-efficacy beliefs of viewing oneself performing at a level lower than expected or desired. Winfrey and Weeks (1993), and Law and Ste-Marie (1995) both found that VSM did not lead to improved performance in gymnastics and ice-skating respectively, but neither did it lead to increased self-efficacy. It is possible that where self-modelling does not affect self-efficacy or where it affects it adversely (either because an individual already has high self-efficacy, or because the observed behaviour is not perceived as desirable), it will not result in improved learning.

2.5.2 Imagery

Smith and Holmes (2004) make no reference to Social Cognitive Theory in providing a rationale for using VSM with golfers, or in explaining their findings. Rather, they discuss the effects of self-modelling in terms of imagery.

There has long been interest in the role of mental imagery in sporting performance (Holmes & Calmels, 2008; Moran, 2009). Research suggests that mental imagery is widely used as a preparation strategy by elite sports people. For example Orlick & Partington (1988), in a study of 235 members of the Canadian teams for the 1984 Winter and Summer Olympics, found that 99 percent of participants reported using mental imagery in preparation for competition.

Cognitive neuroscience research has shown that imagining motor acts involves activation of brain areas associated with motor behaviour, and it has been suggested that imagined and performed behaviours share common processes (Annett, 1995). As Jeannerod (1999) puts it: “A motor image is in fact a covert action: it exhibits many of the properties of the represented action” (p. 4). It is suggested that: “at some level of representation overt and imagined actions appear to be ‘functionally equivalent’” (Annett, 1995, p. 163). This implies that mental rehearsal of an action actually involves rehearsal of the motor behaviour, by engaging the neural processes involved in execution of the behaviour, even when the behaviour is not actually performed.

Smith and Holmes (2004) suggest that VSM was effective at improving putting performance because it provided a sensory imagery experience that optimised functional equivalence with the target action. Not only did the videos provide appropriate visual cues, from a first-person perspective, but also gave information about the correct timing of the action.

It could be argued that other VSM interventions, where participants are filmed from an external perspective, lessen functional equivalence. For example, the participants in Winfrey and Weeks’ (1993), and Law and Ste-Marie’s (2005) studies viewed videos of themselves doing gymnastics and figure skating from an external perspective. Visual information gained through watching such a video is likely to be very different to that experienced by an individual when they actually perform their routine or their jump. When a figure-skater jumps they will not be able to see all of their body, in the way that they could

on a video, but on a video they will not be able to see the visual information that they experience when they are performing a jump.

Studies comparing the effect of imagery type and perspective on the learning of motor skills suggest a somewhat more nuanced position. Research has shown that external visual imagery can be superior to internal visual imagery for tasks where form is important (Hardy & Callow, 1999), and that different aspects of motor performance (e.g. speed and accuracy) can be enhanced by different imagery perspectives (White & Hardy, 1995). It would appear that watching a video of oneself (or another) perform a behaviour, can give different information, depending on the perspective of the video, and the utility of such information depends of the nature of the task.

This does not necessarily mean that viewing or imagining oneself from an internal point of view involves the same brain processes as viewing or imagining oneself from an external point of view, although this has been suggested (Vogt, 1995; Jeannerod, 1999). This implies that the equivalence of imagery, observation and motor behaviour is not simply in terms of common sensory inputs, but rather occurs at a representational level. The identification of “mirror neurons” in monkeys, which fire both when they perform a hand movement and when they watch it being performed by a conspecific or an experimenter (di Pellegrino et al., 1992) supports this idea.

It appears, then, that watching oneself perform an action, as occurs in VSM, involves some of the same brain processes as actually performing that action.

Thus, the effectiveness of VSM might be explained in terms of this brain activity and the effect that it has on subsequent behaviour. However, with respect to this suggestion it should be acknowledged that arguably there is qualitative difference between ‘pure’ motor behaviours (i.e. those studied in a neuroscience lab), and behaviours that are construed in semantic and normative terms. Where VSM is used to, for example, promote appropriate classroom behaviour or adaptive social-communicative or functional behaviour in individuals with ASD, it is as a means to provide exemplars of appropriate responses or from which rule generalisations can be made. The child watching a video showing them behaving well in class is not expected to learn a specific motor response; the sportsperson is.

Neuroscience research does show that observation of motor behaviours which are meaningful (i.e. recognisable gestures and hand actions) activates brain areas different from observation of meaningless gestures (Decety et al., 1997), suggesting that actions are encoded differently depending on the ascribed meaning; the representation of actions is not simply in motor form where a more meaningful representation is available. Jeannerod (1999) states that, “It has been proposed that an observed action can be understood and imitated whenever it becomes the source of a representation of the same action within the brain of the observer: in other words, the observer understands the action whenever he/she becomes able to simulate it and therefore to share the experience of the person who performs that action” (p. 9). It is unclear, however, how or if normative features of an observed behaviour and the values associated with it (i.e. whether it is judged to be

‘good’ or ‘bad’), affect the representation of an action, and its later performance.

2.5.3 False memories

A third candidate explanation for the efficacy of VSM emphasises the role that memories have in affecting motivation and self-efficacy. Research in cognitive psychology has shown that, far from providing an accurate account of the past, memory reconstructs events and is susceptible to biases, distortion and suggestion (Loftus, 1997; Schacter, 1999). Such is the unreliability of memory that researchers have shown that participants in experimental studies can create false memories of an event which did not occur (e.g. being lost in a shopping mall as a child) after reading an apparently true account of the event (Loftus & Pickrell, 1995), and that imagining an event increases participants’ confidence that it actually occurred (Garry *et al*., 1996).

Kehle *et al*. (2002) suggest that students with behavioural disorders, who view a video of themselves behaving well, may create a false memory that they have previously behaved in this way. This memory may in turn affect students’ efficacy beliefs. Based on an erroneous belief about the past, students have greater confidence in their capacity to replicate self-modelled behaviour in the future. Increased self-efficacy may lead to improvements in behaviour, which further affect efficacy beliefs, thereby creating a ‘virtuous circle’.

The hypothesis that watching a self-modelling video creates a false memory could be tested empirically by asking participants to rate their behaviour prior

to an intervention. None of the studies included in this review refer to this practice. There is, however, anecdotal evidence that VSM interventions can affect judgements about previous behaviour. Webber, *et al*. (2004) used VSM to try to reduce stuttering, but it was effective for only one of their three participants. Nevertheless, in exit interviews all participants said that their stuttering had reduced at the point of intervention. It would appear that watching fluent performance can affect judgements about the likelihood of it having occurred previously, even when there has not been a resultant change in behaviour.

While it may appear plausible to suggest that VSM can alter individuals' memories about their previous behaviour, it should be noted that Kehle *et al*. (2002) only proposed this mechanism in relation to the behaviour of students with behavioural disorders. There are some cases where it would appear less likely that VSM could affect memory in this way, for example where feedforward is used to create a video image of a behaviour that has not yet been performed successfully. One might imagine that memory is more susceptible to distortion for judgements about frequency where a behaviour already occurs, albeit more or less frequently than is desired, than for judgements about whether or not a behaviour has ever occurred. It is also possible that such false memories could have negative consequences. If individuals judge their previous performance to be better than it actually was, based on a VSM-induced false memory, then this might cause complacency on the behalf of the observer and reduce motivation to change.

If altering memories contributes to effective interventions, then this would imply that participants should be less, not more, involved in the video-making process, and less, not more, aware of the purpose of the intervention. Dowrick (1991) argues that this should not be the case in unequivocal terms:

> In clinical applications (e.g., rehabilitation) and with students in video training courses, I consistently stress the value, *not* the disadvantage, of client participation. The procedure is best presented as a straightforward depiction of potential future behaviour, not a bogus past. If the emphasis is on positive self-review, then the message is, "Here are good examples of what you should do more often." If using feedforward, the message is "Here is your goal; this is what you will look like when you've mastered this difficult situation." (p. 117)

2.6 Conclusions

Differing explanations for the effectiveness of VSM are not mutually exclusive. They are likely to be complementary rather than contradictory, with differences of emphasis rather than type. Kehle *et al*. (2002) make clear that their explanation – invoking the role of false memories – is in accordance with social cognitive theory, suggesting that behaviour change is mediated by self-efficacy beliefs. Research into mental processes underlying imagery, observation and motor performance, similarly does not conflict with social cognitive theory. Rather, it examines processes of observational learning at a different level of description.

Dowrick (1999) states that it is “parsimonious to consider the *observation of one’s behaviour* to be a *learning mechanism in its own right*, not a special

case of observational learning from others with some positive reinforcement, reciprocal inhibition, cognitive restructuring, and self-efficacy added in" (p.36, emphases retained). It could, however, be argued that such parsimony is unwarranted and that it is more useful to consider a number of different mechanisms and processes as contributing to the effectiveness (or otherwise) of VSM applications. Thus VSM *would* be considered a 'special case' of observational learning, relying on the same neural processes that all observational learning does.

What is special about observing oneself is that it does have the potential to alter self-beliefs and inform self-regulatory processes in a way that observing another model does not. It may also have the capacity to alter memories too. Moreover, it should not be forgotten that any self-modelling intervention requires the individual who is the focus of the intervention to perform the target behaviour, or elements of it, in order to produce the video. In many cases, such as where role play is used, where the target behaviour is broken down into component parts, or where additional (hidden) support is used, there is likely to be opportunities for learning to occur. The use of oneself as a model may prove positively reinforcing and may increase an observer's attention to the modelling video, thus facilitating improved learning. And the use of oneself as a model may also help to ensure that the behaviour represented in a self-modelling video is achievable and within the observer's ZPD, and thus more likely to be learned, than if, say, an expert model were used.

What an individual learns from a VSM intervention, and how they learn it, is likely to vary depending on the individual and the nature of the intervention. For example, Buggey (2007) suggests that participants in his study (children with ASD) carried a memory of their videos and used it as a cue to overcome conditioned responses. He reports a number of occasions where participants would start a tantrum (the target behaviour for reduction) and then apparently notice what they were doing and stop and employ the adaptive responses shown in their VSM videos. In many other cases of interventions there are not these kinds of conditioned responses to overcome. For cases where the target behaviour is defined as a specific motor response (as in sport), the perspective of the video and the sensory input that this affords may be a more important factor in determining the effectiveness of an intervention. Also in such cases, VSM may function by improving self-monitoring rather than by affecting self-efficacy (as suggested by Winfrey & Weeks, 1993).

While Dowrick's (1999) assertion that "the observation of one's adaptive or valued behaviour increases the future likelihood of that behaviour" seems to offer a valid rule of thumb, there are likely to be a number of mechanisms involved in such learning, and a number of factors affecting the outcome. Further research examining these mechanisms should help to explain why some VSM interventions are more successful than others, and should help identify principles for developing effective VSM interventions tailored to the needs of different contexts and different populations.

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APPENDIX 1: Public domain briefing – presentation slides

3. Using Video Self-Modelling to Teach New Skills to Children with Social Interaction and Communication Difficulties

3.1 Introduction

According to Social Cognitive Theory, one of the principal ways that individuals learn is through observation, or vicarious experience (Bandura, 1986). Indeed, imitation is believed to be the most common process in the early learning of children (Thorensen & Hosford, 1973). The potential of observational learning to effect behaviour change has long been recognised, and has informed the use of modelling within therapeutic (Bandura, 1969; Hosford, 1981; Krumboltz et al., 1967; Lazarus, 1966) and educational (Maheady et al., 2006; Robertson & Weismer, 1997; Scruggs & Richter, 1985) interventions.

Not all models are equally effective, however. Observers are more likely to learn from a model perceived to be similar to the observer (Bandura, 1969; Hosford, 1981). Models who display absolute mastery are less effective than those whose skill level is slightly above that of the observer, who are demonstrating the ability to cope with a task (Hosford & Mills, 1983). Given the apparent benefits of model-observer similarity, it is unsurprising that researchers have questioned whether individuals, if able to observe themselves performing well, might serve as more effective models than peers, professionals or unknown individuals (Buggey, 2007; Dowrick , 1983; Hosford, 1981).

3.1.1 Video self-modelling

Video self-modelling (VSM) is a behavioural intervention in which an observer views a video of themselves engaged in adaptive behaviour, in order to learn the behaviour and reproduce it more frequently, fluently or appropriately. Different techniques can be used to create a video of an individual engaging in adaptive behaviour, or even behaviour apparently at a skill level that appears to exceed that which they have actually mastered (Dowrick , 1983; 1999). Video-editing can be used to remove unwanted behaviour and create a film of only adaptive behaviour. For example, VSM interventions have involved editing footage of an individual speaking with a stutter to create the impression of fluent speech (Bray & Kehle, 1996; Hosford, 1981; Webber et al., 2004), and removing incidents of poor or undesired behaviour from videos of children with behavioural difficulties, to produce an exemplar of only positive behaviour (McCurdy & Shapiro, 1988; Shear & Shapiro, 1993). Alternatively, role play can be used to demonstrate and film examples of adaptive behaviour, such as positive behaviour responses (Schwan & Holzworth, 2003; Tseng, 2008) and parenting skills (Magill-Evans et al., 2007). Also skills can be broken into discrete component steps, each to be filmed separately and combined through editing. For example, Winfrey and Weeks (1993) filmed gymnasts performing the different parts of a particular routine, and then combined clips to give the impression of a complete, successful routine.

Dowrick (1999) distinguishes between two types of VSM: *positive self-review* and *feedforward*. Positive self-review (PSR) occurs where a video is made of

an individual in which the may perform a target behaviour either infrequently or often with errors. The footage is then edited to remove distractions and errors, so that self-modelling video comprises only their successes. PSR relies on the target behaviour being one that is already in the individual's repertoire and "appears suited to improving the rate of a behaviour that is below its desired level, whether it has not yet reached that level (newly learned) or fallen off (failed to maintain)" (Dowrick, 1999, p. 25).

Feedforward involves using VSM to "depict a skill not yet acquired or not previously demonstrated in a challenging context" (Dowrick, 1999, p. 25). Examples include combining component behaviours as in Winfrey and Weeks (1993), or producing a video of an individual executing a behaviour in one situation and editing it with images and cues from another situation (where s/he has not hitherto performed the behaviour). This enables the viewer to see what it would be like to perform the behaviour in a new situation, and has been used to address selective mutism. Video footage of a child talking at home (where s/he does talk) is combined with footage of her/him being spoken to at school (where s/he does not usually talk) to create the appearance of her/him talking in a situation in which s/he has not actually spoken (Holmbeck & Lavigne, 1992; Kehle et al., 1998; Olivares Rodriguez et al., 1993; Piggott & Gonzales, 1987).

A feature of Social Cognitive Theory that can be used to explain the effectiveness of VSM is the idea of self-efficacy. Self-efficacy refers to an individual's belief in their competence to execute a given behaviour (Bandura,

1977; 1997). Bandura (1977) suggests that self-efficacy can be derived from a number of sources, such as performance accomplishments, vicarious experience and verbal persuasion. Most modelling procedures tap into only one of these elements, namely vicarious learning, but where an individual acts as their own model there is potential for increased self-efficacy both through performance accomplishments and through vicarious experience.

Reviews of research into VSM attest to its efficacy (Dowrick, 1999; Hitchcock et al., 2003; Mechling, 2005; Meharg & Woltersdorf, 1990). Hart (2010) highlights the breadth of VSM applications. Successful uses of VSM include:

- addressing mood and anxiety-related symptoms within counselling and behaviour therapy (Dowrick & Jesdale, 1990; Hosford, 1981; Kahn et al., 1990);
- promoting development of speech, language and communication skills (Bray & Kehle, 1996; Buggey et al., 1999; Buggey, 2005; Webber et al., 2004; Wert and Neisworth, 2003; Whitlow & Buggey, 2003);
- teaching reading and writing skills (Delano, 2007; Dowrick et al., 2006; Greenberg et al., 2002; Hitchcock, 2002; Hitchcock et al., 2004);
- teaching parenting skills (MagillEvans et al., 2007; Reamer et al., 1998; Vidair, 2006);
- promoting positive behaviour in schools (Clare et al., 2000; Davis, 1979; Kehle et al., 1986; Lonnecker et al., 1994; Possell et al., 1999; Schwan & Holzworth , 2003; Walker & Clement, 1992; Woltersdorf, 1992);

- improving sports skills (Bradley, 1993; Melody, 1990; Smith & Holmes, 2004); and
- use as a remedial intervention for individuals with injuries or disabilities (Andersson et al., 1995; Coulson et al., 2006; Dowrick & Raeburn, 1995; McGraw-Hunter et al., 2006).

While evidence for the effectiveness of VSM appears compelling (Dowrick, 1999), it should be noted that a number of studies have produced inconsistent effects or null results (e.g. Clark et al., 1993; Deaton, 2008; Edl, 2008; Law & Ste-Marie, 2005; McCurdy & Shapiro, 1988; Murdock, 2008; Shear & Shapiro, 1993; Winfrey & Weeks, 1993). Explanations for equivocal findings are suggested by Hart (2010), and question the suitability of particular VSM approaches for some behaviours, and whether individual factors (e.g. age, skill level) render VSM better suited to some populations than others.

3.1.2 VSM and social interaction and communication difficulties

VSM is thought to be particularly suited to certain populations because of their specific cognitive strengths. One such group is children with social interaction and communication difficulties, such as autism spectrum disorders (ASD), as VSM “integrate[s] a powerful learning modality for children with ASD (visually cued instruction) with a frequently studied intervention strategy (modelling)” (Bellini & Akullian, 2007, p. 266). Moreover, given that these children can encounter difficulties in selectively attending to stimuli and filtering out unwanted information, presenting a stimulus on a small screen for a short period of time without making demands on language skills, would appear

potentially beneficial (Bellini & Akullian, 2007; Buggey, 2005; Sherer et al., 2001).

VSM has been used to support individuals with ASD in developing language and social communication skills (Buggey, 2005; Buggey et al., 1999; Sherer et al., 2001; Wert & Neisworth, 2003); improving writing skills (Delano, 2007); reducing off task behaviour in school (Coyle & Cole, 2004; Hagiwara & Myles, 1999), and acquiring functional skills (Lasater & Brady, 1995). As Buggey (2009) states:

> "Although we must be cautious about claims for video self-modelling, it seems safe to say that this technique has great promise and that children with autism spectrum disorders and other developmental disabilities that affect cognitive, social, and language skills may be especially predisposed to treatment effects" (p. 34).

Such studies have typically employed single-case experimental designs; however a meta-analysis of VSM studies for individuals with ASD identified moderate intervention, generalisation and maintenance effects, and concluded that VSM could be considered to be evidence-based practice (Bellini & Akullian, 2007).

3.1.3 The Present Study

Research using VSM suggests that it has potential for considerable benefits. It has been shown to be effective for a range of populations, notably within special education, and for a variety of target behaviours and skills (Buggey,

2009; Dowrick, 1999). A number of features make it potentially well-suited for addition to the repertoire of EP interventions, including the relative economy and efficiency of the intervention, and the speed with which positive effects can be observed.

Setting up a VSM intervention involves identifying a target behaviour, filming the individual demonstrating that behaviour, and then editing the footage to create a video, usually about 3 minutes long. Implementing the intervention simply involves the individual repeatedly watching the video over a period of weeks – something that anyone, the participant included, can facilitate. The practice of implementing interventions “at a distance”, designing and developing interventions in collaboration with school staff and then having school staff assume responsibility for the implementation, is a common feature of the work of EPs (Farrell, et al., 2006) .

Given these apparent benefits of VSM, it is notable that it has received little attention within the EP community in the UK. Most published research pertaining to VSM is North American, and there are no published reports of VSM use by practicing UK EPs. No research involving VSM has been published in the main UK practice journals for applied educational psychology – *Educational and Child Psychology* and *Educational Psychology in Practice*. Thus, there is merit in research to address the question of whether VSM can be used within the work of an EP to teach new skills to children with social interaction and communication difficulties.

This paper reports two single-case experiments using VSM with children with social interaction and communication difficulties. I was involved in these cases as part of my work as a trainee educational psychologist. The aim of the study was to see to see if and how VSM could be integrated into the work of an Educational Psychologist (EP). In addition to using experimental procedures to assess the effectiveness of VSM intervention, I sought to elicit stakeholder views about VSM in order to inform judgements about its suitability as an intervention implemented by school staff under the supervision of a psychologist working as an external consultant.

3.2 Method

3.2.1 Participants

The study was carried out in a primary school. Purposive sampling (Robson, 2002) was used: specifically I sought to identify potential participants for whom school staff had identified a need for skill development in a particular area as a means to supporting their educational progress. Before starting the study, I explained its proposed aims and methods to the speech and language therapist (SLT) who worked in the school. She identified five children as potential participants, who attended an intervention group that she ran to help to develop and improve social interaction skills. I discussed possible target skills for self-modelling videos for each child, as well as their perceived suitability for the study, with the SLT and a learning mentor (LM). Based on

these discussions, two participants were identified, 'Fred' and 'Christopher'[*], both 10-year-old boys in Year 6, who had been identified as having social interaction and communication difficulties. (Additional information about each of the participants is provided in the individual case reports in §3.3 and §3.4 below). The children's parents received letters providing information about the intervention and requesting consent for their child's participation. I discussed the study with each child and gave them each an information booklet and consent form. Consent was obtained for both children for participation in the study (Appendices 1-4 contain exemplar consent forms and documentation regarding ethical approval for this research).

3.2.2 Epistemology

The research presented here is informed by the philosophy of pragmatism (see e.g. Rorty, 1979; 1980). It is suggested that pragmatism can be seen as occupying an intermediate position both between realism and constructivism or relativism, and between epistemological dogmatisms and scepticism (Johnson & Onwuegbuzie, 2004; Robson, 2002).

Pragmatism does not offer a *theory* of truth or knowledge (Howe, 1988), rather it asserts that the justification for beliefs and theories is based on judgements of instrumentality (Johnson & Onwuegbuzie, 2004). The meaning or provisional truth value of an expression or theory is determined by the experiences or practical consequences of believing or using that expression

[*] The names of both of the participants in this study have been changed in order to preserve their anonymity.

or theory in the world (Murphy, 1990). The reason for this instrumental view is that pragmatists reject realism and the idea that we might be able to discover knowledge about an objective reality, or the 'way the world really is'. Pragmatists believe that no sense can be made of a mind-independent "Reality" that by its very nature can never be known – thus they deny the existence of a dilemma about the nature of truth in relation to reality (Howe, 1988).

This is not to deny the existence of a mind-independent world or reality, but rather to acknowledge "that we are historically and socially situated… when we read the world we can never be quite sure if we are reading the "world" or reading ourselves (Cherryholmes, 1992, p. 14). As Rorty (1999b) argues:

> We should give up the idea that knowledge is an attempt to *represent* reality. Rather we should view inquiry as a way of using reality, so that the relation between our truth claims and the rest of the world is causal rather than representational. It causes us to hold beliefs, and we continue to hold those beliefs which prove to be reliable guides to getting what we want…. [T]here is no one Way the World Is, and so no one way it is to be represented. But there are lots of ways to act so as to realise human hopes of happiness. The attainment of such happiness is not something distinct from the attainment of justified belief; rather, the latter is a special case of the former. (p. 33, emphasis retained)

The rejection of realism does not mean that pragmatism is a relativistic philosophy. Johnson and Onwuegbuzie (2004) contend that pragmatism rejects strong ontological relativism; there are not multiple (socially or individually constructed) realities, rather there are multiple perspectives or beliefs or opinions. Nevertheless, "There is room in ontology for mental and

social reality as well as the more micro and more clearly material reality" (p.15). Neither is pragmatism relativistic in the sense of there being no grounds for rationally evaluating theories (Howe, 1988). Pragmatists doubt that we can ever *know* if we are getting closer to "true" explanations of the world (Cherryholmes, 1992), so instead of using "truth" or "correspondence with reality" as criteria for judging theories, they evaluate them instrumentally, considering how well a theory explains things, predicts things, helps understand things, or enables us to improve things (Rorty, 1999b). Thus pragmatists appeal to criteria such as predictability, applicability, accuracy, simplicity, consistency, and comprehensiveness (Howe, 1988; Johnson & Onwuegbuzie, 2004). This may imply a degree of uncertainty that some find uncomfortable. But pragmatism is based on a rejection of historical dualisms, such as knowing vs. reality, facts vs. values, and subjectivity vs. objectivity (Johnson & Onwuegbuzie, 2004; Maxcy , 2003), which have caused philosophers since Plato to search for a degree of certainty that has thus far proved elusive (Rorty, 1980).

One way in which pragmatism could be summarised is by saying that accepting that something (e.g. a mode of enquiry) has been found wanting, does not necessarily imply that a better way of doing things has been (or can be) identified. Or perhaps more accurately: accepting that something has been found wanting *by its own standards*, does mean that it cannot be judged by another set of (perhaps more useful) standards. As Howe (1988) puts it: "basing theory choice on these [instrumental] criteria entails not that science is irrational, but that scientific rationality simply does not fit the positivistic (i.e.

mechanistic) account" (p. 15). Empiricism and a scientific approach can be favoured, not as a way of discovering truth, but because and to the extent that they offers a way of making useful predictions and finding out what works (Johnson & Onwuegbuzie, 2004; Rorty , 1999a). As Rorty (1980) puts it, the question that we should be asking of scientists and others "is not 'Do they get it right?', but more like 'What would it be like to believe that? What would happen if I did? What would I be committing myself to?'" (p. 723).

3.2.3 Methodological implications of pragmatism

A traditional view of the relationship between epistemology and methodology is that ontological assumptions will give rise to epistemological assumptions, which in turn shape methodological considerations which go on to determine methods for data collection (Hitchcock & Hughes 1995). Pragmatism, however, is an anti-foundationalist philosophy (Cherryholmes, 1992) and seeks to eschew the search for an ultimate grounding for research approaches. Instead, pragmatists argue that the research question is more important than either the method or the paradigm underlying it; it is this that should determine what approach(es) one adopts (Teddlie & Tashakkori , 2003).

Researchers should be asking which approach or method is most helpful in answering questions and yielding information that serves their purposes. Pragmatic research is driven by anticipated consequences, and choices about what and how to research determined by where we want to go (Cherryholmes, 1992). Given this "dictatorship of the research question"

(Teddlie & Tashakkori , 2003, p. 21), pragmatists advocate *contingency theory* in the selection of research approaches, which:

> accepts that quantitative, qualitative, and mixed research *are all superior under different circumstances* and it is the researcher's task to examine the specific contingencies and make the decision about which research approach, or which combination of approaches, should be used in a specific study" (Johnson & Onwuegbuzie, 2004, pp. 22-3, emphasis retained).

Pragmatism is viewed as a philosophical approach that fits well with mixed-methods research (Howe, 1988; Johnson & Onwuegbuzie, 2004; Maxcy , 2003; Rallis, Rossman , 2003; Robson, 2002; Teddlie & Tashakkori , 2003). The epistemological heritage of an approach or method has little bearing on judgements of utility and instrumentality, as Howe (1988) argues:

> "The fact that quantitative and qualitative methods indeed might be historical outgrowths of incompatible positivist and interpretivist epistemologies no more commits present-day researchers to endorsing one or the other of these epistemologies than the fact that astronomy is an outgrowth of astrology commits present-day astronomers to squaring their predictions with their horoscopes." (p. 15)

In resisting methodological dogmatism (Howe, 1988), pragmatism is viewed as a very practical philosophy for applied research (Teddlie & Tashakkori , 2003). Likewise, Johnson and Onwuegbuzie (2004):

> "agree with others in the mixed methods research movement that consideration and discussion of pragmatism by research methodologists and empirical researchers will be productive because it offers an immediate and useful middle position philosophically and

> methodologically; it offers a practical and outcome-oriented method of inquiry that is based on action and leads, iteratively, to further action and the elimination of doubt; and it offers a method for selecting methodological mixes that can help researchers better answer many of their research questions." (p.17)

There are a number of ways of combining qualitative and quantitative approaches, and a number of reasons for doing this (Greene et al., 1989; Robson, 2002). Johnson and Onwuegbuzie (2004) suggest that a key principle of mixed methods research is that researchers should collect multiple data using different methods in order that the resulting combination is likely to result in complementary strengths and nonoverlapping weaknesses. For example, Greene et al. (1989) identify five reasons for adopting a mixed methods approach:

- triangulation – using results from different methods/ designs to seek convergence and corroboration;
- complementarity – using the results from one method to elaborate or enhance the results from another method;
- initiation – discovering paradoxes and contradictions that lead to a reframing of the research question;
- development – the use of findings from one method to help to inform the other method; and
- expansion – the use of different methods for to expand the breadth and range of research.

The aim of the present study was to see to see if and how VSM could be integrated effectively into the work of an Educational Psychologist (EP). Thus the study sought, not only to assess the effectiveness of the VSM interventions employed in the case studies, but also to gather data in relation to the perceived utility and applicability of VSM.

3.2.4 Methodology

Both interventions in this study employed single-case within-participant designs in order to assess intervention effects. Single-case experimental designs are the principal designs used in, and derived from, applied behavioural analysis (Morley, 1989). While Buggey (2009) contrasts VSM with applied behavioural analysis (ABA), suggesting that the former offers a less time-consuming alternative to traditional ABA, he does suggest that similar methods be used in order to evaluate the effects of VSM interventions. Indeed, single-case experimental designs are the most commonly used methodology in VSM research, although some researchers have adopted experimental designs making between groups comparisons (Hart, 2010).

A key feature of the single-case experimental design is that the participant acts as their own control, and the researcher is studying within-participant variation in response to an independent variable or variables (intervention) (Barlow & Hersen, 1984). Barlow and Hersen (1984) argue that, while case studies are not (generally) capable of isolating particular mechanisms effecting change, or the functional relationship between two variables,

research focused on individual participants can achieve this if an experimental methodology in employed. In order to investigate such causal relationships it is necessary that the behaviour under investigation is measured repeatedly over time at different levels of the independent variable. Individual behaviour naturally varies over time, so the purpose of such repeated measurement are to be able to inform judgements about whether variations in behaviour are a result of this natural variation or whether they are a response to an independent variable (e.g. an intervention).

Thus single-case designs should include at least two phases of repeated measurement: a baseline (A) phase and an intervention (B) phase. However research involving only one of each of these two phases is essentially quasi-experimental insofar as it is difficult to draw conclusively causal inferences based upon one change in the dependent variable (Morley, 1989). In order to identify causal relations with greater certainty, a number of developments on the basic AB design can be employed. One possibility is to repeat the cycle of intervention and non-intervention (baseline) using an ABAB (or ABABAB…) design where and intervention is withdrawn and then reintroduced in order to see whether treatment effects are replicated.

An alternative strategy is to employ a multiple baseline design. Two types of multiple baseline design can be used depending on study. If the is more than one participant under investigation, each receiving the same intervention for the same behaviour, a multiple baseline across participants design can be used. This involves staggering the points at which the B-phase starts for

different participants so that it is possible to see whether or not the point of behaviour change for each participant is the same in relation to the implementation of the intervention. Thus, for example Hartley et al. (1998) used VSM to increase classroom participation in three students. All students levels of participation were measured over the same time period, however interventions were staggered and implemented at different points for each student (3, 5 and 7 weeks) enabling the researchers to see whether improvements in participation occurred contemporaneously (implying a cause other than the intervention) or at similar time points in relation to the implementation of the intervention (implying that the intervention caused the change in behaviour).

Where there is only one participant, but multiple behaviours are being targeted by different elements of an intervention, a multiple-baseline across behaviours (or problems) design can be used. Here different behaviours are targeted sequentially by staggering introduction of different elements of the intervention. If each behaviour improves in response to the introduction of the corresponding element of the intervention then it implies a causal link between intervention and outcome. If, however, such temporal contingency is not observed, then it implies that there is another cause for any improvement in behaviour, or that not all elements of the intervention are causally related to a change in behaviour. An example of this design is provided by Delano (2007) who used VSM to improve written language performance in students with ASD. She targeted two elements of writing performance – number of words written and functional essay elements – and used different instruction

techniques and self-modelling videos for each, allowing her to assess whether each dependent variable improved in response to the relevant element of the intervention.

Margison and McGrath (1989) identify four desirable conditions for conducting single-case experiments to research the effects of therapeutic interventions:

1. There should be sufficiently long lead-in to assess baseline status.
2. The measures should be as clear as possible and directly measurable at the end of each session and preferably every day.
3. The treatment, ideally, should permit periods on and off treatment without making nonsense of the treatment approach.
4. The goals of therapy must be defined particularly clearly with plausible measures of change available. (pp. 113-4)

While such conditions are desirable, certain features of the present study meant that its design and procedures were less than optimal. The selection of a single-case experimental design was guided by the need to create individualised interventions (i.e. personal self-modelling videos), and the fact that such designs are viewed as being uniquely able to evaluate the effectiveness of interventions for individual subjects (Cohen et al., 2007). However, the present study sought to see how VSM to be integrated into the work of an Educational Psychologist in order to assess its utility within a real-world setting. This meant that the interventions were implemented and evaluated by myself working at a distance from the setting in consultation with staff members. It also meant that the problems that were the target of VSM interventions were those identified by staff at the school. In short, the study

was concerned with studying the effectiveness of VSM applied in a real-world setting, to real-world problems using real-world methods of implementation.

In terms of the problems addressed using VSM, different target behaviours were identified by school staff for each of the participants: anger management for Fred and writing performance for Christopher. This meant that a multiple-baseline across-participants design was not possible, as this requires that the same intervention and outcome measures be used for each participant. And because there was only one target behaviour for each participant, a multiple-baseline across-behaviours design was not possible either.

While Margison and McGrath (1989) talk about it being desirable to be able to withdraw and reintroduce an intervention without rendering it nonsensical, it is worth emphasising a key difference between VSM research and more traditional applied behaviour analysis and other research involving single-case experimental designs. Usually in single-case research a repeated cycle of periods of intervention and non-intervention (i.e. ABAB…) can be adopted in order to establish a cause and effect relationship between the intervention and the dependent variable. The assumption here is that there is a continuing contingent relationship between intervention and behaviour, whereby the continuing presence of the intervention is believed to be a necessary condition for the target behaviour to occur. So, for example, whether the intervention be a particular drug or a particular reinforcement programme, in implementing it and withholding it the researcher is investigating whether such a continuing contingent relationship exits.

Critics of single case research, however, argue that one of its limitations is that oftentimes behaviour and interventions are not reversible in the manner that withdrawal and reversal designs assume (Bandura, 1969). Certainly, in the case of VSM, the purpose of the intervention is to support learning and effect lasting behavioural change. This means that a withdrawal or reversal design cannot be used as an experimental manipulation to provide further evidence of causality. Consequently, where multiple-baseline designs cannot be adopted, single-case research involving VSM cannot meaningfully extend beyond a basic AB design for the purposes of establishing a causal link between the intervention and behaviour. A subsequent withdrawal (A) phase can be included, not to evidence causality, but rather as a way of assessing whether treatment effects are maintained.

Regarding the present study, in the case of Fred an ABA design was used, whereas for Christopher a truncated AB design was used as delays in the implementation of the intervention meant that post-intervention withdrawal measures could not be taken. While such designs are viewed as being quasi-experimental (Morley, 1989), Kazdin (1982) suggests that under certain conditions AB designs can “provide information that closely approaches that which can be obtained from experimentation” (p. 88). Kehle et al. (1998) argue that the use of such designs within VSM research can be appropriate and allow valid inferences to be drawn depending on certain conditions, including the heterogeneity of subjects, the nature of the data, the number of

assessment occasions, future projections regarding the target behaviour, and the magnitude of the observed effect.

One feature of single-case research that affects the certainty with which one may draw inferences about treatment efficacy regards the duration of assessment during the initial baseline phase and stability of response within that phase. Single-case research involves repeated measurement of the dependent variable throughout experimental phases in order that one can identify the extent to which behaviour varies naturally, and the extent to which observed variations in behaviour exceed this natural variation and are therefore attributable to the independent variable (Barlow & Hersen, 1984). In order to draw strong conclusions one should hope to see a long stable baseline trend, followed by a rapid and sizeable change in behaviour following intervention. To this end, Baer et al. (1968) suggest that baseline measurement be continued “until its stability is clear” (p. 94). However, Barlow and Hersen (1984) concede that there are practical and ethical limitations to extending the baseline phase beyond certain limits. In particular, it is questionable whether it is appropriate to withhold an intervention, thereby not addressing the problem that has been identified, in order to achieve a more convincing piece of research. Thus, Sidman (1960) suggests that “the behavioural engineer must continuously take variability as he (sic) finds it, and deal with it as an unavoidable fact of life” (p. 192). Similarly Barlow and Hersen (1984) suggest that if a stable baseline cannot be attained, there is no completely satisfactory strategy for dealing with a variable baseline.

Morley (1989) suggests as a rule of thumb that the baseline phase should be last longer than the time that it is expected to take for the intervention to take effect. Proponents of VSM suggest that positive effects should be seen quickly following the introduction of an intervention and that around six viewings of a self-modelling video over a two- to three-week period are sufficient to effect lasting observable changes in behaviour (Buggey, 2009; Dowrick, 1999). In the present study baseline measurements were taken over at least six weeks. It was not appropriate to wait indefinitely for a stable baseline trend to be attained in each case as this would have involved withholding a potentially useful intervention to address problems that were causing real difficulties for school staff and the participants alike.

A number of other studies involving VSM have involving implementing interventions while there are significant variations in the baseline rate of the target behaviour (e.g. Buggey et al., 1999; Hartley et al., 1998; Hosford, 1981; McCurdy & Shapiro, 1988; Neisworth & Wert, 2002). Nevertheless, it is possible for such research to demonstrate convincing effects of VSM where the duration of the baseline, frequency of measurement and magnitude of effect is sufficient. It is the norm for data from single-case research to be analysed by graphing and visual inspection (Morley, 1989; Peck, 1989). This approach reduces the chance of type I errors in that large observable changes in behaviour will be identified, whereas small changes (which may attain statistical significance) will not (Morley, 1989). This somewhat conservative approach is appropriate in applied settings, where the utility of an intervention can only be demonstrated in worthwhile manner if its effects

are clearly observable. If a statistical model is required to demonstrate change, any effects are unlikely to have clinical or practical significance.

In this, and other respects, single case research in applied settings should endeavour to demonstrate findings that have external, as well as internal, validity. One form of external validity is social validity. Social validity refers to "the degree of acceptance for the immediate variables associated with a procedure or programme designed to change behaviour" (Carter, 2010, p. 2). Social validity relates to the goals, procedures and outcomes of an intervention or programme, and within applied behavioural analysis is frequently determined by asking the opinions of those receiving or implementing an intervention (Carter, 2010). Research into VSM has reported social validity based upon anecdotal reports, social comparisons, teacher and parent ratings or interviews (Hitchcock et al., 2003).

The present study sought to attain and demonstrate social validity in a number of ways. Regarding the goals and procedures of intervention, the target behaviours were identified by staff working with the participants and mode of implementation was intended to reflect the norms of EP service delivery. Regarding measures of target behaviour that were used, Buggey (2009) suggests that certain methods of data collection, such as interval recording and time sampling, although convenient, can lack validity insofar as they give a partial measure of behaviour. In the present study data were collected relating to behaviour as it naturally occurred within the school environment. For Fred this involved the teacher keeping a log of all significant

behavioural incidents that required a staff member to intervene to help to resolve the incident. In Christopher's case the measure used was the number of words written during a weekly "big writing" exercise in class. Thus the measures related directly to the problem behaviours and settings which had prompted the request for EP support. Nevertheless, the choice of measures does affect the reliability of measurement that it was possible to attain.

Barlow and Hersen (1984) emphasise that for single-case research to demonstrate robust findings, objective measures are required In order to achieve this they advocate that behaviour be measured by more than one individual and checks for inter-rater reliability used. In the case of Christopher, such inter-rater reliability was not an issue. The behaviour being measured was the number of words written, and Christopher created his own objective record of behaviour (by writing) which could be measured uncontroversially. For Fred, however, this was not the case. The definition of a 'significant behavioural incident' is significantly more subjective, although its operationalisation in terms of incidents requiring the intervention of a staff member means that recording incidents was not merely based on the observer's subjective judgement of what met an arbitrary threshold. Moreover, as the class teacher was the individual who was keeping the behavioural incident log, she was both in a position to observe Fred's behaviour most frequently and the staff member who would, as a matter of protocol, be informed of incidents that occurred when she was not observing (i.e. when with another teacher or during recreation times). It would not, however, have been practical to check the reliability of this measure by means of inter-rater

reliability. During Fred's baseline phase significant behavioural incidents were occurring at an average rate of one incident every two days. Thus, to assess inter-rater reliability, it would have required an additional observer to watch Fred throughout the school day for a number of days, or even weeks. Not only would this be unfeasibly time-consuming, the presence of an additional and unfamiliar observer could have a potentially confounding effect of data by altering the behaviour of Fred (and all the other individuals in the class, including the teacher) in unpredictable ways.

The social validity of intervention outcomes was assessed using post-intervention interviews with participants, their class teachers and a learning mentor who worked with both of the participants. These sought to elicit stakeholder views regarding whether the intervention was felt to be effective and whether the procedure used (i.e. VSM) was one which could have further application within the setting. Johnson and Onwuegbuzie (2004) argue that "adding qualitative interviews to experiments as a manipulation check and perhaps as a way to discuss directly the issues under investigation and tap into participants' perspectives and meanings will help avoid some potential problems with the experimental method" (pp. 18-9). Given the identified shortcomings, the experimental approach adopted in these studies was augmented with participant and stakeholder interviews in order to ascertain their views about the effectiveness or otherwise of the VSM interventions. Following Greene et al.'s (1989) typology (listed on p. 84), the rationale for including interviews in this study was to seek triangulation and complementarity. Interview data were used not only to seek corroboration of

experimental findings, but also to gain a fuller picture of intervention responses and effects.

3.2.5 Procedure

Target behaviours for each child were identified through discussion with school staff. Suitable behaviours were those where: a change in behaviour would be beneficial; the target skill would be observable; and there was the potential for the child to be portrayed displaying the skill in a video through the use of role play, hidden support or editing.

Having identified the target behaviour I filmed each participant and edited footage to produce the self-modelling videos (additional details about each participant's video appear in §3.3.2 and §3.4.2, below). Researchers suggest that VSM videos should be short, with a three-minute film sufficient to effect change (Buggey, 2007; Dowrick, 1999; 1991; Dowrick & Raeburn, 1977). Edited videos were between three and five minutes long.

Before the study I briefed all of the school staff involved about its proposed aims and methods. Dowrick (1991) recommends that six viewings over a two-week period are sufficient for an effective VSM intervention. Staff agreed to implement the intervention by showing videos two or three times per week, up to a maximum of eight times, over a period of up to four weeks, however this did not actually happen. Fred's intervention was terminated early after he expressed a preference to stop watching it after four viewings. Christopher's

was shown his video by his teacher only once, by his mother once, and by me on four occasions.

The study was conducted over a 25-week period, from initial planning discussions and baseline data collection to final post-intervention interviews. The interventions were implemented consecutively, with Fred's occurring before Christopher's. At the end of the study I conducted interviews with the participants and the staff involved to elicit views about the intervention. This occurred 15 weeks after the intervention period for Fred and two weeks post-intervention for Christopher.

3.2.6 Measures

Two single-case within-participant experiments were conducted in order to determine the efficacy of the intervention. Outcome measures were identified that were contextually relevant, relating to the concerns of school staff in identifying target behaviours.

Fred's intervention focused on anger-management skills, and the outcome measure was the frequency of significant behavioural incidents. These were incidents that occurred both in and out of class, where Fred's teacher or another member of staff had to intervene to support Fred, help him to calm down or otherwise resolve the issue. Fred's teacher kept a written log of incidents for an 18-week period covering pre-intervention (baseline), intervention and post-intervention periods.

Christopher's intervention focused on his writing skills. The outcome measure was the number of words that he had written in a story during a "Big Writing" session in class, when children were expected to work independently. Christopher also completed a scaling exercise before and after the intervention to measure his attitudes towards writing. There were four statements ("I like writing", "I am good at writing", "I plan what I write", and "I write a lot") from which Christopher indicated the extent to which these applied to or were true about himself on a scale from 1 to 10.

It is worth noting that, while this study aimed to investigate the teaching of skills using VSM, proxy measures were used to assess intervention effectiveness. The selection of behavioural measures (i.e. frequency of problematic behavioural incidents and number of words written) was informed by pragmatic considerations. Such data are easier to collect than direct measures of skill performance, which would have required extensive observations, with observer effects potentially threatening the validity of findings, but also they were contextually relevant inasmuch as they measured the behaviour that school staff had identified as a cause of concern.

In addition to outcome measures, I conducted semi-structured post-intervention interviews with the participants in order to elicit their views about the VSM intervention. Questions focused on the perceived efficacy of the intervention, its benefits and drawbacks, and judgements about its suitability for future use (see Appendix 5 for interview schedules). Qualitative interview data were used to complement behavioural measures, by seeking stakeholder

and participant views about intervention effectiveness in terms of whether particular skills had been used, recalled or observed, and also whether there was evidence for mediating effects with respect to self-efficacy.

3.2.7 Materials

A Panasonic SDR-H25 digital video camera was used to film participants. Videos were edited using ImageMixer 3 for Panasonic software on a PC, and were then converted into DVDs. They were shown to participants using the school's computer equipment.

3.3 Participant 1 – Fred

Fred was at School Action Plus on the Special Educational Needs (SEN) Code of Practice (DfES, 2001). His Individual Education Plan (IEP) identified communication and interaction difficulties, and social, emotional and behavioural difficulties, and described his difficulties thus:

- Fred has difficulties understanding what triggers unsettled feelings triggering frustration and anger.
- Fred has difficulties understanding some social rules that can keep him and others safe – he can be insular and in a world of make believe.
- Fred continues to have episodes of difficult behaviour towards peers and adults in school.

At the time of the study Fred had been referred to health professionals who were conducting assessments to see whether a diagnosis of autism was appropriate.

3.3.1 Target behaviour

Staff working with Fred had concerns about his skills with respect to his own emotional understanding and regulation. There had been a number of incidents where Fred appeared to become angry or frustrated, and would either become very upset, or behave aggressively towards peers or adults at school. These incidents occurred both in and out of classroom situations, and triggers included situations where Fred reportedly felt that he was put under pressure, and situations involving disputes with peers. Fred's teacher described him as getting really angry very quickly, and said that when he was angry he could not explain what was wrong. She said that on a number of occasions she had to walk around the school site with Fred until he became calm, which could take between 30 minutes and an hour.

There was a target on Fred's IEP for him to become better able to recognise when he was feeling frustrated or angry, and to learn to respond appropriately. An advisory teacher from the Local Authority Communication and Autism Team had identified a particular approach to addressing Fred's emotional management difficulties. This involved Fred working with the LM, to describe incremental levels of frustration or anger on a five-point scale, before discussing how he could identify when he was feeling these, and identifying an appropriate adaptive response at each level. Having discussed this with the LM, I considered that this was an approach that could potentially be supported by VSM as it involved identifying replacement behaviours, and there was the potential for visual representation of these through role play.

3.3.2 Making the video

I filmed Fred during a session where he was working with the LM using the five-point scale. They identified five different levels of anger or frustration, discussing potential triggers, and possible ways of responding to reduce the emotional response or to manage it adaptively. Whenever Fred identified a particular strategy or response I asked him to demonstrate it for the camera. Four strategies were identified in total, as the first point on the scale was the absence of anger or frustration. The session lasted about an hour, and afterwards I edited the video to remove any images of myself or the LM, and show Fred displaying each of the four strategies that he had chosen. Text was added to the footage to punctuate and introduce "scenes". Where text appeared it was set against a black background. Fred's self-modelling video is described in Box 1, below.

Box 1: Fred's video

Fred's film began with a black title screen containing the text: "How to stay calm. A film by Fred". Then a question appeared on screen: "What do you do when you start to feel frustrated?" At this stage Fred had identified moving his hands, rubbing them together and gently squashing a soft, squeezy "stress ball" as something that helped him to feel calm, and so there was footage of him doing that. More text appeared, saying, "At the next stage breathing deeply helps me to stay calm", followed by footage of Fred slowly inhaling and exhaling, with his eyes closed, accompanied by the voice of the LM saying, "in through your nose – hold it – now out through your mouth". The next text to appear said: "If I get angrier I can move away and think and do things that make me feel happy". Fred was filmed getting up and moving to a seat on its own and playing with plasiticine. We had also discussed other things that Fred might chose to do at this stage which included playing with Lego and looking at a book of pictures that he had chosen. After images of him calming down by playing with the plasticine, the next text to appear on screen read: "When I'm really angry I should take time out, away from other people – I can crush the stress ball". There then appeared footage of Fred doing this, closing his eyes and breathing deeply, as he gradually appeared to become calmer. The film ended with text on the screen saying: "Remember these steps – You can do it!"

The video was just over three minutes' long.

3.3.3 Response to intervention

When the intervention started Fred was given access in his classroom to both a stress ball and a picture book that he had made with the LM, as he had identified both of these as things that he could use to help him to calm himself when upset or frustrated. Fred was shown his video by the LM four times over a three week period, in a room away from his regular classroom and other children.

For the seven weeks before the intervention, during the intervention period, and for eight weeks following the intervention, Fred's class teacher kept a record of all significant behavioural incidents, both in and out of class, where she or another member of staff had to intervene to support Fred, help him to calm down or otherwise resolve the issue. The incidents included occasions when Fred became upset, angry, frustrated or aggressive, or when he refused to do work or participate in class activities.

The graph, Figure 1 (over) shows the rate of these behavioural incidents across the pre-intervention, intervention and post-intervention phases. Data are presented as a rate of incidents per day for each week to take into account the fact that the behaviour occurred at a relatively low rate (i.e. less than once a day on average), and also to account for the fact that there were some weeks where Fred attended for fewer than five days as a result of school closure or sickness absence.

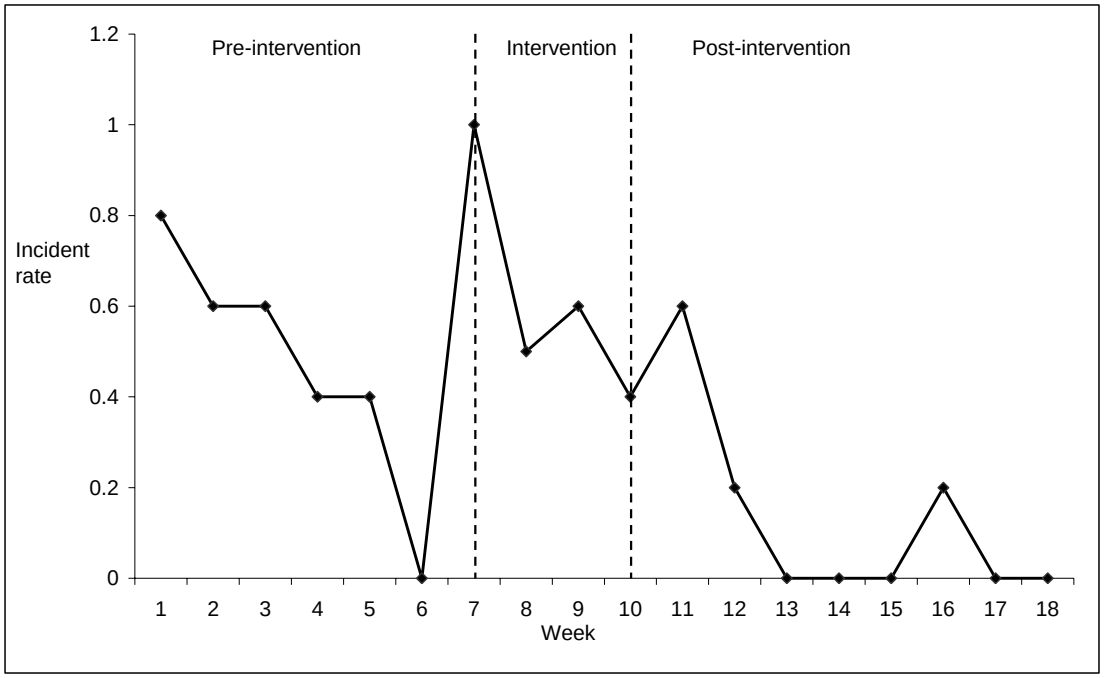

Figure 1: A graph showing the rate of behavioural and emotional incidents (incidents/day) before, during and after intervention. Note – plotted data points are the average number of incidents per day attended for each calendar week. In weeks 6 and 7 Fred did not attend for a full five days in either week. In week 6 he attended for four days (with no incidents), and in week 7 he attended for three days (with three incidents). Thus over these seven days there were three incidents recorded (i.e. 0.42 incidents/per day), which suggests that the baseline rate of incidents was more stable than the graph implies.

During the seven weeks before intervention, Fred attended school for 32 days and the teacher recorded a total of 16 incidents, giving a mean incident rate for the pre-intervention period of 0.5 incidents per day. This mean rate remained the same during the intervention phase, with a total of 7 incidents over a 14-day period. The graph shows that the week after intervention stopped (i.e. week 11) there did not appear to have been a change in Fred's behaviour, and there were a further 3 incidents over the next five days. It is worth noting that week would have been when the intervention was still occurring, had it not been terminated early. After week 11 there appears to have been a dramatic change in Fred's behaviour, with only two further

incidents over the next seven weeks. Whereas pre-intervention there had only been one incident-free week (week 6), post intervention there were five.

Figure 1, then, suggests that the VSM intervention was successful, albeit with the effect delayed slightly, only appearing after the intervention had ceased. However, while the VSM intervention was aimed at teaching Fred skills and strategies to help manage his emotions when he became upset or angry, the count of behavioural incidents is only a proxy measure of intervention efficacy. It does not show whether Fred was actually employing these strategies, and it is possible that the rate of incidents could have decreased without him using them.

3.3.4 Post-intervention interviews

Four months after the start of the intervention period I interviewed separately Fred, his class teacher and the LM to ascertain their views about the utility of the intervention with each of them.

Fred did not enjoy watching his video and chose to stop viewing it after four occasions. He told me that while he did not mind undertaking the role play and actually making the video, he felt really embarrassed while watching it. When asked what he remembered from the video, Fred found it difficult to identify anything, except for the funny faces that he was making in it. When prompted that the video had been about things that he could do to calm down, Fred did say that in the video he demonstrated deep breathing and slowly counting down in order to calm down. (The latter of these did not actually

appear in his video). Fred said that he felt that he now coped better when upset, but could not identify why. He said that he did not use the stress ball or the picture book that he had made and had been provided for him. When I asked Fred if he would like to make another video in the future, he said that he would not.

Fred's teacher reported a significant change in Fred's behaviour, and he was better able to deal with frustration or being upset. She explained that Fred would use time-out effectively and remove himself from challenging situations in order to calm down, although she said that she was not aware of him using the resources provided for him (the stress ball and the picture book) in class. Fred was said to be better at communicating when he was upset, and at explaining what was wrong than he had been previously. Significantly, she noted that, if and when Fred did become upset, the time that it took for recovery was much reduced.

> *Gone are the days of walking round and round building with Fred just for him to calm down.* (Fred's teacher)

The teacher reported that, prior to intervention it would take between 30 minutes and an hour for Fred to become calm when he was angry, which had a significant, detrimental impact on his educational progress and placed significant demands on herself and other school staff.

The LM had also noted a positive change in Fred's behaviour following intervention. She too said that she had noticed a marked decrease (both in

frequency and intensity) in incidents of Fred becoming angry, frustrated or upset and losing control over his behaviour. She reported that the post-intervention period was the most extended time that Fred had been "keeping on track". The LM said that she had seen Fred using both the stress ball and the picture book, but this had been away from his peers and the class setting. She also said that if Fred was becoming angry or agitated she could simply say to him, "Fred, breathe" and he would use the slow breathing technique to help himself calm down. Peviously she would have to model breathing with him in order to maintain his focus and regulate the speed of his breathing.

The LM explained that she had been supporting Fred for three years and trying to help him develop his anger management and social skills to – she believed – no avail.

> *I openly put my hands up and say that what I've done hasn't worked.* (LM)

Given the apparent intransigent nature of Fred's difficulties and the reluctance that she had observed in Fred engaging with the intervention, she found the change in his behaviour both surprising and difficult to explain.

> *I've known Fred for many years now and I can't work it out – how things have changed so suddenly.* (LM)

The LM suggested that certain of his 'personality characteristics' might explain why Fred did not like the intervention. She said that Fred was someone who did not like to feel singled-out, put under pressure, or be the centre of

attention. She suggested that this was precisely what the VSM intervention did. Fred had a video that other children did not. Moreover, it involved him role-playing being angry and then becoming calm, and she suggested that it served a reminder of difficulties that he had, rather than of positive strategies for him to use.

3.4 Participant 2 - Christopher

Christopher was jointly on roll at the primary school and at a nearby special school for children with social interaction and communication difficulties. Christopher had a diagnosis of Autism Spectrum Disorder. He had a Statement of SEN which identified difficulties with respect to the following skills:

- social and interpersonal skills with peers and adults;
- listening, attention and concentration skills; and
- independence skills.

3.4.1 Target behaviour

Initially when I discussed identifying a target behaviour for Christopher with the SLT, she explained that she was concerned with his behaviour within the social skills group, particularly his sitting and listening skills. Christopher would reportedly get up and down from his seat during group sessions, wave his hands or gesture distracting others, and often interrupt others. While observing Christopher in the group setting these behaviours were evident, but

when in class, while there was some evidence of these behaviours, they appeared to have a lesser impact on his and others' participation in class activities. In both settings Christopher usually responded appropriately when his behaviour was brought to his attention or he was reminded to show "good sitting".

This was not an appropriate target behaviour for two reasons. Firstly, improving Christopher's sitting and listening skills was not something that appeared to be of significant benefit *to him*. His behaviour could be distracting to others, but it was managed effectively in class, and was not a barrier to his learning. Secondly, the SLT did not identify alternative behaviours for Christopher to learn. A self-modelling video would have involved removing undesired behaviours through editing to present an exemplar of only desired behaviour – in Christopher's case simply sitting, listening and not participating. "Listening", as opposed to simply sitting passively, did not constitute observable behaviour. Moreover this positive self-review, "edit out bad behaviour" paradigm is, as Hart (2010) argues, of questionable efficacy, with a number of studies employing it not reporting positive results (e.g. Clark et al., 1993; McCurdy & Shapiro, 1988; Shear & Shapiro, 1993).

To identify an alternative focus I spoke to Christopher's teacher. She expressed concern about Christopher's writing. He reportedly had a good imagination and the potential to be an effective writer, but found it difficult to write without support. The class regularly did "Big Writing", when they were required to write an extended piece of prose without assistance. Christopher

would write significantly less than his peers, and would frequently appear agitated at being unable to receive adult support. He would do little planning and would often not complete written tasks.

3.4.2 Making the video

VSM has previously been used to improve the writing skills of young people with Asperger Syndrome (Delano, 2007), using an approach called self-regulated strategy development (SRSD; Harris and Graham 1996) to develop writing skills. SRSD aims to improve students' knowledge and use of planning and drafting strategies, develop students' use of self-regulatory skills (e.g. goal setting, self-monitoring), and enhance motivation and self-efficacy (Lane et al., 2008).

SRSD is an empirically validated approach, based upon research into writing processes and self-regulation (Santangelo et al., 2008), with reported efficacy in improving the quality and quantity of writing produced by students at primary and secondary school level (Chalk et al., 2005; Eissa, 2009; Lane et al., 2008; Sadler, 2006; Santangelo et al., 2008). Meta-analyses of SRSD have established the effectiveness of SRSD for struggling writers (Graham & Harris, 2003).

Delano (2007) amended the typical method of SRSD instruction, by producing two self-modelling videos with each of three participants: one focusing on using a self-monitoring strategy to increase the number of words written, and one using a planning strategy to increase the amount of functional essay

elements. With limited time available for me to work with Christopher to introduce writing strategies and to make his self-modelling video, I decided to focus on teaching strategies for planning and for self-monitoring, as a means of increasing his written output.

Mnemonics have been used to help students remember writing strategies (Graham & Harris, 1989). Researchers using SRSD instruction identify a number of mnemonics that assist in developing writing skills, including POW (as a way of approaching the writing process): Pick my ideas, Organise my notes, Write and say more (Lane et al., 2008); and TREE (as a tool for planning): note Topic sentence, note Reasons, Explain each reason, note Ending (Delano, 2007). I used these two mnemonics with Christopher as a means for identifying the skills that he could use to develop his writing, although I added Audience (i.e. considering who he was writing for) to POW, to make it A-POW. Following Delano (2007) I chose to use a graphical strategy for target-setting and self-monitoring, with Christopher setting a target for the number of words he would write and marking it on a bar chart. While writing he could count the number of words, and mark it on the chart to see if he had met his goal. The sheet for the bar chart had the mnemonic A-POW written on it. I also made a sheet with the mnemonic TREE on it, and an outline drawing of a tree that Christopher could use for planning, by noting the topic sentence on the trunk, the reasons at the end of each branch and the ending at the base (examples are included as appendices 6 and 7).

One 90-minute session was used to demonstrate the writing strategies and to make the video with Christopher. Whereas Delano (2007) used a pre-prepared script and exemplar materials not produced by the participants, in order to make videos, I chose to explain the strategies to Christopher and film him while he was using them on an unfamiliar writing task (provided by Christopher's teacher), so that his video showed his own achievements.

Box 2: Christopher's video

Christopher's video started with him talking to camera, saying "Hello, I'm Christopher and this is my video on how to write well". There followed footage of the stages of the planning, writing and monitoring process. Christopher explained the mnemonics A-POW and TREE, accompanied by footage of writing on the TREE plan, with him describing what he was doing as he did it. Close-up shots were used to show what Christopher was writing. Any footage of me prompting or supporting Christopher was removed, so that the film only showed him working independently. After completing the plan, the film then showed Christopher using the graph to set a target number of words. As with Fred's video I inserted text against a black background at certain points to identify the skills and stages that Christopher was demonstrating. After footage of Christopher writing, the film ended with Christopher saying, "I beat my target by picking my ideas, organising them in a plan, using the TREE and writing and saying more – I elongated my paragraphs – I used some good words – I am a good writer – Next time I will really challenge myself!"

The video was about four minutes' long.

During the session I explained the mnemonics and associated strategies to Christopher and helped him to use them. Throughout the session I filmed Christopher and prompted him to explain what he was doing. In his previous piece of work Christopher had written 94 words. Christopher set a target of 125 words for this piece. While he was writing, I did not interact with him, except for occasionally prompting him to keep going, to use his plan or to

check his progress. When Christopher told me that he had finished the exercise I encouraged him to check his work, and make any corrections or add additional information that he thought of. Finally I asked him to count how much he had written to see whether or not he had beaten his target (he had). Following the session I edited the video to produce Christopher's self-modelling video (see Box 2).

3.4.3 Response to intervention

Because of the difficulties in identifying an appropriate target for Christopher's VSM intervention, the intervention period started later than intended. His video was produced in two weeks before a school holiday. Christopher's teacher had agreed to show the video two to three times a week. She actually only showed him the video once – after the holiday. Christopher was also shown the video once, by his mother, during the holiday. When I became aware that the video was not being shown regularly, I arranged to visit the school four times over a two-week period to show the video to Christopher. When viewing his video, Christopher was enthusiastic and keen to watch his video. He would look at the screen intently, and he would comment as he was watching, anticipating what he would see.

During the intervention phase Christopher completed three story-writing tasks independently in class. Figure 2 (below) shows the number of words in stories written by Christopher before and during the intervention phase. Before intervention his longest story was 132 words, and the mean story length was 104 words. Each of the pieces of writing that Christopher completed during

the intervention phase was longer than those that he had completed pre-intervention, with his final story being 324 words long. The mean story length during intervention was 219 words.

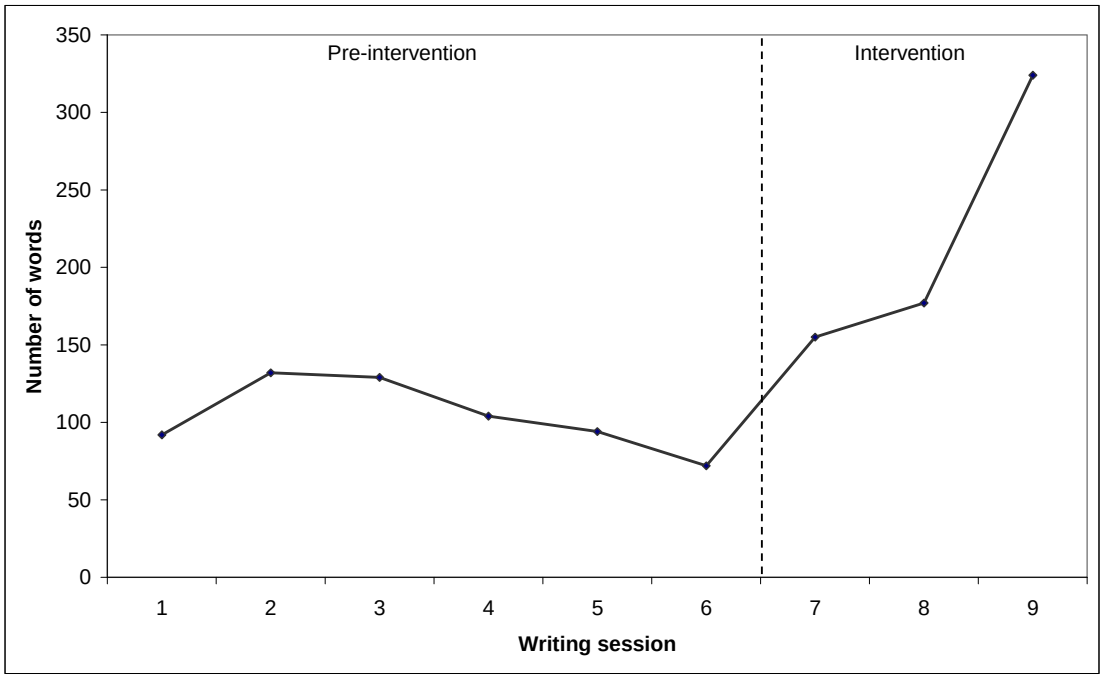

Figure 2: A graph showing the number of words written by Christopher in independent story-writing sessions before and during intervention.

The filming session with Christopher occurred between the fifth and sixth writing sessions. This was when he was taught and practised the planning and self-monitoring skills. During the filming session Christopher was able to exceed his target of 125 words. In the subsequent writing session (No. 6) in class, which was before he had seen his self-modelling video, he wrote only 72 words. Only after he started watching the video was an increase in written output observed.

Following the intervention period Christopher was withdrawn from the primary school for a week to do his SATs exams at the special school. In addition to

delays associated with changing intervention targets and with Christopher being shown the video, this meant that it was not possible to take post-intervention measures to assess maintenance effects. I did, however, see Christopher the week after his SATs and he was keen to tell me that he thought he had done well on his writing paper. He told me that he had written a page and a quarter on A4 paper. In his (A4) schoolbook, Christopher tended to write between 150 and 170 words a page, suggesting that he had written approximately 200 words. The accuracy of this cannot be verified, moreover there is potential for bias in Christopher's self-report. When asked what helped him to do well in his exam, Christopher told me that he had used A-POW, explaining to me who the audience was, and how he had organised and picked his ideas. Again, it is not possible to verify that Christopher had actually done this, but it does clearly show that he had remembered some of the contents of the video.

Before the intervention I used scaling questions to elicit Christopher's attitudes towards writing. Christopher redid this exercise two weeks after completing the VSM intervention. The statements, scales and Christopher's responses are shown in Table 1, over.

Christopher's responses indicate that for each statement his attitude towards writing, and his appraisal of his writing skills had become more positive. When administered for the second time, Christopher could not see his previous responses, made almost two months previously. It is unlikely that he could have recalled his initial ratings and adjusted his responses to account for

these. Christopher's scores for the two behavioural items ("I plan what I write" and "I write a lot") indicated high agreement both before and after intervention. However, his scores for the attitudinal items ("I like writing" and "I am good at writing") were somewhat ambivalent at the pre-intervention stage, but more positive post-intervention: Christopher was more confident about his writing skills and had a more positive attitude towards writing than at the start.

	Scale		Ratings		
Statement	0	10	Pre-intervention	Post-intervention	Difference
I like writing	Not true	Completely true	4	7	+3
I am good at writing	Not true	Completely true	6	9	+3
I plan what I write	Never	Always, very well	8	10	+2
I write a lot	Never	Always	8	9	+3

Table 1: Christopher's pre- and post-intervention ratings for attitudes towards writing.

3.4.4 Post-intervention interviews

When interviewed two weeks after the intervention phase, Christopher told me that he had enjoyed taking part in the study. He liked making his video and said that when he watched it he felt happy and confident. He told me that he felt more confident about writing than he had previously. In particular he said that he thought he was better at making notes into a story, using capital letters and full stops, and writing a lot.

Christopher's teacher reported noticing some changes in his behaviour when he approached writing tasks. She noted changes in his planning behaviour and also that Christopher would engage in target setting discussions with her about how much he would write, and that he was writing at greater length as a result of setting these targets. Christopher was, she said, better at writing independently and less reliant on help.

The teacher was not unequivocally positive, however, suggesting that VSM had made Christopher focus on the quantity of his writing, but without an accompanying focus on improving quality or checking his work. Nevertheless, she reflected that – having tried various approaches to support Christopher's writing (e.g. additional support from a teaching assistant, using prompt sheets, supporting with paragraph-by-paragraph planning, partnered work) with limited success - the response to VSM was encouraging.

> *In that short period of time he did become a more willing writer*.
> (Christopher's teacher).

3.5 Discussion

3.5.1 Key findings

This study sought to investigate the potential of VSM as means to teach new skills to children with social interaction and communication difficulties. Two single case experimental studies were conducted in which VSM was used. In the first of these, Fred viewed a video of himself demonstrating adaptive

anger management skills and there was a marked decrease in problematic behavioural incidents following VSM intervention. In the second study, the quantity of Christopher's written work increased during an intervention period when he repeatedly viewed a video of himself demonstrating planning and self-monitoring skills for writing. Ostensibly then, this study provides strong support for the effectiveness of VSM interventions with children with social interaction and communication difficulties, however in reality a more nuanced interpretation of the findings is merited.

In the case of Fred, there are reasons for exercising caution in offering a positive interpretation of the results. Fred did not enjoy watching his video and chose to stop watching it after four viewings. He reported feeling embarrassed while watching the video. Staff noted that Fred's behaviour changed in the period immediately after watching his video; he became quieter and seemed less happy. VSM thus appeared to be a particularly ill-suited intervention for Fred, given his reluctance to participate. When Fred opted to stop viewing his video, it not only would have been unethical to persuade him to continue, it seemed likely to be fruitless too:

> Putting pressure on the child to watch the video could result in him or her putting up defences and resisting more adamantly…. If he is not interested in the video then it won't be successful. (Buggey, 2009, p. 110)

At the follow-up interview Fred found it difficult to recall the contents of his video, and his teacher reported not having observed him using materials that

had been provided for him to reduce stress and frustration. With the exception of time-out there was little anecdotal evidence of him employing the strategies that he had modelled. Thus there is good reason to support a conclusion that the intervention had failed. However *that* conclusion cannot account for the dramatic change in Fred's behaviour following the intervention. Prior to and during intervention, there was an average of one significant behavioural incident every two days. In the five days after intervention stopped there were three further incidents. In the seven weeks that followed there were only two recorded incidents.

The data from his teacher's incident log suggest that the change in Fred's behaviour was remarkable, and the observations of both the teacher and the LM confirm this. All parties, Fred included, were at a loss to provide alternative explanations for why his behaviour had changed. The inconsistency between Fred's apparent resistance to VSM and the change in his behaviour after the intervention seems paradoxical. But it is only a paradox if one assumes that being positively disposed to an intervention is a necessary condition for its success. However, this assumption is open to question. The cliché of something being a bitter pill to swallow reminds us that successful medical interventions can leave a bad taste, or worse. Similarly, psychological interventions, such as for example flooding, can be unpalatable but effective nonetheless (Foa, et al., 1977).

For Christopher, the evidence in support of the efficacy of VSM is more persuasive. His reaction to the intervention was altogether different. He was

enthusiastic and found watching his video a positive experience. While there was no increase in the amount that he wrote following the video-making session where he was taught the new planning and self-monitoring strategies, there was a marked increase in the number of words that he wrote after he started watching his self-modelling video. This suggests that the skill instruction session on its own was not sufficient to increase his written output, and it was the VSM element that effected behavioural change. The strategies that I demonstrated to Christopher *were* drawn from a programme (SRSD) that has been empirically validated as a method for improving writing skills when delivered through instruction and practice alone, and without a VSM element (Chalk et al., 2005; Eissa, 2009; Lane et al., 2008; Sadler, 2006; Santangelo et al., 2008). But in these studies the instruction period was an order of magnitude longer in duration than the 90 minutes that spent on skill instruction with Christopher.

Christopher clearly remembered the contents of his video, as evidenced by his unprompted comments about the writing strategies that he had used in his SATs exams. There is also evidence – both from Christopher's responses to scaling questions and teacher feedback – that Christopher's attitude towards writing and his perceptions of his competence as a writer improved following VSM. This supports the views of those who have hypothesised a link between self-modelling and self-efficacy (Bandura, 1997; Bellini & Akullian, 2007; Kehle et al., 2002; Law & Ste-Marie, 2005; Winfrey and Weeks, 1993).

3.5.2 Explaining differential responses to VSM intervention

The contrasting reactions of the two participants in this study to watching their self-modelling videos are worthy of some examination. School staff attributed this to individual differences in personality: Christopher was gregarious and enjoyed being the centre of attention, which Fred, who was seen as more withdrawn, did not. Indeed, the LM suggested that VSM would not have been suitable for two other of the potential participants because their individual 'personality characteristics' would have led them to respond badly. Within the literature VSM has been presented as a universal learning mechanism (Dowrick, 1999) with scant consideration of individual differences in applicability. Where individual differences are used to explain why VSM is ineffective for some individuals this has been attributed to cognitive factors, such as attention and concentration skills, that are required for engaging with and processing information from a video (Buggey, 2007; Clark et al., 1993), rather than dispositional factors or individual interest, although occasionally these are implied (e.g. Buggey, 2009).

An alternative explanation for the differing reactions concerns the contents of the two participants' videos. Christopher's video was a very positive portrayal of him. It showed him displaying competence in genuinely novel skills, but also contained optimistic messages, with him declaring to camera "I am a good writer", describing how he beat his target and saying that he would challenge himself further in the future. Fred's video, by contrast, was less positive. While the intention was to portray Fred engaged in adaptive behaviours (i.e. anger reduction behaviours), the nature of these adaptive

behaviours meant that it was difficult meaningfully to demonstrate these without showing less desired behaviour (i.e. role-played anger). A number of authors have identified potential negative effects of viewing oneself engaged in undesired behaviours, including the confirmation of negative self-perceptions, undermining notions of competency, and reducing self-esteem (Dowrick, 1999; Fuller & Manning, 1973; Hosford, 1981). Buggey (2005) suggests a key feature in effectiveness is “the implantation of an image of a future and more competent self” (p. 62). It may well have been the case that when Fred viewed his self-modelling video he was not perceiving a positive future self, but rather a problematic and uncomfortable present one.

Of course these two explanations are not mutually exclusive. It is possible that both the person and the video were ill-suited to an effective VSM intervention. The present study cannot determine whether one or both of these explanations apply. Further research is needed to establish the limitations of VSM, as well as evidencing its potential. This study implies that there is a need to address the question of whether personal characteristics and individual differences contribute to differential responses to VSM intervention.

3.5.3 Limitations

A number of limitations of the present study need to be acknowledged. Firstly, the small sample size in the present study means that generalisation of its findings it difficult. VSM is necessarily an individualised approach, and while a more or less standardised general paradigm can be adopted, differences in intervention focus, implementation and the influence of extraneous factors

render it difficult to generate generalisable findings or exactly replicable protocols. The majority of research into VSM has utilised single-case experimental designs. Very few studies (e.g. Schwan & Holzworth , 2003) have used large sample sizes and experimental designs with comparison groups that allow for more robust conclusions to be drawn. Also, in this study only two of five children who were identified as potential participants received a VSM intervention. These two children were selected on the basis that they were the most suitable, in terms of their individual characteristics and the target behaviours identified; thus there is the potential for an in-built positive bias.

There were limitations with the measures used in this study. While the aim was to see if skills could be taught using VSM, the outcome measures for both participants were not actually direct measures of the target behaviour. Fred was taught anger-management skills, but the outcome measure was the number of behavioural incidents, while Chris was taught planning and self-monitoring skills for writing and the outcome measure was the number of words written. These proxy measures were chosen for two reasons. Firstly they comprised data that were relatively easy to collect insofar as extensive observations were not required, as they would have been to measure skill demonstration directly. Written output was something where an objective record was created by Christopher. For Fred, the definition of behavioural incidents in terms of incidents requiring staff intervention, meant that the teacher was recording something that was, by definition, unmissable.

Secondly, these measures had high social validity. In both cases the rationale for teaching particular skills was not that the absence of these skills had been identified, but rather that the *negative consequences* (i.e. limited written output, problematic behavioural incidents) of the hypothesised absence of these skills was a cause for concern to staff. Thus the study focused on contextually-relevant behaviours, rather than specific skill acquisition. Nevertheless this does make the interpretation of the findings more difficult, as there were no systematically collected data to show whether or not a change in outcome behaviour was the result of the child exhibiting the skills that they had been taught. To mitigate this difficulty, post-intervention interviews with participants and school staff were used to identify convergent data and thus improve the reliability and validity of findings. For Christopher there was clear convergent evidence from his and his teacher's reports that he had indeed learnt and displayed some of the writing skills that were in his self-modelling video. For Fred such unambiguous data were not forthcoming. While there was a marked reduction in the number of behavioural incidents, there is limited evidence linking this to the skills modelled in his video, save for the fact that there is no convincing alternative explanation for the change. Such a conclusion is somewhat unsatisfactory.

While of the two cases, Christopher's appears to offer the more convincing support for the effectiveness of VSM, with feedback evidencing the use of particular writing strategies as well as evidence of changes in attitude and self-efficacy, it should be noted that there was no post-intervention measure of effect maintenance. It is possible that, having stopped watching the video,

his written output will diminish again. Also generalisation was not measured to ascertain if there were changes in his writing on tasks other than independent story-writing. For Fred, the behaviour being measured was more general anyway, applying to incidents in all activities throughout the school day. Data were not, however, collected to see if changes had generalised to non-school settings.

This study was conducted by myself, as researcher, working in collaboration with, but at a distance from, the school staff. Consequently, there are a number of potential threats to the reliability and validity of findings. Staff had agreed to show participants their self-modelling videos a set number of times and at regular intervals, but in neither case was this done. They had been instructed to show the videos without additional support or interaction, except for attentional prompts as required, but it is not possible to verify that these instructions were followed accurately. School staff , having watched the videos with pupils, were aware of the content, leaving the potential for them to offer prompts or otherwise to refer to the videos in-between viewing sessions. There is thus a potential threat to validity if observed effects were due to staff instruction and reminders rather than the video intervention itself.

Regarding the outcome measures, while the number of words written by Christopher was an apparently objective measure, the written tasks, preparation for these and time allocated to them were all determined by the class teacher, and thus not standardised or controlled. For Fred, the reliability of the outcome measure relied on the accuracy of the teacher's record-

keeping and on her interactions with him. It is possible that she became better at identifying triggers for Fred's behaviour or at intervening early to prevent small frustrations from escalating, thus reducing the number of recorded incidents.

While there is the potential for such "staff factors" to have a confounding influence on the results, two points are worth making. Firstly, information from staff interviews does not provide support for confounding influences. Fred's teacher did not feel the improvement in his behaviour could be attributed to changes that she had made. Christopher's teacher did attribute the improvement in his writing to his use of the modelled strategies rather than any in-class factors, such as increased support or easier tasks. Secondly, the present study was a scoping exercise, aiming to see if and how VSM could be implemented effectively within a real-life setting in a manner consistent with the usual working practices of an EP. There was thus a preference for ecological validity over strict experimental control. While an experimental approach was used for intervention evaluation, this study does not aim or claim to establish proof of whether VSM works or not.

3.5.4 Concluding remarks

The findings of the present study provide tentative support for the addition of VSM to the repertoire of EP interventions. Outcome measures suggested that there had been positive changes in both participants' behaviour following intervention, although the foregoing discussion emphasises that the findings should not be interpreted without qualification.

Staff involved in implementing the intervention reported positive views about VSM, suggesting that it could provide a ‘useful intervention’ for other children. Provision of a visual stimulus was judged useful for children with communication difficulties, and the LM suggested that younger children might be particularly suitable candidates for future interventions, as they were likely to engage positively with the process and tended to learn through visual means.

Certain challenges in implementing VSM effectively were highlighted. Identifying appropriate target skills is crucial, but for some of the potential participants school staff found it difficult to identify skills that were both beneficial and “video-able”. For Fred, the skills that he modelled were based on a strategy that was “donated” by an advisory teacher and not determined by myself. The effectiveness of this strategy is open to question, whether or not VSM had been used to teach it. For Christopher, however, skills were derived from an empirically-validated approach, SRSD, potentially increasing the likelihood of achieving positive outcomes.

The role of school staff within this study is interesting. While staff were positively disposed towards VSM after the interventions, initially they appeared more circumspect: videos were not shown as and when agreed; staff were reluctant to record behaviour and share records; and they did not readily identify target behaviours or help facilitate filming sessions. One of the

teachers reported that was difficult to find time to show the self-modelling video, even though this took less than ten minutes.

A potential challenge for EPs wishing to employ VSM is to convince school staff of its potential value and the importance of implementing and monitoring interventions in an agreed manner. Discussing interventions in school settings, Buggey (2007) suggests that school staff can be more willing to spend four hours directly implementing an ineffective intervention, than they are to spend one hour on the editing process. In this study staff were not involved in editing, but it may nevertheless be that the relatively passive role played by staff means an intervention is judged less worthwhile than one requiring active participation in a more time-consuming alternative. Buggey's (2009) book about VSM is titled "Seeing is believing"; perhaps this applies for children receiving VSM interventions and the adults implementing them alike.

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APPENDIX 1: EC2 form requesting ethical approval for research (Part A)

Part A: to be completed by the STUDENT

NAME: Robert Hart

COURSE OF STUDY: App Ed & Child Psych D

POSTAL ADDRESS FOR REPLY: [redacted]

CONTACT TELEPHONE NUMBER: [redacted]

EMAIL ADDRESS: [redacted]

DATE: 25 September 2009

NAME OF SUPERVISOR: Sue Morris

PROPOSED PROJECT TITLE: Using Video Self-Modelling to teach new skills to children attending a speech and language resource base.

BRIEF OUTLINE OF PROJECT: (100-250 words; this may be attached separately)

Video Self-Modelling (VSM) is a behavioural intervention in which an observer views a video of themselves engaged in adaptive behaviour. The aim of the intervention is for the participant to learn the adaptive behaviour and to reproduce it more frequently, fluently, or appropriately. A typical VSM intervention involves producing a short video (approximately 3 minutes) of an individual engaged only in adaptive target behaviour. They would view this video two to three times per week over a period of four to six weeks, with the aim that the video provides a stimulus and iconic representation to promote positive behaviour change.

The proposed project would use VSM to support children attending a resource base for children with speech, language and communication needs (SLCN) within a primary school. In order to do this I would work with the school's Speech and Language Therapist to identify target social or communication behaviours, such as producing specific speech sounds, making or responding

to requests, or putting up one's hand in class. We would then produce a video of the child engaging in the target behaviour. This would be achieved through a role play exercise with the Speech and Language Therapist, or through them modelling and supporting the child to produce the appropriate behaviour. I would edit the video to create a short (2-3 minute) clip, showing only the target behaviour, with all evidence of support removed. Each child in the project would then be shown their video three times per week by a member of school staff over a period of four weeks.

In order to evaluate the effectiveness of the intervention I would take baseline, intervention and maintenance measures of the target behaviour. This would involve observing the child during normal classroom activities and recording the number of times that the target behaviour occurs. It may be possible to do this by videoing the class, depending on the agreement of the school staff, children and their parents, or I may conduct the observations by being present in class. A further aspect of the project evaluation would involve using either questionnaires or interviews to elicit the views of the participants and stakeholders in the project: the children, school staff, Speech and Language Therapist, parents or carers. The aim of this exercise would be to assess the validity of any observed changes in behaviour, and to gain views about the perceived utility and practicality of the intervention.

MAIN ETHICAL CONSIDERATION(S) OF THE PROJECT (e.g. working with vulnerable adults; children with disabilities; photographs of participants; material that could give offence etc):

Working with children – participants would be children aged seven to eleven years, attending a speech and language resource base. As such all participants would have a Statement of Special Educational Needs, and would be identified as having SLCN.
Videos of participants would be made as part of the project intervention. Videos of individuals, not participating in the project (e.g. other children in the class) may be made as part of the project evaluation.

RESEARCH FUNDING AGENCY (if any): None

DURATION OF PROPOSED PROJECT (please provide dates as month/year): October 2009 to February 2010

DATE YOU WISH TO START DATA COLLECTION: 12 October

Please provide details on the following aspects of the research:

1. What are your intended methods of recruitment, data collection and analysis? [see note 1]

Please outline (in 100-250 words) the intended methods for your project and give what detail you can. However, it is not expected that you will be able to answer fully these questions at the proposal stage.

Recruitment: Twelve pupils attend the resource base in which the project s intended to run. All pupils and their parents/ carers will be offered the opportunity to participate in the project. I would like there to be four participants who are the main focus of the project, for whom there would be a video made as well as baseline, intervention and maintenance measures. If more there are more than four children who wish to participate and whose parents/ carers give consent, I intend to select four children to be the main focus, in consultation with the Speech and Language Therapist, based upon which are perceived to offer the most promising prospect of a measurable, successful intervention. The remainder of the children who volunteer would receive the intervention. I would make a video for each, as described above, and it would be shown with the same regularity over the same period. They and their parents would also be involved in the stakeholder evaluation.

Data collection and analysis: The main type of data collection would be non-participant observation. Measures of target behaviour rates before, during and post-intervention would be taken by observing participants during lessons over a period of a day or a half day (depending on the frequency of the behaviour) each time. I may do this by conducting observations in person, or it could be done by videoing the class. If it is a video observation, all those being videoed would be made aware that they were being videoed, and this would only happen if consent were given by school staff, children and parents.

In addition to observational data, the study will seek to elicit views of stakeholders about the effectiveness and viability of the intervention. This is likely to be done through semi-structured interview methods for participants and staff involved in the project, and through questionnaires for parents.

2. How will you make sure that all participants understand the process in which they are to be engaged and that they provide their voluntary and informed consent? If the study involves working with children or other vulnerable groups, how have you considered their rights and protection? [see note 2]

In order to ensure that participants understand the process and provide voluntary and informed consent they will be given an information booklet (attached). I, or another adult involved in the project, will read this booklet with

them and make sure that they understand it. They will be given opportunities to ask any questions throughout, and a named member of school staff will be identified, to whom they can address any concerns when I am not there. This will apply to parents/ carers alike.

Parents/ carers will be given a letter outlining the project process and purposes, and which requests their consent (attached).

A separate consent form (attached) will be used to request permission to use video clips in presentations after the project. Parents/ carers will be able to watch the video for their child before this request is made, and at any time during the project if they wish to.

3. How will you make sure that participants clearly understand their right to withdraw from the study?

Participants will be made aware of their right to withdraw through the information booklet (attached). I will remind each participant of this right, both before and after filming for their video. There will be a named member of school staff whom they can alert if they wish to withdraw at any time. If a participant expresses a wish to withdraw this will happen without any further questioning. This will apply to participants and parents/ carers alike.

4. Please describe how you will ensure the confidentiality and anonymity of participants. Where this is not guaranteed, please justify your approach. [see note 3]

To ensure the anonymity and confidentiality of participants, each participant's name will be changed in the written report of the project and any subsequent presentation of the project. Videos will be stored secured (see Q.6 below). Explicit and separate consent will be sought and obtained (see attached form) before any of the videos are shown, for example in presentations to other Educational Psychologists.

5. Describe any possible detrimental effects of the study and your strategies for dealing with them. [see note 4]

It is possible that the intervention might lead to a certain level of self-consciousness of the behalf of participants as a result of being filmed, and that this could be experienced as being uncomfortable for them. If this does occur, or if I perceive it to be occurring I will proceed as follows:
The child will be reassured that their video is just for them and they can watch it alone if they choose. I will ensure that this happens.
I will offer the child the opportunity to take some time (as much as they like) to think about whether they are happy to be videoed or to watch their video.
I will remind the child that their participation is voluntary, and tell them that they do not have to take part, reminding them also that there would be no negative consequences of their withdrawal.

Involvement in the project could also lead to heightened awareness of areas of skill deficit on the behalf of the child and/ or his or her parent(s)/ carer(s). It is worth noting that the intended participants would all be children with Statements of Special Educational Needs, and the intervention would be carried out within the context of a pre-existing withdrawal group, run by the Speech and Language Therapist, for children with communication or social difficulties. As such, participants would not be being “singled out” or identified as having difficulties in any way that was different to that which would occur within their regular schooling. For both children and their parents/ carers, I would seek to reassure them that the intervention was simply a way of trying out something to help them learn better, and a way of trying to meet their usual targets albeit in a novel way; it was not being given because I (or anyone) felt that they had any extra difficulties or needs.

6. How will you ensure the safe and appropriate storage and handling of data?

During the project it will be necessary to record video footage and to store it on my work computer. Copies of videos will also need to be stored on specific computers I the school to enable participants to view them. At the end of the project all video footage will be removed from computer hard drives and stored on compact discs. These discs will be stored securely at [redacted] Educational Psychology Service and University of Birmingham in order to meet requirements of the Data Protection Act [I am consulting on what this entails].

If any participants and their parents give consent for me to retain a copy of an individual participant’s video I will do so, so that I may use these for presentations about the project to professional colleagues. I will not, however, make copies or in other ways share these videos.

7. If during the course of the research you are made aware of harmful or illegal behaviour, how do you intend to handle disclosure or nondisclosure of such information? [see note 5]

I would follow [redacted] Educational Psychology safeguarding procedures. If made aware of behaviour that suggested that a child was at risk of harm I would informed the named person responsible for child protection within the Educational Psychology Service and/or the school.

8. If the research design demands some degree of subterfuge or undisclosed research activity, how have you justified this and how and when will this be discussed with participants?

There is no degree of subterfuge or similar involved. Children's videos will be edited to show only positive or adaptive behaviours, but participants will be told that this is happening/ has happened. Peter Dowrick, one of the pioneers of Video Self-Modelling is very clear that subterfuge is neither warranted nor desirable:

In clinical applications (e.g., rehabilitation) and with students in video training courses, I consistently stress the value, not the disadvantage, of client participation. The procedure is best presented as a straightforward depiction of potential future behaviour, not a bogus past. If the emphasis is on positive self-review, then the message is, "Here are good examples of what you should do more often." … [or] the message is "Here is your goal; this is what you will look like when you've mastered this difficult situation." (Dowrick, 1991: p. 117)[*]

9. How do you intend to disseminate your research findings to participants?

I will present my findings to participants at the school by producing a child-friendly booklet about the study. I will present and discuss this in person at the school to the group of participants.

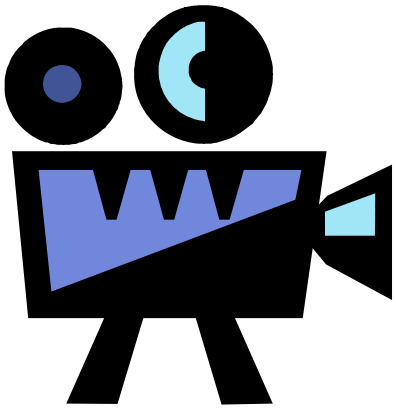
I will write a public domain briefing about the report and share this with parents/ carers.

I will share copies of any publications resulting from this research (such as the public domain briefing and any articles submitted for publication in academic journals) with participants and their parents/ carers.

[*] Dowrick, P.W. (1991) **Practical guide to using video in the behavioral sciences.** New York: Wiley.

APPENDIX 2: Participant information booklet

Video Project



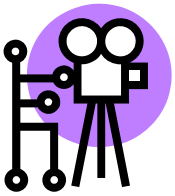
Information booklet

Video Project

Hello, my name's Rob Hart. You might have seen me around school before. I am working with your school on a project. You might like to be involved…

Your invitation

- You are invited to take part in a project that I am carrying out at [redacted].
- The project is about using videos to help you to learn.
- I will make a video of you. The video will show you doing something that you might find difficult or something that can help you learn.
- You will be able to watch the video a few times each week.
- We will see if this helps you to learn better.
- It is up to you if you want to take part. Before you decide you should read this booklet and talk about it with an adult that you know and trust.



Why?

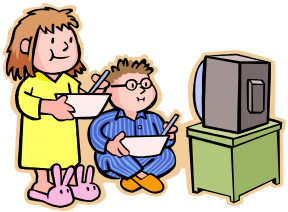
- I work for [redacted] Educational Psychology Service as well as studying at Birmingham University.
- This project is part of what I am studying at University.
- Your school have agreed to take part in my project because they think that it could help you to learn better.

What if I agree?

- You will have to fill in the consent form and your parent or carer will have to sign that too.
- Please give the consent form to me, Mrs [redacted] or Mrs [redacted] when you have completed it.

What happens next?

- I will come and visit you at school. You will see Mrs [redacted] and me, and we will work together to make a video of you that will help you to learn better.
- When we meet you can ask me any questions that you want to.
- When your video is made you will watch it a few times each week for about a month.
- I may also come into your lessons or video your lessons so that I can see how you are getting on.
- At the end of the project I will come and see you to have a chat. You can tell me if you liked it or not.



What if you decide you don't want to do it?

- You can decide not to take part at any time.
- If you don't want to take part you don't have to give a reason.
- You will not have to do anything that you don't want to do.

What happens after the project?

- I will be writing down notes about your learning in the project and about what you say to me.
- I will then write a long report about how the project worked.
- Nothing that I write will have your name on it.
- I may want to publish something about the project in the future. If I do this I will tell you first. You will get to see what I publish.
- I may want to show your video to people that I work with. I will ask you first if I can do this. No-one will mind if you don't want anyone to see your video.
- You can talk to me or Mrs [redacted] if there is anything that bothers you at anytime.

Want to know more?

If you want to know more you can talk to Mrs [redacted] at school, or you can talk to me when you next see me.

Thank you very much for reading this information.

APPENDIX 3: Participant consent form

Video Project Consent Form

Young person's consent

I _____ (full name) have read the information booklet and I would like to take part in the [redacted] Video Project.

Have you talked about the project with your parent / carer? Yes / No

Are they happy for you to take part in the project? Yes / No

Do you have any questions about the project? Yes / No

Has Rob answered these questions? Yes / No

Are you still happy to take part in the project? Yes / No

Signed: _____

Age: _____ Date: _____

APPENDIX 4: Parent information letter and consent form

To the parent(s)/ carer(s) of _____

[redacted] Video Project

My name is Rob Hart and I work for [redacted] Educational Psychology Service. I am currently working with [redacted] Primary School. I am also studying for a Doctorate in Educational Psychology at Birmingham University. As part of my studies I am hoping to run a project at [redacted] Primary School. I would like it if _____ could take part in this project. This letter is to tell you a little more about the project, and to ask for your consent for _____ to take part.

What is the project about?
The project is about seeing how video can be used to help children to learn. It is based on the idea that if someone sees themselves in a video they are likely to pay attention and learn from that video.

What does it involve?
Children who take part will each have a short video made of them. The video will show them doing things or performing skills that they find difficult. They may need some help to do this, but the video will be edited so that they just see themselves being successful. The child will then be shown the video three times a week for about a month. During this period I will observe your child in some of his/her lessons to see how they are progressing. They will receive all of the usual lessons and support that they usually receive.

Does my child have to take part?
No. Taking part is entirely voluntary. There are no consequences if your child does not take part – it is up to you and _____.

What happens if I agree to my child taking part?
If you are willing for _____ to take part I will arrange to come into school to work with him and with [redacted] (Speech and Language Therapist) to make a personal video. Before we start I will discuss the project with _____ and check that he is happy to take part. Staff at the school will show _____ the video during the week. At the end of the project I will send you a questionnaire asking for your views about the project. I will also speak to T_____ to find out what he felt about it.

What if I have any concerns?
If you have any concerns at any point during the project, you can talk to me on [redacted]. If you wish to withdraw your child from the project you can do this at any time. You will not have to give a reason to withdraw your child, and it will not affect their education or support at [redacted] in any way.

P.T.O.

What happens after the project?
When I have completed the project I will be writing up the results for my studies. Your child will not be named in anything that I write. Videos made during the project will be stored securely at [redacted] Educational Psychology Service and Birmingham University in accordance with the Data Protection Act. No-one will be able to watch the films or use them without your and Tristan's permission. If you wish to see Tristan's video you can.

Some parts of my research may be published in the future. If I do this I will let you know beforehand, and your will receive copies of any publications. Tristan will not be named or identified in any publications.

If you would like to know more about this project, please feel free to contact me on [redacted] or at [redacted]. If you are happy for _____ to participate in the project, I would be grateful if you could complete the form below and return it to school to give to Mrs [redacted] or Mrs [redacted].

Yours sincerely,

Robert Hart
Trainee Educational Psychologist
[redacted]

Consent form

I have read and understood the information about the [redacted] Video Project.

I would be happy for _____ to take part in the project.

I agree to completing a questionnaire about the project if asked to.

I am aware that I may withdraw my child from the project at any time.

Details of first consenting adult:

Name: _____

Relationship to child: _____

Signature: _____ Date: _____

Details of second consenting adult (if applicable):

Name: _____

Relationship to child: _____

Signature: _____ Date: _____

Please return to [redacted] Primary School to Mrs [redacted] or Mrs [redacted] by 2 November 2009.

APPENDIX 5: Stakeholder interview schedule

Participant interview questions

What did you think about making the video? (Prompts: enjoyment, interest)
What do you remember about your video? (Prompts: behaviour shown)
Did you like watching the video? Why?
Did you feel that watching the video helped you? Why?
Do you do any of the things that are in your video?
Have things changed since watching the video? How? Why?
Would you wish to make a similar video in the future to help to learn new skills?

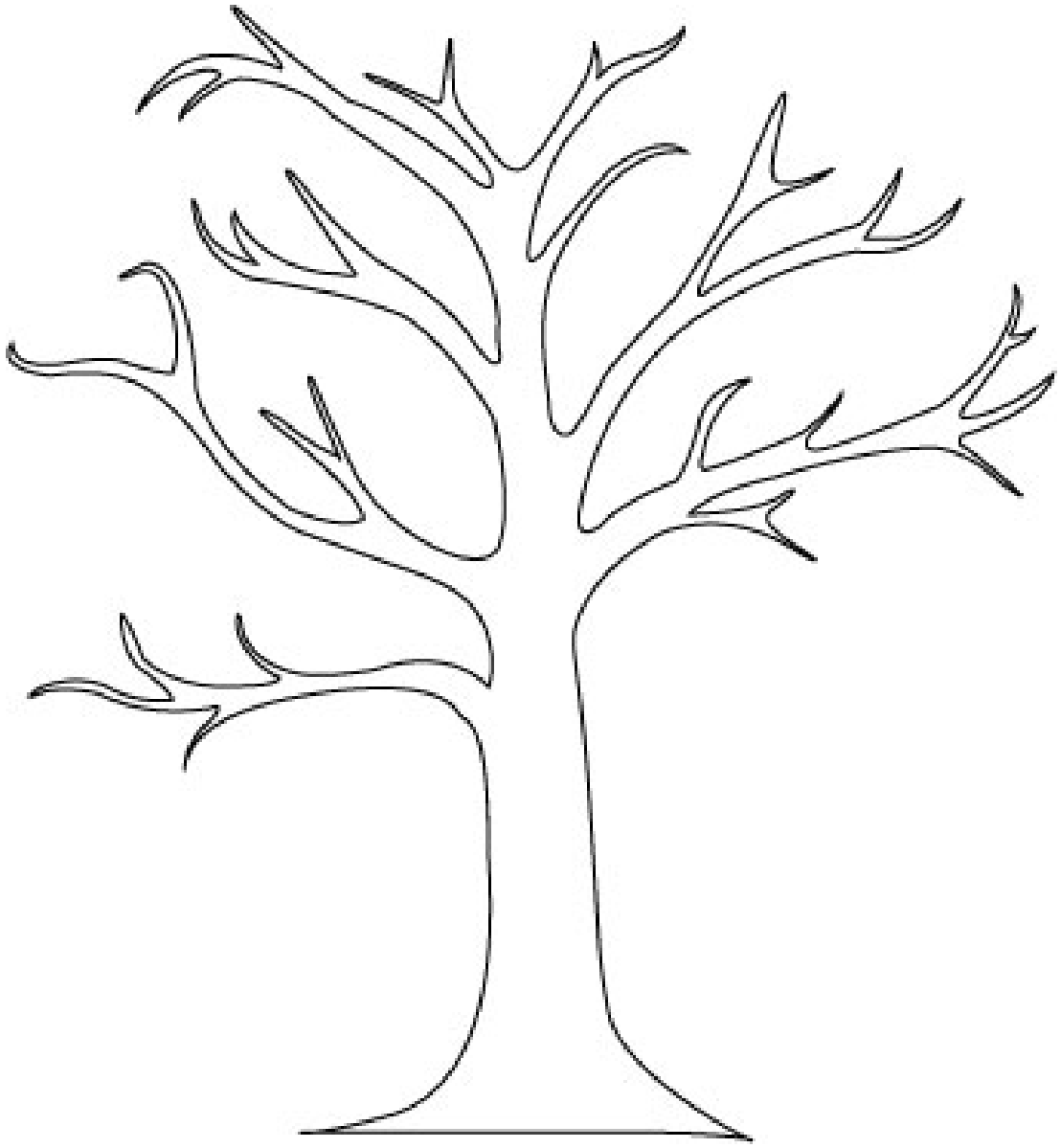
Staff interview questions

How did [child] react when watching their video?
Have you noticed any changes in [child] since they watched the video?
Do you think that the video made any difference to [child's] behaviour? Do you think it achieved what was intended? Why?
What had been tried previously to support [child] in developing their [behaviour] skills?
What was good/ what went well with the intervention?
Was there anything that didn't go so well/ was difficult?
Do you think that these kinds of videos could be used in future to help children to develop particular skills? How? For whom?

APPENDIX 6: Writing strategy sheet - planning

TREE Writing Plan

Topic sentence
Reasons
Explain each reason
Ending



APPENDIX 7: Writing strategy sheet – self-monitoring

How well am I writing?

I need to write with **A POW**!:

Audience in mind
Pick my ideas
Organise my notes
Write and say more!

200									
190									
180									
170									
160									
150									
140									
130									
120									
110									
100									
90									
80									
70									
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20									
10									
	Date	Date	Date	Date	Date	Date	Date	Date	Date
	Total words	Total words	Total words	Total words	Total words	Total words	Total words	Total words	Total words
Audience									
Picked ideas									
Organised plan									
Written more									

APPENDIX 8: Public domain briefing – presentation slides

4 Conclusions and implications for future research and professional practice

In the foregoing chapters of this volume I have discussed research into VSM in a range of applied settings as well as reporting research using VSM to teach new skills to children with social interaction and communication difficulties. This concluding chapter seeks to consider implications of this research with respect to the role of the EP, before identifying ways in which this volume affords an original contribution to research and theory development.

4.1 Role of the EP – consultation and scientist practitioner

As mentioned above, pragmatism is viewed as being a very practical philosophy for applied researchers, and it is to this dimension of the present research that I now turn my attention. The research was conducted within my role as a Trainee EP. My role as a Trainee, and the status of this research as a component of a postgraduate thesis, have meant that I was both able and required to make a greater time investment in these cases than might be typical within the quotidian EP role. Nevertheless, as explained in Chapter 1, the research study was positioned as a study of effectiveness rather than efficacy, and sought to consider the potential of VSM as a tool for EPs to use in an ecologically valid way.

Since the ‘reconstruction movement’ of the 1970s and 1980s (Gillham, 1978) EPs have sought to move away from direct, individual casework to systemic

working and working through consultation (Boyle & Lauchlan, 2009; Larney, 2003; Wagner, 2000). Evidence suggests that school-based consultation is an approach that is valued by consultees, such as school staff, although there is a lack of sound evidence to attest to its reported benefits (Larney, 2003). Typically a consultative model of service delivery involves working with and through other professionals, so that the EP's contribution to outcomes for children may be indirect and hard to determine (Norwich, 2005).

Given concerns about the potential for EPs to make or demonstrate contributions to improved outcomes, some authors have argued for a greater emphasis on individually-focused work within the role of the EP (Boyle & Lauchlan, 2009; MacKay, 2008). In certain respects VSM offers the potential to reconcile benefits of a consultative approach with the attractions of individually-focused interventions. The distinctive contribution of EPs is conceived of as involving the application of psychology to solve problems in collaboration with other professionals (Cameron, 2006; Norwich, 2005). VSM is grounded in psychological theory and research, and in producing self-modelling videos and setting up intervention, EPs can make a distinctive contribution that is both identifiable and overtly psychologically-based. But a VSM intervention, as described here, can involve school staff in formulating needs, implementation and monitoring of intervention. The potential to involve staff not only makes VSM more amenable to service delivery structures and constraints, but it also means that staff can support the development of particular skills and reinforce them within the relevant context in a manner that complements the individually-focused intervention.

The aim of the present study concerned using VSM to teach new skills, and as a consequence, there was no thoroughgoing problem formulation to inform the choice of methods or skills. Indeed, in the case of Fred, the skills identified were drawn from an intervention that was determined by an advisory teacher, the choice of which is open to question (as I acknowledge in §3.5.4). If EPs employ VSM within their work it is important that they acknowledge the risks of interventions arising from insensitive assessments or poor functional analysis. The decision whether or not to use VSM, and the choice of target behaviours, should be informed by a more complete formulation of problem dimensions, and would for part of an intervention strategy emphasising the role of ecological factors as well as individual behaviour. Moreover, an indirect approach to service delivery raises the threat of the dilution of implementation fidelity, as occurred here. Thus, it is also important that EPs are able to mediate a working relationship within which all aspects of assessment, intervention and evaluation can be done appropriately and competently.

It has been suggested that EPs should be adopt the role of scientist-practitioners (Lindsay, 1998). Such a role emphasises the importance of applied practice that is both informed by and responsive to evidence, where interventions are evaluated as hypotheses to be tested (Shapiro, 2002). According to the scientist-practitioner model, practitioners should be applied researchers who employ evidence-based procedures (Kratochwill & Shernoff, 2004). Shapiro (2002) identifies certain core tenets of the scientist-practitioner model of applied psychology:

:

- delivering psychological assessment and intervention in accordance with scientifically-based protocols;
- assessing and integrating scientific findings to inform decisions about intervention; and
- framing and testing hypotheses to inform these decisions.

Kratochwill and Shernoff (2004) suggests that one way in which applied psychologists can be scientist-practitioners is in the use of single-participant designs to evaluate real-world interventions, as was the case in this research. In Chapter 1, I made reference to Salkovskis' (1995) “hourglass model” for how different research approaches contribute to the development of an evidence base for applied practice. As Frederickson (2002) emphasises, there is a need for complementary research at each stage of the model: development of new theory and practices; assessing efficacy using rigorous methodologies with high internal validity; and assessing effectiveness, generalisability and application in different settings. In the present study I have endeavoured to work as a Trainee EP adopting the scientist practitioner role, by identifying, developing and implementing evidence-based practices and evaluating these experimentally, within a mixed-methods approach. Scientist-practitioner EPs have much to contribute to the development of evidence-based practices, predominantly at the bottom (generalisation and application) part of the hourglass, but also at the top (innovation) level. Certainly there is a need for more methodologically rigorous and internally

valid approaches at the theory-testing and efficacy-assessment stage, but the limitations of these underscores rather than undermines the utility of more applied, ecologically valid research, as presented here.

4.2 Contribution to knowledge and theory development

The small sample size of this study and the use of single-case designs raise questions about the generalisation of its findings (Cohen et al., 2007; Robson, 2002). Bassey (1999) suggests that rather than looking (in vain) to produce scientific or statistical generalisations, educational research including individual case studies, can lead to so-called “fuzzy” generalisations. A fuzzy generalisation “is a qualified generalisation, carrying the idea of possibility but no certainty” (p. 46). Thus, while the present study did not set out to assess the efficacy of VSM for a particular skill or target population, and so cannot make claims about that, it can suggest that VSM *may be* an effective method for teaching skills to children with social interaction and communication difficulties, with certain qualifications. Introducing an element of uncertainty into a generalisation is not an admission of frailty in how research was conducted; rather it is a “firm reminder that there are many variables which determine whether learning takes place” (Bassey, 1999, p. 51). Indeed, as Salkovskis (1995) identifies, it is the purpose of applied practitioner research to help to identify possible potentiating and limiting factors in the application of evidence-based practices. Similarly, pragmatists emphasise that research is not a search for truth, but rather should be viewed as a means for identifying opportunities and constraints (Cherryholmes, 1992).

Thus, in terms of the original contributions to knowledge and theory development afforded by the present study, it is important to attend to the identification of possible constraints as well as positive findings.

There are no published reports of UK EPs using VSM within their work, and so the present study extends research into the application of VSM to a new applied context. As discussed in §3.5.4, the research study highlighted challenges associated with the implementation of VSM interventions in collaboration with school staff. Such challenges pose questions about how VSM interventions can be effectively implemented by EPs working through a consultation approach to service delivery. The foregoing discussion (§4.3) emphasises the potential role of EPs as scientist-practitioners in further developing our understanding of the factors that contribute to effective real-world interventions.

The literature review in Chapter 2 seeks to update the field by reviewing research using VSM across a range of applied domains. It also addresses questions in relation to various hypothesised psychological processes implicated in VSM that have hitherto not been considered in systematic reviews. In relation to these processes, the case of Christopher provides additional support for the role of self-efficacy in effective VSM interventions, as evidenced by the improvement in his self-reported efficacy beliefs about writing. Also with respect to the case of Christopher, there is only one previous published report of the use of VSM to improve writing in children with autism spectrum disorders (Delano, 2007). The present study provides further

evidence that VSM may be an effective approach in this domain. The case of Fred, while providing less convincing support for the effectiveness of VSM, does suggest that there may be individual differences relating to the suitability of VSM for different people (as discussed in §3.5.2), which is something that has received little attention in the research literature and merits further research.

This volume cannot make a broad and simplistic conclusion that VSM works, or that it works for children with social interaction and communication difficulties. It did not seek to. It can, however, suggest that VSM has much to commend it as a form of evidence-based practice, and it might be a useful addition to the existing repertoire of EP interventions. As scientist-practitioners EPs can further develop our knowledge of when and how VSM can be implemented effectively. I have argued that philosophical pragmatism and mixed-methods approaches provide a suitable framework for this undertaking.

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