Article

Closing in on the Picture: Analyzing Interactions in Video Recordings

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Abstract
In this paper the author provides a detailed account of the processing and analyzing of data obtained through video recording during reflective practitioner research. She sets out five stages in the analysis of video recordings of classroom interactions during a series of educational drama lessons, from decisions relating to the selection of data for close analysis to the seeking of themes and finally to the presentation of conclusions. The researcher adapted and synthesized several processes derived from discourse analysis to produce a range of instruments for use in transcription and analysis of verbal and nonverbal discourse. These include a simple transcription key, classifications for verbal and nonverbal discourse, and a template for a transcription and analysis matrix.

Keywords: video recording, transcription, discourse analysis, interaction, reflective practitioner, drama, role-play, simulations

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Introduction

The purpose of this paper is to provide the reader with a detailed account of the processing and analyzing of data pertaining to group interaction, obtained through video recording. Although, initially, using a video recorder might seem like a straightforward method of gathering data about aspects of communication, it requires systematic organization and analysis, and is by no means an easy option. However, it can provide rich, intimate data about the complex nature of human interaction. When I began to work on the analysis of the numerous actions and interactions caught in the video recordings, I found useful advice from a number of sources (Gee, 2005; Silverman, 2000; Spiers, 2004) but no one text that would give me an overview of the steps I needed to take nor the analytical tools I would have to employ. The information in this paper might be useful to researchers (for example, educators, professionals examining aspects of human discourse, and, in particular, anyone researching using role-play or simulations as part of a learning process) looking at interactions between large or smaller groups of people (here, interactions between the teacher and the whole class and interactions within small groups of pupils working independently). The use of video recording was particularly effective for me as I was both the participant in the interactions and the researcher. The camera gave me a way to look at phenomena that was not possible while I was in the middle of the interactions. Before the description of the processes of analysis of the video recordings, however, it might be useful to summarize the scope and context of this research, conducted with three classes of children aged 10 to 12 from three different primary schools.

The context of the research

For many years I have worked as a teacher and academic in the area of educational drama: using drama as a learning medium across that curriculum. I also teach and research in the field of environmental and sustainable development education. UNESCO (2005) has designated 2005 to 2014 as the Decade of Education for Sustainable Development (ESD) and has described the key qualities and features of ESD. These include that education for sustainable development should involve interdisciplinary and holistic approaches; examination of values; critical thinking and problem solving; multimethod creativity in word, art, drama, debate and experience; collaboration; and participatory decision-making. It was my hypothesis that educational drama might be able to help in the exploration of specific issues and in the development of the communication, collaboration, and decision-making skills necessary for learning in ESD. It might also help to increase pupils' appreciation of and sensitivity to others and to local and global environmental issues.

It is important to note at this point that full ethical approval for all stages of the research, that is, the data collection, analysis and dissemination (including photographs), was obtained (from the university ethical approval committee, from the schools, from parents and from the pupils involved) before any of the work was undertaken including video recordings made of the lessons with the children. The teaching method selected for use in the drama lessons was that recommended by the Scottish curriculum guidelines (Scottish Office Education Department [SOED, 1993]; Scottish Executive, 2006).

Methodology: background to the project

To test my hypothesis, I designed and carried out a piece of qualitative research. I devised two sets of drama lessons whose themes were based on Education for Sustainable Development

issues: a local issue and a global issue. These lessons were implemented with three different classes of children (Classes A, B, and C) over the course of a school year. I worked with Classes A and B, and then the lessons were replicated by another teacher in Class C.

The method used in this research was case study. I employed a multicase approach as the processes (i.e., the drama-ESD process) and the episodes (i.e., the set of lessons) were repeated on a number of occasions with different participants or contexts (Miles & Huberman, 1994; Stake, 2000). In this study there were five subcases:

- Case 1: Lesson Set 1 undertaken by me with Class A in School 1
- Case 2: Lesson Set 1 undertaken by me with Class B in School 2
- Case 3: Lesson Set 2 undertaken by me with Class A in School 1
- Case 4: Lesson Set 2 undertaken by me with Class B in School 2
- Case 5: Lesson Sets 1and 2 undertaken by Mrs. B with Class C in School 3

This approach had a rolling quality, with the ongoing observation and analysis process (particularly the analysis of the lesson-observers' comments, the pupils' evaluations, and my own reflective field notes), enabling me to obtain feedback that informed the next phase of the research. Thus, an accumulation of knowledge about the effects of the drama might be achieved. This method is described by Stake (2000) as collective case study. Winston (2006) identified that a key tension in the case study approach is that it could be argued that the findings of the study might be unique to that particular set of circumstances and so might render dubious any subsequent generalizations. This is countered by Stake (1995): "Naturalistic generalizations are conclusions arrived at through personal engagement in life's affairs or by vicarious experiences so well constructed that the [reader] feels as if it happened to them" (p. 85).

In this research, the gathering of a range of perspectives from participants and observers, in my two subject schools, and the replication of the drama-SDE lessons and subsequent independent data collection by a teacher in a third school (Case 5) were designed to provide data source triangulation (Stake, 1995) and thus render the analysis and any subsequent hypotheses more robust.

Five methods of data gathering were employed for each case in the study: teacher-observers' observations of each of my sets of lessons (Cases 1 to 4) and the lessons in Case 5, children's evaluations of each set of lessons, a series of interviews with observers and children, children's written and drawn work, and practitioner-researcher reflective field notes. Instrumentation included semistructured observation schedules, questionnaires, and semistructured interviews. In Cases 1 to 4 video recordings were made of my drama-ESD lessons as I wanted to obtain an "external" view of my work with the children and a record of the lesson procedures and interactions. The analysis of the discourse captured during the video recordings was the final stage in the analysis process occurring after all of the other data had been scrutinized.

The lessons

The drama used in this research was not based on prewritten scripts or on preparing performances for external audiences. Rather, it was based on the well-documented theories and techniques of international practitioner-researchers such as Heathcote (described by Wagner, 1976) Bolton (1984, 1992, 1998) and Neelands (1984, 1992, 2006). Here, educational drama is viewed as a learning medium whereby the teacher employs the conventions of drama (for example, creating still and moving images, role play, improvisation, and mime) to enable learners to explore and examine human events, situations, or dilemmas. In some ways, it might be seen as an extension of

the type of activities that children engage in during "pretend play." Working in role, often as members of a fictional community, both teacher and pupils actively recreate and adapt their perceptions of the world and the people in it. This is sometimes referred to as whole-group drama with teacher in role (Baldwin, 2004). Working out of role, reflection and analysis of the drama undertaken together by the teacher and the pupils help to extend and deepen understanding of what might be termed the human condition: exploring ideas and feelings and looking at different perspectives.

The first set of lessons, *The Dump Drama*, looked at a local issue, illegal dumping of rubbish and waste (sometimes known in the UK as "fly-tipping,") and the effects that this had on a small community. The residents (teacher and children in role) living across from the dumping site experienced increasing levels of discomfort. Eventually, they made plans and took action to deal with the problem.

The second set of lessons, *The Rainforest Drama*, explored a global issue, the destruction of the rainforests and the effect this has not only on the environment but also on communities that live in and depend on the forests. The drama, set in a time about 20 years in the past, viewed the issue from the perspective of a group of villagers (teacher and children in role) whose homes were threatened by deforestation. The lessons explored the feelings and responses of people whose way of life is being threatened and considered the human cost of global expansion and development. For each set of lessons, a set of specific teaching aims and learning outcomes, linked to knowledge and concepts, skills and attitudes in ESD was set out. Data were collected that might provide evidence of learning linked the drama lessons to ESD.

The research questions: The story so far

This inquiry was based around three questions and phases.

Phase 1

Initially the research sought to discover which specific ESD learning outcomes, for example, in concepts, skills, values, positive attitudes, and sympathy/empathy with others, might be addressed through the medium of drama. Elsewhere I have presented the analysis of the responses (in evaluations, interviews and writing activities) of the pupil-participants and teacher-observers in the educational dramas (McNaughton, 2006). This paper presents evidence to demonstrate that the dramas were able to help the children to explore and consider alternatives relating to specific environmental issues and to develop the communication, collaboration and decision-making skills necessary for learning in ESD.

Phase 2

In the second phase I sought to examine aspects of the data that might determine which drama techniques and conventions could be employed to help children to explore issues and to extend their learning in ESD. I (McNaughton, 2006, 2008) have presented an analysis of the evidence from the teacher-observers and from the reflective field notes of the teacher-researchers (me and "Mrs. C" of Case 5). I identified a particular range of drama techniques that helped to increase the pupils' ESD-related skills, and their positive values toward others and to local and global environmental issues.

Phase 3

Following on from phases 1 and 2, the final stage of the research sought to discover what the actions and interactions of the participants (both pupils and teacher) within the drama-ESD lessons indicated about how and why drama can be a useful tool in teaching and learning in ESD? The answers to this question were sought through the detailed analysis, in the light of the cumulative evidence gained from the analysis detailed above, of the actions and interactions, that is, the discourse, captured in a series of video recordings of my lessons.

Of my three research questions, I had already uncovered evidence to answer the first two. I was confident that I had discovered which aspects of learning in SDE might be addressed though drama. Furthermore, I was confident that my analysis had demonstrated which drama conventions and strategies were most useful in helping learners to develop knowledge, skills and values in ESD (McNaughton, 2006). The final stage of the research, therefore, addressed the question:

What do the actions and interactions of the participants (both learners and teacher) within the drama-ESD lessons indicate about how and why drama may be a useful tool in teaching and learning in ESD?

This question fits with the work of Yin (2006), who identified two types of questions asked by researchers in case studies: the "What?" and the "How or Why?" (p. 121). In the analysis of the video data, therefore, I was concerned with the actions and interactions that occurred during the drama lessons: answering the question, "What happened?" Would they provide clues to why drama had been useful in ESD? Evidence was sought through the detailed scrutiny and analysis of the children and teacher (that is, my) actions and interactions captured in the video recordings of the lessons. From this evidence, pedagogical links between the drama lessons and ESD were sought.

The remainder of this paper is concerned, principally, with this third stage of the research: the explanation of the instrumentation I used to enable my transcription and analysis of the discourse captured during the video recordings.

Framing of the video evidence

Although the video recordings of the lessons did provide a record of the events and interactions within the lesson, the limitations of this method of data collection must also be recognized (Silverman, 2000). The camera could not be everywhere at once. If a wide-angled view of an aspect of the lesson was recorded, for example, during whole-group interaction with teacher in role, the focus and framing were either on the teacher or on the pupils. With one camera, it could not be on both, and even then, not every pupil could be included in every frame. In the filming of small-group interaction, only one group could be filmed at a time if meaningful exchanges were to be captured. Decisions about which groups to film, how long to remain with each group, and when to move on were discussed with the camera operator, who was asked to try to use a range of frames to best represent the classroom action and interaction. The camera moved between groups to try to capture the essence of the discourse. The final decisions about what to record had to be left to the camera operator, as I was caught up in the teaching of the lessons. The teacher-observers viewed the final videos, and they agreed that they were fair representations of the drama lessons.

**An overview of the five stages
in the analysis of the video data**

There were just over 10 hours of recording comprising six of the drama lessons taught by me. These were a rich source of data pertaining to the actions and reactions of the drama participants. However, I had never undertaken analysis of video evidence and the process, initially, seemed daunting. I had to spend some time familiarizing myself with how this might be carried out. I investigated the use of Transanda (2005), a computer program to facilitate qualitative analysis of video data. I found that it did not match my needs as it was designed to analyze and give an overview of larger quantities of data rather to focus in detail on small samples. Spiers (2004) offered straightforward advice on analysis using Apple iMovie software. This was the format that I was already using to edit the videos. In this section I describe how I adopted and adapted Spiers's methods of analysis.

The analysis of the videotaped recordings of the lessons was undertaken in five stages. They culminated in the analysis of the discourse occurring during the episodes of the drama lessons. This was related to the evidence of learning in ESD revealed in earlier analysis. The following sections outline these five stages.

Stage 1: Creating logs of the video data

First, the videotapes of the lessons were viewed many times using conventional video playback equipment. At this stage, descriptive notes were written and a log of contents was compiled. These noted the timings of each of the steps or episodes in each lesson. They also identified the types of dramatic activities involved, for example, planning in role, planning out of role, narration, whole-group drama with teacher in role, or teacher-led discussion.

A problem that I had not envisaged but that became evident in the viewing was that some of my nonspecialist volunteer camera operators were less skilled than others. For example, the teacher recording one of the lessons frequently moved around the room while using the video camera, and for this reason some of the footage was sometimes difficult to view. In another lesson the radio microphone did not work, so audio recordings of close exchanges were not always clear. The quality of the sound improved greatly when a radio microphone was used. However, although decisions about which extracts and clips would be selected for close analysis had to be based, to some extent, on the quality of the video recordings, the final decisions were based on the selection of extracts that would provide evidence that would address the research question.

Stage 2: Initial identification of significant episodes

For the videotape of each lesson, a large number of segments and episodes were noted for further scrutiny. In the first instance, the selection was based on short extracts and longer episodes that illustrated the nature of the actions or interactions occurring within the drama. These were logged and documented in terms of the number of participants, the type, if any, of teacher involvement, the nature of the interactions (for example, planning, negotiating, instructing, or information giving), and the subject matter. Each segment and episode was then cross-referenced with the analysis of the data obtained from the interviews with the children and observers, from the evaluations and from my field notes. From these, it was possible to identify all of the interactions in the dramas that were identified as memorable, interesting, or in some way significant. At this stage, an initial focus pertaining to the nature of the dramatic activity was assigned to each extract (for example, small-group planning, teacher-in-role, group role-play).

Stage 3: Selection and transcription of episodes for close analysis

The videos were then transferred to the Apple iMovie program, which provided additional facilities for stopping, reviewing, and isolating potentially relevant episodes or interactions. Additionally, specific timing could be allocated within the episodes, and individual frames could be isolated for closer examination. It was important at this stage to make the selection of episodes and events for inclusion in the final DVDs. I wanted to ensure that I had an accurately representative sample of the interactions that had occurred during the lessons. The criteria for the final selection of representative episodes for close analysis were based on my notes from the multiple viewings, the actions and interactions identified as significant in my field notes written after the lessons, and the identification of significant interactions by the participants and observers. The samples also had to be clear in terms of sound and visual quality. The final cut comprised samples from each of these significant episodes. The example in the appendix illustrates a sample of 1 minute 37 seconds of interaction from an episode of group discussion lasting just over 5 minutes. Finally, two DVDs, one of just over 20 minutes and one of 25 minutes in length, *The Dump* and *The Rainforest*, each containing 11 extracts, were produced. As an additional check, I asked the teacher-observers to view the DVDs in conjunction with their observation notes and to suggest any omissions or unnecessary duplications.

For each extract, I transcribed all of the interactions between the pupils and between the teacher and the pupils. This provided detailed written data pertaining to all verbal and nonverbal activities. The purpose of this was to enable the close scrutiny of the identified extracts to examine the interactions and relationships that developed during the drama lessons. The presentation and subsequent commentary on the transcribed data were based on Spiers's (2004) two-column matrix. However, I adapted this to include a third column in which codes could be assigned to each exchange within the discourse. The transcription method is detailed in the next section of this paper.

Stage 4: Description and interpretation of the transcribed episodes

After the transcription of the episodes, the participants' actions and interactions, that is, the discourse, were examined. How did the children behave toward each other and respond to each other? How did the teacher (me) behave, both in role and out of role? How did the children respond to her at various points throughout the drama lessons, and what, if anything, does this suggest to us about why drama is useful as a tool in the teaching of ESD?

Bloome, Carter, Christian, Otto, and Shuart-Faris (2005) in a wide-ranging text on the use of discourse analysis in the study of classroom language, used the term *contextualization cues* to describe any feature of language that contributes to people's interaction with each other in ways that can be understood. These can include all "verbal and non-verbal signals . . . as well as the manipulation of artefacts" (p. 9). Description and Interpretation of Contextualization Cues is the overarching term used to head the matrix column in which the discourse of the lesson episodes is described and interpreted. The decisions pertaining to the selection and use of specific terminology to describe and analyze the verbal and nonverbal aspects of the drama lesson discourse are set out in the next section of this paper.

Stage 5: Seeking themes and making links to learning in ESD

The descriptions and interpretations of the contextualization cues in the second column of the transcription matrices were read many times, and any trends or meaning clusters were sought and recorded. These notes formed the basis for the subsequent thematic coding (Flick, 1998) that appears in column 3 of the matrices. In an accompanying analytical commentary, the themes were discussed in terms of the participants' interactions during the episodes. This culminated in an analysis, suggesting a correspondence between the ESD learning outcomes and the interactions occurring within the drama.

The details of the discourse analysis processes

In this section I describe in fuller detail the transcription and analysis process outlined in Stages 3, 4, and 5 above. Specifically, I explain and justify the decisions made regarding: transcription notation, analysis of the verbal and nonverbal discourse, coding and classification of emergent data, presentation of the data, and discussion and analysis of the data.

The aim of the analysis of videotaped extracts of the lessons was to exemplify key moments in the drama that show the participants engaging in behavior that might have had a bearing on the children's learning in ESD. In particular, it examined the following.

- The children's relationships with each other. Within the drama extracts they were often engaged actively in thinking, planning, decision-making, and presenting. Pedagogically this can be viewed in terms of a constructivist approach (Selly, 1999), in that they were actively seeking and making meaning. Here, specific links were sought between the drama and the scaffolding of knowledge and concepts, the acquisition of skills and development of positive attitudes in relation to ESD.

- The role of the teacher in role within the drama lessons: What did the teacher do to help the children learn in this particular type of teaching? The analysis examined the particular linguistic and behavioral teaching strategies adopted and how the children responded to these. Specifically, through the analysis I sought to uncover any possible learning links to ESD that might arise from the teacher in-role behavior.

The role of the researcher was to be open minded: to find meaning through the analysis rather than to attempt to impose the ideas from the earlier phases of the research.

Transcriptions and interpretative comments matrix: the analysis instrumentation

Wells (2001) has suggested that when transcribing data in the analysis of classroom interaction, the researcher should try to ensure thick representations of the data, that is, ones that go beyond transcription of the lexis and grammar to take into account the wider context: the physical and vocal exchanges within the activity along with the setting and any background details. In addition, he suggested that there is no single correct interpretation of events. The analyst's purpose and perspectives will have a bearing on what is deemed to be relevant or important.

I adapted Spiers's (2004) structure of a two-column matrix, setting out the transcription in conjunction with interpretive notes, followed by a reflective commentary, for use in this analysis. Specifically, I added a third column to the matrices to facilitate the application of codes to the exchanges within the episodes. These codes were subsequently counted and tabulated. A

Table 1. Example of the three-column analysis matrix

Dialogue (Clip times set from 00.00)	Description and Interpretation of Contextualization Cues	Themes codes
00.09 B1: But (.) eh, My name was Uncle Dan and I was 85 ((*points to B2*))	Marker. Possessive pronoun/use of past tense: not speaking in role but recalling. Seems to change mind to give just a short piece of information, does not elaborate but passes the conversation to next ch. Social and task awareness.	PI F/R S

reflective commentary on each transcribed episode helped to inform the analysis process. Specific decisions, relating to the three stages of the presentation and analysis of the transcriptions (related to the three columns appearing in the matrices), are explained in the following sub-sections. An example is shown in Table 1. In the appendix I have provided an example of a completed matrix and the corresponding reflective commentary.

Column 1: Transcription decisions

I wanted to transcribe the video extracts in a way that allowed a clear understanding of the discourse of the drama lessons. Both verbal and nonverbal aspects of the discourses have been transcribed. I adapted Standard Jeffersonian Transcription Notation (Jefferson, 1984) as some of the 17 original categories proved unnecessary and were allocated to no discourse transactions in the transcriptions in this study. I selected the 11 categories that most accurately represented the specific range of discourse transactions occurring during the recorded episodes. Table 2 sets out the transcription key that I developed to set out the ways that nonverbal interaction along with intonation, pace, and pitch of speech could be conveyed in the transcriptions. These symbols were added to the transcriptions to provide additional information that might later aid interpretation and analysis (see Table 1).

Column 2: The discourses within the drama

Gee (2005) stated that the purpose of discourse analysis is to reflect on what has been said (or written) and to "discover better, deeper and more humane interpretations" (p. 2). Language, he explained, is used in any given situation to make meaning, but the situation itself dictates, to some extent, what our language choices might be. For the purposes of this analysis, it was assumed that in drama participants behave and communicate within the rules and conventions of the "real" context of the drama classroom. However, at times within the drama lesson, they might also be behaving and communicating within the fictional context of the drama story. The

Table 2. Transcription key: Transcriptions of DVD extracts

[ ]	Overlapping speech
<u>no</u>	Word emphasized
((nod))	Nonverbal gesture/action
( )	Pause
°	Words spoken quietly
:::	Prolongation of sound
(XXX)	Words unclear or in doubt in transcription
> <	Words spoken more quickly than usual
< >	Words spoken more slowly than usual
⇧	Rises in pitch or intonation
⇩	Lowering in pitch or intonation

Note: Adapted from Standard Jefferson Transcription Notation (Jefferson, 1984).

participants "*actively* inhabit both the real world and the imagined world" (O'Neill, 1995, p. 82, emphasis in original). In terms of discourse analysis, this can be related to what Bloome et al. (2005) have described as personhood: the characteristics and attributes that are assumed to be inherent in a person within a given cultural context. The cultural group within the "real" classroom was different from the groups that existed within the fictional context of *The Dump* and different again from *The Rainforest* people. Analysis of the discourse was used to illuminate the participants' interpretation of the fictional drama cultures and might provide evidence that this "duality of existence" (O'Neill, 1995, p. 82) had an influence on learning in ESD.

To analyze the discourse within each lesson extract, it was necessary to identify larger or smaller segments of each extract. Hierarchical discourse analysis terms used in the discussion, interpretation, and analysis of the drama lesson extracts have been adapted from descriptors used by Gee (2005), Bloome et al. (2005), and Sinclair and Coulthard (1975). They are:

> *Episode:* the complete section of the drama,
> *Discourse:* the whole of the transcribed portion,
> *Transaction:* the short dialogue about a particular topic,
> *Exchange:* a single block/set of utterances from one person, and
> *Act:* individual meanings within the one exchange.

These terms were used in the discussion and analysis of the discourse.

Analyzing the discourses of the drama

It must be recognized that most writing in relation to discourse analysis of classroom talk comes from the area of learning in language and literacy. However, this research was aimed at examining the social and educational implications of the participants' lexical, patterning, and paralinguistic usage and choices (Halliday, 1973). Therefore, the decision was made not to engage in microanalysis of the linguistic content of each of the exemplar segments through the assignment of linguistic codes for interpretation but rather to use the coding terminology in a descriptive and interpretive commentary. This fit more readily with the next stage in the analysis, the search for potential links between linguistic and behavioral choices in the drama and learning in ESD.

Analyzing verbal discourse

Wells (2001) produced an extensive classification scheme to aid those analyzing video-recorded data pertaining to classroom interaction and discourse analysis in language and literacy. This system sets out 33 categories, each containing a number of subcategories too complex for the needs of this research. I adapted and simplified the coding system devised by Wells' into nine categories that were be used to describe all of the transactions occurring within each short transcribed episode. The categories were particularly useful, in column 2 of the transcription matrices, in providing a common terminology for the description and interpretation of each exchange within the episode. The same terminology was used in the discussion and analysis of the drama episodes (see Table 3).

To differentiate the teacher's interactions at different stages in the drama lessons, teacher-in-role was used to preface the teacher's exchanges while in role: T was used for the out-of-role exchanges.

Table 3. Nine classification categories of verbal discourse

Classification Category	Description
1. Nature of activity	Teacher-led discussion, pupil independent discussion, presentation, teacher-in-role
2. Activity mode (teacher or pupil)	Commenting, organizing, planning, problem solving, generating, reporting, reviewing evaluating
3. Development initiated by pupils	New topic, further contribution, extending ideas, challenging ideas
4. Cognitive demands (high level)	Generalization, analysis, speculation
5. Affective involvement	Personal pronouns (in relation to characters), expression of feelings, personal opinions
6. Information	Factual, repetition, confirmation, makes connections, opinion, suggestion, personal experience, imaginative, explanation, conjecture
7. Register	Formal, informal, restricted, elaborated when viewed in relation to lexical and patterning choices and uses (adapted from Halliday, 1973)
8. Volume and intonation	Loud, quiet, shouting, whispering, stressing, rising inflection, falling inflection
9. Marker	Short utterances (e.g., "well," "eh," "so," "ok") that mark the beginning of an exchange or a break or hesitation

Analyzing nonverbal communication

The term *nonverbal communication* is used to describe all human communication and interaction that does not include the spoken or written word. Recent work in analyzing and defining nonverbal communication has come from the field of animation linked to the creation of virtual environments as described, for example, by Fabri, Moore, and Hobbs (2008). Much of this is based on Argyle's (1996) classification of nonverbal communication. Argyle suggests that nonverbal communication can be divided into six specific areas: facial expression, gaze, gesture, posture, touch, and spatial behaviors/proxemics. Ekman (1999) found that there were six universal facial expressions corresponding to emotions: surprise, anger, fear, happiness, disgust/contempt, and sadness. Other facial expressions are subsets of these. Rowe (2006) set out descriptors corresponding to Argyle's categories for use by health care and other professionals working with human participants. I developed a set of descriptors, based on the work of Argyle, Ekman et al., and Rowe, for use in the discussion and analysis of the video data (Table 4).

The language of the nine categories of verbal discourse and the six categories of nonverbal discourse was used throughout column 2, the Description and Interpretation column, of the transcription matrices to describe the nonverbal communication occurring within each transcribed episode.

Table 4. Six classification categories of nonverbal discourse

Classification Category	Description
1. Facial expression	Surprise, anger, fear, happiness, disgust/contempt, and sadness
2. Gaze	Threat, intimacy, interest
3. Gesture	Pointing, waving arms, palms facing forward, face-touching
4. Posture	Crossed legs/arms, leaning toward/away from, slumped/straight, posture related to character being portrayed
5. Touch	Affection, affiliation, understanding, aggression, greeting
6. Spatial behaviors	Intimate zone, personal zone, social-consultative zone, public zone

Column 3: Review of the analysis and the emergence of themes

Strauss and Corbin (1998) described a focused procedure of microanalysis through which "the data are allowed to speak" (p. 65). The first step in this analysis process involved scanning the transcriptions "looking for potentially interesting and relevant analytical material" (p. 70). During the process of description and interpretation of the transactions within each of the drama episodes, common features became evident. Indeed, the description and interpretation was, as Strauss and Corbin suggested, a stage in the analysis process. The next step was to undertake the formal process of systematically reviewing all of the transcriptions along with the descriptive and interpretive commentaries to identify any similarities and patterns observable in the data. Initial codes were allocated to elements within each exchange. For example, in the exchanges within the children's interactions, there were a number of instances where children appeared to be supporting each other's learning (praise: p; nod: n) or seemed to be taking responsibility for organization within the group or class (directing: d; suggesting: s). Many initial categories and codes were allocated. As the process of categorizing and coding progressed, themes began to emerge. These were (a) themes pertaining to the children's interactions and (b) themes pertaining to the teacher's interactions. During the subsequent commentary on and analysis of these themes, links between the drama episodes and learning in ESD were revealed.

Assigning codes to the themes emerging from the children's exchanges

During extensive close reading and review of the descriptive and interpretive comments, initial codes were assigned to the data. Six themes emerged from this coding. The designation of the themes was based on the established terminology used in the literature, theory, and practice of educational drama (Bolton, 1998; Neelands & Goode, 2000). Each theme contains a number of subcategories. The children's thematic codes were as follows:

FC	Building the fictional context of the drama
	Subcategories include initiate (i), extend (e), recall (r), confirm (c)
*PI	Personal involvement in the role or dramatic context
	Subcategories include self (s)—personal pronouns, personal details; relationships (r)—with others, to others; linguistic (l)—lexis, pattern, register
O	Organizational and collective involvement
	Subcategories include initiate (i), suggest (s), direct (d), challenge (ch), justify (j), negotiate (n), reason (r), question (q)
S	Supportive behavior to others in the group or class
	Subcategories include verbal support (V)—praise (p), complement (c), agree (a), suggest (s); nonverbal support (NV)—smile (s), gaze (g), wait (w), nod (n), touch (t)
*E	Emotional involvement in the fictional context
	Subcategories include verbal (V)—expressions of need (n), want (w), fear (f), anger (a), happiness (h), unhappiness (u); nonverbal (NV)—smile (s), frown (f), body language (b)
F/R	Awareness of acting within the fictional context/audience awareness
	Subcategories include: verbal (V)—comment (c), instruction (i), question (q); nonverbal (NV)—glance (g), smile (s), look at camera (l)

The two codes marked with an asterisk (*) were later amalgamated as closer scrutiny revealed substantial areas of overlap.

*Assigning codes to the themes emerging
from the teacher's exchanges*

During the close reading and review, initial codes were also assigned to the data pertaining to the teacher-children exchanges. Here, too, themes emerged. These related to the teaching roles and responsibilities within the drama-ESD lessons. The thematic designations selected here are based on the established terminology to describe teacher behavior in and out of role.

Teacher out of role codes/themes were designated as follows:

FC   Developing the children's understanding of the fictional context
O   Directing and organizing activities and managing the lesson
S(o)   Supporting pupil learning through verbal and nonverbal behaviors

Teacher-in-role themes were designated as follows:

C   Context building within the fictional context
D   Extend and develop the fictional context
A   Creating and sustaining the atmosphere of the drama
T   Creating dramatic tension
S   Support the children's work in role
M   Manage the children's behavior from within the role

Counting and tabulating of codes

The codes relating to the analysis of both the children's behaviors and the teacher behaviors were counted and tabulated, as recommended by Miles and Huberman (1994). The number of occurrences of each theme was recorded in a set of four tables. These relate to the themes developed from the analysis of the children's exchanges and themes developed from the analysis of the teacher exchanges, within the drama extracts. In each of the four tables, column 1 lists the clip number and extract number for each of the DVD clips. Each row displays the information from one video clip. In the example shown in Table 5, the subsequent five columns display the number of occurrences of each of the five themes listed at the top of each column. These tables informed subsequent discussion and analysis.

Table 5. Example of summary analysis of thematic codes

	Themes Relating to Children's Interactions: Number of Instances of Thematic Codes *The Dump* Drama Extracts				
Clip & Extract No.	*Build Fictional Context* *(FC)*	*Personal Involvement/ Emotion* *(PI/E)*	*Supportive Behavior* *(S)*	*Organization/ Direction* *(O)*	*Fictional/ Real-World Awareness* *(F/R)*
1. D: 1	27	10	16	9	3
2. D: 2a	5	9	1	–	–
3. D: 2b	1	4	1	–	–
4. D: 3	10	9	4	–	–
5. D: 4a	5	1	3	19	–
6. D: 4b	26	8	9	21	1
7. D: 4c	9	5	–	–	–
8. D: 5a	18	15	9	before clip	3
9. D: 5b	2	7	3	–	1
10. D: 5c	12	8	5	–	1
11. D: 5d	8	9	3	–	3

Organization of the analysis of the DVD extracts

After the transcriptions of the DVD extracts from the drama-ESD lessons were read, interpreted, and coded and themes were assigned, counted, and tabulated, the next step was to discover what this analysis revealed about what the actions and interactions of the participants (both pupils and teacher), within the drama-ESD lessons, indicated about how and why drama was a useful tool in teaching and learning in ESD; that is, to address Research Question 3. A decision was made that the subsequent discussion and analysis would not simply deal with each of the themes in turn but instead would merge and synthesize these in terms of how they were deemed to relate to aspects of learning linked to ESD, identified in earlier analysis (McNaughton, 2006, 2008). The outcome of this was the grouping of the discussion under four headings: building of fictional contexts within the drama-ESD lessons, the children's status within the drama, personal and affective involvement in the dramatic roles and context, and the teacher's attitudes to status and to supporting learning.

Summary of the analysis of the DVD extracts

Although it is not within the scope of this paper to offer a detailed descriptor of the outcomes of the analysis of the video evidence, a very brief summary will allow the reader an overview of the complete research process from planning to conclusions. The findings from the analysis were synthesized and the cumulative evidence suggested that four aspects of the educational drama were conducive to developing the children's learning in ESD. The four areas were the building of fictional contexts within the drama-ESD lesson, the children's status within the drama-ESD lessons, personal and emotional involvement in the dramatic context, and the role of the teacher related to his or her attitudes toward status and supporting learning. These are discussed below.

The building of fictional contexts within the drama-ESD lessons

A key drama strategy, evident in the extracts from the DVD recordings, was the children's building and development of the fictional contexts. The participants did not simply depict predetermined events and characters but were involved in actively creating and shaping how characters and their stories developed. In all of the extracts, it was possible to identify in the children's behavior and interactions, aspects of learning linked to the development of concepts and knowledge, and skills and attitudes in ESD. The drama might have added an experiential element to the learning (Kolb, 1994). A final point from the analysis was to note that their attempt to sustain the fictional context throughout the dramatic scenes indicated the children's willingness to make a sustained effort to engage with the learning context.

The children's status within the drama-ESD lessons

In the DVD extracts, there were extended examples of children's behaviors in their interactions with each other and with the teacher that indicated their status as equal partners in the learning experiences. The dramatic conventions appeared to allow them opportunities to develop their concepts of, and to initiate actions in response to, the environmental problems posed within the fictional context of the drama. On several occasions in both dramas, one or more of the children, in role as residents or villagers, were seen to question or reject suggestions or requests made by the teacher-in-role. The opportunity to challenge the authority of the teacher within the controlled situation of the drama allowed the children to demonstrate their understanding of and their commitment to the underpinning environmental concerns of fictional contexts. Thus, learning in ESD in terms of values and positive attitudes was supported.

Personal and emotional involvement in the dramatic context

In all of the extracts when they were working in role, the children made first person references to themselves and their possessions while describing events and experiences witnessed or actions undertaken. For example, when referring to the other characters, the children used first person personal and possessive pronouns: we, us, and our. They also made many references to their relationships with other characters in the dramas: my son, my husband, my daughter, our tribe. These lexical choices indicate a sense of personal involvement in the fictional community. Bruner (2003) suggested that this construction of reality through narrative is a natural way of learning. Although it would be neither desirable nor appropriate for the children to be allowed to experience real emotions such as distress or fear, the evidence suggests that the drama provided a safe context that allowed the children to gain an understanding of the emotional impact of environmental and sustainable development issues on the particular fictional communities built by them within the drama.

The role of the teacher: Attitudes to status and to supporting learning

To answer the research question, it was necessary to examine not only the children's actions and interactions but also those of myself as the teacher. In the video extracts my function could be divided into two discrete but complementary components: working with the children out of role and working with the children using the drama convention of teacher-in-role. Out of role, there is evidence that I used strategies such as giving initial information, negotiating the fictional space and initial roles, asking questions, confirming ideas, and explaining or extending initial background details to develop the children's understanding of and commitment to the fictional contexts. Working in role, there is evidence that I participated in development of the fictional context through the adoption of a wide range of educational drama strategies. The evidence suggests that the use of a wide repertoire of democratic, participative, and sympathetic (Massey, 2003) teaching and learning strategies within the drama lessons was instrumental in allowing the children to develop knowledge and concepts, skills, and positive attitudes linked to ESD.

Summary: Using video recording in qualitative research

I found the process of working with data from video recordings both useful and practical. I was able to "eavesdrop" on the children's interactions in a way that would have been impossible for me while teaching the lessons. I was also afforded a new perspective on my interactions with the children. Discourse is, by nature, transitory, so having a permanent record that could be viewed many times was a valuable asset in the analysis process. Additionally, the validity of the researcher's analysis could be checked and verified or questioned, rendering the process more transparent and helping to minimize potential bias. However, this method is not without its pitfalls. Here, I offer some advice to researchers contemplating using video recording as part of their data collection and analysis.

First, as one is dealing with human participants, obtaining ethical approval is vital. It is important that the subjects of the recordings (and parents or guardians in the case of minors) are fully informed about the purposes and intended use of the recordings. This is especially important in the case of recording human interactions, where nonverbal communication is an essential aspect of the analysis, so faces cannot be digitally disguised. Having obtained the necessary permissions, there are then technical issues for consideration. In terms of recording equipment, one camera is probably enough. However, a good-quality radio or boom mike is essential for clear sound quality. If you are seeking to record naturalistic situations, it is important to give the participants

time to get used to the recording equipment. I found that the children very quickly forgot that it was there. This was partly due to the camera operator being as unobtrusive as possible. Before recording, it is worthwhile discussing with the camera operator the possible framing of the recording: wide on a whole group or narrow on one or two participants, close up or at a distance, back or facing view of the researcher if in the shot. The research focus will affect the camera focus.

Having gained the video footage, it is important to view it in its entirety on a number of occasions. Gradually it will become possible to make a log of all potentially useful or interesting segments and to note times and timings. At the beginning, everything looks useful, but as the viewer becomes familiar with the data, a filtering process begins to take place. It is important to keep in mind the key research question but it is also important not to be closed to other possibilities as themes and categories begin to emerge from the data (Silverman, 2000). At this stage, the researcher may choose to use a qualitative data analysis program such as Transanda (2005). However, the purpose of this paper was to demonstrate that it is possible, and, perhaps, in some cases more illuminating, to decode and analyze interactions without the use of such programs and that the steps in the process are straightforward and replicable by any researcher wishing to do so.

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Appendix
Example of Transcription Matrix and Reflective Commentary

The Dump: DVD Clip 1

Episode D1
DVD start time: 00.09
Clip running time: 1 minute 37 seconds

Title of Clip: The residents remember
Type of Activity: Small group independent discussion and planning
Context: The children, in family groups, have been instructed to remind each other of roles from previous lesson and to plan what they are going to tell the councilor about what has been happening as a result of the Dump.

Dialogue (Clip times set from 00.00)	*Description and Interpretation of Contextualization Cues*	*Themes*
00.09 B1: But (.) eh, My name was Uncle Dan and I was 85 ((*points to B2)*)	Marker. Possessive pronoun/use of past tense: not speaking in role but recalling. Seems to change mind to give just a short piece of information, does not elaborate but passes the conversation to next ch. Social and task awareness.	PI F/R S
00.12 B2: Well (pause) I'm Auntie Chelsea and I'm married to Uncle Dan ((*points, boys exchange slight smile, G2 smiles*))	Marker. Personal pronouns (I'm). Speaking in role. Relationship of characters identified. Both boys and girl make eye contact and smile indicating acknowledgment of contrast of the fictional context with reality	PI PI FC F/R
00. 18 G1: I'm (pause) I'm (pause), ((*rubs eye and looks at G2*)) I can't remember.	Personal pronouns—in role then out of role. Attempting to recall, face touching gesture suggests discomfort	PI F/R
00.21 B2: Teenager° ((*looks at G1 and whispers, B1 and G2 look at G1*))	Individual offers support, group appears to offer unspoken support.	S S/R
00.23 G1: (pause) em, I'm a teenager and I'm (pause), ((*makes eye contact with G2. G2 points to G1's name tag*)) my name my name's Siobhan and I'm thirteen ((*nods at G2*))	Marker. Struggling to recall, hesitant. Supported by G2's gesture and whole group waiting, looking and listening. No pressure appears to be put on G1 by group.	FC S
00.31 G2: Well I'm the mum and my name is Shona and I'm thirty. ((*rest of gp look at G2, B2 leans in*))	Personal pronoun. Not fully in role (the mum). Recall of fictional relationship. Group support.	PI PI
0036 B1: What, what's our complaints gonny be?	B1 initiates development of new topic—next part of the task.	FC O
00.39 G2: [Em] ((*smiles at B1*))	Shows approval of suggestion.	S
00.39 B2: [you] can be the spokesperson ((*points at G2*)) cause you've got [the loud..]	Emphatic gesture towards G2, begins flattering comment	O
00.41 G2: [No] ((*puts hands to face*))	Hand to face gesture indicates negation/distress	E

00.42 B2: [Daniel] ((swings arm round and rests hand briefly on B2's chest))	B2 sees this and very quickly changes gesture to point to B1. Touching B1 indicates comfort with personal proximity. Gesture seems to be accepted by group.	S S
00.43 G1: Daniel you've got [the loudest voice]	G1 confirms group decision	O
00.44 B2: [You've got] me… XXX) ((*nods*))	Unclear comment, appears to be confirmation	O
00.45 B1: ((looks at B2)) [OK]	Very brief agreement exchange between B1 and B1	O
00.46 G1: [and], eh, what [about]	Marker. Speaking over B1	
00.47 G2: [and you're old]	All seem to be trying to seek a topic/way in	
00.48 B1: Right. There's rats	Marker. Initiates topic; problem in dump	FC
00.49 B2: Rats ((*nodding*))	Approval from B2	S
00.50 G1: My new puppy's got cut [on glass]	Initiates new topic: dangerous effect cited. Possessive pronoun	FC PI
00.50 B2: [Waste]	B2 initiates new topic	FC
00.51 B1: Yeh ((*looking at G1*))	B1 encourages G1 to continue	S
00.52 G1: He's got cut twice [this week]	Additional information, extends topic	FC
00.53 B1: [Yes. your] new puppy's getting cut ((*pointing round group*))	Summarizing for group, confirming this as complaint	FC S
00.55 G2: Waste⇑	Rise in intonation indicates assertive	FC
00.56 B1: <u>Waste</u> ((*nods*))	B1 approves new topic	FC
00.57 B2: Dead animals	Initiates new topic: dangerous effect	FC
00.58 B1: Yeh. The smell	Extends comment by citing effect	FC
01.00 G2: Smell ((holds hand palm up))	Confirms effect, emphasises with open hand gesture	FC S
01.01 B1 Smell ((*nods*))	Further confirmation	FC
01.01 G2: Burnt, em, [cars]	Initiates new topic, things left on dump, but tentatively (marker)	FC
01.02 B1 [Drugs] drugs ((looks at G2 and nods)), like medicine bottles	Initiates new topic, things left on dump. More insistent	FC
01.04 B2 Daniel (says something to B1…) ((*B1 turns, looks and nods*))	Interrupting to get B1's attention	O
01.06 G2: Medicine bottles and syringes	G2 continues to respond to B1, develops idea, adds to his list	FC
01.07 B1: ((*looks at G1*)) Yeh, [and],	Confirming G2's suggestion	FC
01.08 B2: [and (pause) ripped] up sofas ((*waves hands*))	Initiates new topic after brief pause in discussion	FC
01.10 B1: ((*looks at B2*)) [Yeh]	Acknowledging new topic	FC
01.11 B2: [and] baths	Continues	FC
01.12 B1: ((*still looking at B2*)) A big bouncy bed	Adds to topic, alliteration, use of two adjectives	FC
01.14 B1: Yeh ((*all smile*)) *(pause)*	Group acknowledge the funny sound/visualization of the previous description	F/R
01.15 G1: Small, small [children]	Initiates new topic hesitantly	FC
01.16 G2: [(Tof…XXX)] ((to *B2 who nods*))	G2 begins to initiate new topic	FC
01.16 G1: ((holds up finger interrupt, looks at B1)) [I seen small children], I seen small children ((B1, G2 also talking to each other)) (indistinct)	Group splits into two conversations G1 and B1 and G2 and B2—speak across each other. Eye contact made with ch. opposite.	S
01.19 B1: ((*leans toward G1*)) What?	Confirms interest in G1's statement	S
01.19 G1: I seen small children also go into the dump	Personal recall of fictional context. Develops B1's description by adding additional detail	FC
01.21 B2: broken umbrellas ((B2 nods to G2. B2 leans forward and he and G2 talk to each other across G1 and B1. G2 claps her hands once)).	Develops discussion with G2. Initiating new topic.	FC
01.22. G1: into the dump and jump on the bed ((*B2 clears throat, sits back*))	Additional detail to B1's suggestion. Group body language appears to mark the end of this topic.	FC
01.25 G2: Well, eh ((B1 turns to look at G2. G2 watches teacher walking past them across camera)) eh, em (2 sec. pause) who wants to be the spokesperson?	G1 seems to initiate new topic but pauses. No other takes up the conversation which lulls for several seconds. G1 resumes by initiating a new topic and phase—planning who will present the group's statements.	O

01.32. B2: Eh, ((*waves hand and points at B1*)) me and Daniel can't be 'cause ((*pats upper arm several times*)) we're old people, so ((*indicates to G2*))	Mix of real and fictional response. Speaking on behalf of B2 who is fictional husband. Reiterates suggestion made at the beginning that G2 should be spokesperson.	O
01.36 G2: ((*shrugs and puts out hand, palm up*)) So	G2 indicates unwillingness	O
01.37 B1: ((*looks at G2, gestures towards her*)) Well we'll all say something	B2 offers solution to group. Appears to be aware of G2's concern	S O
01.38 G1: ((*nods*)) Yeh	Agrees	S
01.39 G2: Yeh, we could all say something.	Agrees to say something as part of group report.	S
01.40 T: ((*leans over group*)) What are you doing? Are you still talking about who you all are? …	Checking related to set task. Social-consultative special zone. Tone light and casual. Referring to group in nonfictional and fictional terms. Reinforce fictional context	S O FC
01.45 Ends		

Comment and analysis: Dump Extract 1

Teacher role

The teacher's role during this exercise was low key. I would circulate, monitoring progress and addressing any specific issues or problems arising during the discussions. After the initial setting of the task, there were no direct teacher-whole class exchanges until the groups were directed to stop discussion and move chairs into a semicircle for the next episode in the lesson: the meeting with the councilor (teacher-in-role).

Analysis

The four children in the group remain on-task for the whole of the episode and the discussion does not deviate into other topics. The first part of the task was to recall and reintroduce the drama characters they devised and developed in the previous lesson. This part of the discussion lasts for 27 seconds. B1 initiates the exchange and briefly introduces his character using the past tense ("My name was . . ."). He also appears to take the role of leader in the group and demonstrates awareness of the nature of the task by directing B2 to continue. B2 uses the present tense, first person singular to introduce his character. The very brief exchange of smiles among the children appears to acknowledge the incongruity of a young boy adopting the role of an old woman and being "married" to another boy in the group's character. However, it is notable that the role is accepted and not commented upon by any of the children. There is a group acceptance of the fictional context and they display effort in maintaining this. G1 has difficulty recalling her role and displays some discomfort. She is aided immediately by G2 who whispers a prompt. The two boys in the group look at G2 in a way that suggests encouragement and patience. G2 appears to be confident in her knowledge of her role. However, although she speaks in the first person, as if in role, she refers to "the mum" rather than indicating the character's relationship with either G1 or B1 and B2 (mother, daughter) indicating that she is not "inhabiting" the character. There is then a brief discussion concerning who will report for the group. Again, G2's discomfort is recognized and the subject is dropped. It is revisited at 01.15. In summary, this short, 27-second discourse displays clear examples the children adhering to the rules for group behavior and offering positive group support to one of their number.

In the second part of the extract, the group list the residents' complaints. This is initiated by B1 at 38.17 with "Right. There's rats." This is acknowledged by B2. G1 introduces a second item. Speaking in role she relates that her puppy was cut. A second, "cut twice" underlines the serious

nature of the problem. For the next 40 seconds, in a series of initiations, extensions and confirmations, individuals list problems that they have experiences or witnessed: waste, dead animals, smells, burned cars, bottles, syringes and discarded items of furniture. The children are recalling events from the previous drama lesson and there seems to be an acceptance that they have experienced these, for example, "I seen small children . . ." This is a response to B1's description of a "big, bouncy bed" which draws a fleeting smile from the group—an acknowledgement, out of role, of the alliterative language use. After 40 seconds, the group discussion appears to split briefly with the two opposite pairs conducting separate discourses. G2 is distracted by the teacher walking past, which perhaps reminds her of the task instructions, and she initiates the next phase of the discourse: deciding on a spokesperson. A suggestion by B2 is rejected and B1's suggestion that they all say something is accepted. At this juncture, the teacher interrupts the discussion.

Links to Learning in ESD

In both parts of this short extract, it is possible to identify a number of aspects of learning that may be linked to the development of knowledge and concept, skills and attitudes in ESD. These may be linked to some of the learning aims for the lessons. In the early part of the discourse, the children can be seen to support each other within the group by prompting, listening and responding and showing consideration and patience. These match some of the proposed learning statement from Aim 2, cooperating and collaborating, and from Aim 3, willingness to participate, sympathy and empathy. The second part of the extract seems to link with Aim 1: concepts and knowledge of the social and environmental impact of inappropriate disposal of waste. The fictional context of the drama appeared to help the children to recall and name a number of problems caused by the inappropriate dumping of waste. At times, the children seemed to be recalling and visualizing the imagined experience of witnessing the scene rather than simply recalling a conversation. The drama may have added an experiential element to the learning experience.