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Focusing on Classroom Interaction During Designerly Activity in a Secondary Design and Technology Classroom

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Abstract

This paper explores ways in which data collected during designerly activity in a Secondary Design and Technology Classroom can be analysed with a view to ascertaining the features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trebell, 2007). It is anticipated that open questions and other forms of interactive challenge will support this development. Categories drawn from literature on constructive dialogue which illuminate a number of talk functions that empower learners in their thinking and acting: speculating, explaining, elaborating, questioning, challenging, hypothesising, affirming, feedback, evaluating and reflecting (Kumpulainen & Wray 2002; Corden 2001; Wegeriff and Mercer 2000; Coultas, 2007) will be drawn upon to inform analytical assumptions. Having explored the literature, the paper goes on to develop an appropriate methodology, present and analyse relevant data using an appropriate analytical framework. The paper concludes by summarising the features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trebell, 2007)

Key words

classroom interaction, co-construction of knowledge, talk functions, collaborative learning, designers, designing.

Introduction

The aim of this paper is to explore ways in which data collected during designerly activity in a secondary design and technology classroom can be analysed with a view to ascertaining the features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trebell, 2007).

To achieve this aim the paper is divided into five parts. The first part will clarify what is meant by classroom interaction (Mercer, 1995; Wegeriff & Mercer, 2000; Corden, 2001; Kumpulainen & Wray, 2002; and Coultas, 2007). The second part explores the forms that classroom interaction may take when viewed from the perspective of talk functions (Mercer, 1995; Wegeriff &

Mercer, 2000; Corden, 2001; Kumpulainen & Wray, 2002; and Coultas, 2007) and develops these categories further to encompass interactions related to designerly activity. The third part will outline the methodology used in this study. The fourth part will present and analyse data using an appropriate analytical framework drawn from the literature. The fifth part will discuss the findings and the conclusion will summarise the features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trebell, 2007)

Defining classroom interaction

Research into classroom interaction is believed to have begun in the 1950s and 60s (Kumpulainen & Wray, 2002) and reached prevalence with the work of Flanders (1970). This early work focused primarily on whole class interaction and led to the development of Flanders' interaction analysis categories (FIAC), a system of classroom interaction analysis which focuses on the role of the teacher orchestrating the learning process of a whole class. The FIAC system in its original and modified forms has been used extensively in classroom observation studies (Wragg, 1999) over a number of years.

In recent years the role of interaction in supporting the development of learning has become very popular with a number of researchers (Edwards, 1993; Lemke, 1990; Mercer, 1995; Wells and Chang-Wells, 1992) carrying out work in the field. Within Design and Technology Barlex and Welch (2007); Hamilton (2003); Hamilton (2004); Hamilton (2007); Hennessy & Murphy (1999); Murphy & Hennessy (2001) have pursued the study of a social constructivist approach to pedagogy with the quality and nature of classroom interaction assuming an important role in their research.

The growing interest in classroom interaction and more generally in the processes of learning inherent in social interaction, reflect a theoretical shift in perspective on learning as instruction. These studies (Mercer, 2000; Resnick, Levine and Teasley, 1991; Rogoff, 1990) have begun to emphasise the social and cultural nature of human learning. In these studies learning is not only seen as a constructive process that takes place in the mind of the learner (Piaget, 1950) but also

as a process of meaning-making and enculturation into social practices (Kumpulainen & Wray, 2002).

Forms of Classroom and Designerly Interaction

Many categories of classroom interaction have been developed through the study and analysis of talk functions. Speculating, explaining, elaborating, questioning, challenging, hypothesising, affirming, feedback, evaluating and reflecting (Corden, 2001; Coultas, 2007; Kumpulainen & Wray, 2002; Mercer, 1995; Wegeriff & Mercer, 2000) are amongst those that have been highlighted.

In the case of this study knowledge is seen as socially constructed via means of pupil/pupil, pupil/teacher interactions some involving talk functions, others distinctly linked to designerly activity with language seen as a social mode of thinking (Vygotsky, 1978; 1981; 1986). Techniques such as scaffolded sketching, where the act of sketching becomes the centrepiece of designerly conversation or as Schön (1983: 78) puts it 'a conversation with the materials of a situation' represent a distinctly designerly mode of interaction.

Methodology

A review of the literature of classroom interaction (Corden, 2001; Coultas, 2007; Kumpulainen & Wray, 2002; Mercer, 1995; Wegeriff & Mercer, 2000) has led me to conclude that this study needs to be conducted in a natural setting, that is, the classroom, where social interaction is recorded via video and audio recordings.

A 'case study approach bounded by time and focus group' (Cresswell, 1998) was conducted in a design and technology department by running a design-without-make unit of work with one class of Year 9 pupils. According to Yin (1989), small sample size (as in this study) is not a barrier to external validity provided that each study is detailed and analysis of data reveals elements of practice relevant to the study at hand. The design-without-make unit is based on Young Foresight (Barlex, 1999). This is a recent design and technology initiative in England. It challenges orthodox approaches to teaching design and technology which rely on design and make assignments, focused practical tasks and product analysis.

The Educational Context and Sample

The site of the intervention was the design and technology department of a specialist Arts College with 1300 pupils aged 11–18 years. This school was chosen because staff at the school had experience and expertise in collaborative learning. A Year 9 class (age 14 years) was chosen as Young Foresight was designed to be taught in Year 9. The class of Year 9 pupils

chosen for this study consisted of 19 pupils, 8 girls and 11 boys. The class was the bottom set in a year group consisting of 11.

Purposive sampling (Cohen, Manion, & Morrison, 2003) was used to choose the teacher and pupils. The teacher was chosen based on her prior experience as a product designer and her position as a teaching and learning responsibility point holder (TLR holder) within the department. The four pupils were identified by their teacher as suitable for the purposive sampling because they were reasonably articulate and confident and would respond positively and sensibly to being at the centre of the study.

Presentation and Analysis of Data

In order to ascertain the features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trell, 2007), video evidence was collected focusing primarily on the designerly activity of four purposively sampled pupils. However, the focused observations were supplemented by footage of teacher/whole class interaction and of the teacher moving from group to group.

For the purposes of this paper I will focus on lessons 13 and 14 in a sequence of eighteen where the pupils are generating ideas. In order to interrogate the data in depth teacher/pupil, pupil/pupil interactions were presented in a grid and analysed to show the nature of the classroom interactions which take place during designerly activity. An example of the data analysis grid and the way in which it was coded is shown in Table 1 on the following page.

Table 1 An abstract showing the fine grained analysis grid, how it was coded and what the coding represents.

Disc	Lesson 13 and 14	What teachers says to whole class	What pupils say	What teacher says to individuals	What pupils say in response to the teacher	What pupils say to each other	Non verbal communication
13			<p>Miss, what do you think of this so far?</p>	<p>Excellent, remember what we said last time, about showing a person. Yes that is good.</p> <p>Yours looks like Kirsty's. So what are you doing, the lady?</p>		<p>Pupil A to pupils C and D. Are either of you two good at drawing people?</p> <p>Pupil C – I will have a go.</p> <p>Pupil C to pupil A – how do you want it.</p> <p>Pupil A – you know, just like that (gesticulates with her finger on the desk in front of her). Just do the person. Do you want a compass?</p> <p>Pupil A to pupil C – Oh so that is why my people never look right, because I always give them a circle head.</p>	<p>Most pupils are sitting at their desks getting on with their design work. One pupil is walking around looking for a rubber.</p> <p>The pupils in view are getting on with their design work.</p>

Speculating	Explaining	Elaborating	Questioning	Affirming	Feedback	Challenging	Hypothesising	Evaluating	Reflecting

Learning Conversations in lessons 13 and 14

The learning conversations within this lesson began with the teacher reflecting on the learning of the previous lesson and swiftly moving on to explore how pupils can consider the physical, intellectual, emotional and social needs of their clients when designing products for the future to meet specific needs. At this stage the teacher questioned the pupils understanding of PIES and challenged them to make this relevant to their own work through questions such as 'what need would you identify for your T-shirt? What is the end... what is it going to do. what does your T-shirt do?' to which the pupil replied 'Well, it was going to display different logos, bands etc' to which the teacher replied 'so you're need then that you're looking at is maybe more the intellectual or the social bit, so that people that wear t-shirts that have got the same band name on it or whatever, and then you can strike up a conversation, because you know that they like the same thing. So, it could encourage the social needs'. Through this teacher initiated speculation about the users' needs the teacher was able to model her thought processes which enabled the pupils to emulate this when undertaking their own design work. The pupils accepted the pupil/teacher interaction and remained resilient throughout.

Having reflected on progress the teacher led a demo on presentation skills with a view to enabling pupils to apply some of the ideas to their own work. During this demonstration the interactions were teacher led but pupils were invited to contribute.

At the end of the input the pupils returned to their seats and some were noted to make comments such as 'I am going to do it again', signalling that they had decided that it was possible to do their work more effectively.

The teacher then moved into one to one pupil/teacher interaction as she circulated within the room supporting pupils. It was noticeable at this point that sketching became the centrepiece of the conversation which represents a distinctly designerly mode of interaction and one which was well used in this case. The teacher also speculated a great deal on the form that ideas might take with comments such as 'You could do something like that yes. You could have... You would have to programme in to it'. She did this very thoughtfully ensuring that the pupils' ideas were valued but then expanded upon not disregarded.

Within this part of the lesson it is interesting to note that a number of pupil/pupil interactions were evident where support with design ideas in the absence of the teacher was sought from peers. This is an interesting example of the zone of proximal development (Vygotsky, 1978; 1981; 1986) having been enabled within this classroom through the nature of the interactions encouraged. In one case this was exemplified

when one pupil helped another to draw a person leading to the owner of the design work explaining 'Oh so that is why my people never look right, because I always give them a circle head' showing that the pupil was evaluating the design work and reflecting on her previous achievements.

At the end of the lesson the group brought their work around one table and the teacher gave feedback on what had been produced, evaluating outcomes through comments such as 'These are just as good as, or some of them are even better than the others I showed you' and giving further challenges for future lessons as she went along. This sought to confirm that she was happy with the pupils' progress but that the work could be improved further by taking account of the challenges set. This mix of praise and challenge is typical of this teachers style, as are good relationships with pupils and strong behaviour management techniques with those who need to be kept on task.

Discussion

Learning Conversations

In studying the data in order to ascertain the features of the learning conversations which take place in the designerly context being studied it is important to note that the first thing that is striking is the variety of talk functions utilised within each lesson. In encouraging the level of interaction seen the teacher 'creates a comfortable and safe environment for thinking... where all ideas matter and where there is no right answer' (Hamilton, 2007).

Research shows that classroom activities that encourage greater independence, risk-taking and intrinsic motivation, empower pupils in their learning (Dweck, 1986; Shaughnessy, 1991; Wallace, 1996). Dialogue and conversational engagement is crucial to the creation of a participatory process, critical thinking and learner empowerment (Mercer, 2000; Shor, 1992). Throughout the study the teacher utilised a broad range of talk functions in order to facilitate the development of the pupils designerly thinking and acting. These included 'speculating' as she studied the pupils design ideas and then started to think about what else they might include to make them more effective, 'explaining' as she made a point of clearly introducing each task so that the pupils understood what they had to do, 'elaborating' on points made either by herself or by the pupils in order to make them take their thinking further and deeper, 'questioning' in order to ensure that the pupils were engaged in the designerly thinking, 'challenging' usually through the nature of the questioning in order to make the pupils think more about what they were doing, 'hypothesising' to a lesser degree when trying to outline the function and nature of a product, 'affirming' as a means of accepting pupils

ideas and showing they are valued, 'feedback' to ensure that the pupils knew all about their design idea, how effective it was and how it might be improved, 'evaluating' in order to render visible what she thought of each design idea and what criteria she was judging it against and 'reflecting' where the pupils modelled her ability to reflect on the development of a design idea as it develops.

Another feature of the teacher/pupil interactions is her ability to reflect on the answers given before extending the pupils thinking. In the view of Schon (1983) 'the effective teacher is a reflective practitioner who strives to provide a learning context that engages learners cognitively, emotionally and socially' as is the case in this study. One very important feature which I believe is the cornerstone of designerly conversations is the way in which the teacher uses both her own and the pupils design work to facilitate to facilitate designerly conversations.

In the classroom being studied there has been a successful move from 'pedagogical dialogue' to 'dialogical pedagogy' (Skidmore, 2000) where the emphasis is on the kind of exploratory and constructive talk.

Another key feature of the learning conversations was the teachers' ability to relate the discussion to the real world with examples like 'Um, and this kind of device um, is similar to the ball barrow designed by James Dyson who also did the dual cyclone'.

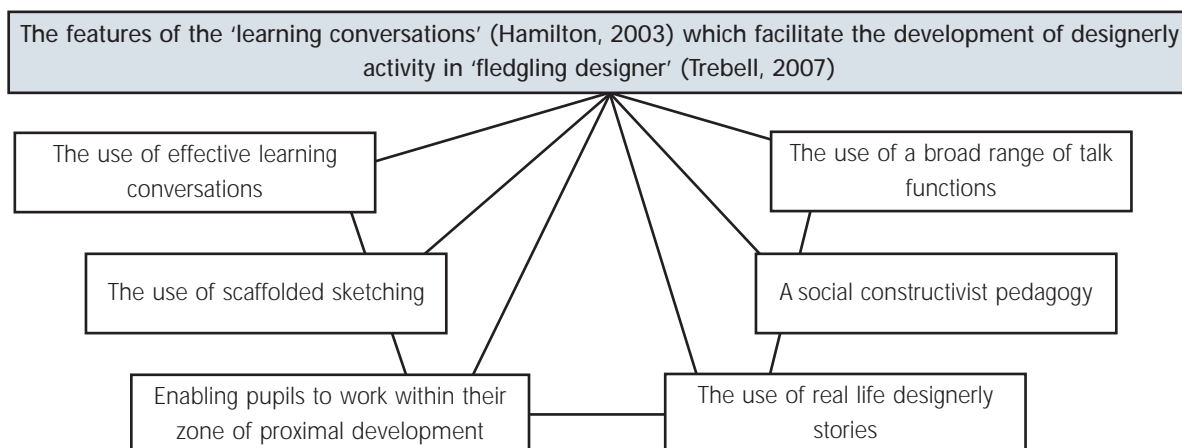
Conclusion

The features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trell, 2007), consist of a broad range of talk functions enabled by the pedagogic stance adopted by the teacher which in this case was a social constructivist approach to the co-construction of knowledge. This was supported by the teacher's subject knowledge and ability to draw on relevant examples of designerly activity in order to inspire design related dialogue. This is further enhanced by enabling the pupils to work within their 'zone of proximal development' (Vygotsky, 1978; 1981; 1986) supported by more able peers and their teacher. In addition 'scaffolded sketching' was well used by both teacher and competent peers to support the designerly activities of others within the group.

These findings can be represented diagrammatically as shown in Figure 1 below.

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Figure 1 The features of the 'learning conversations' (Hamilton, 2003) which facilitate the development of designerly activity in 'fledgling designers' (Trell, 2007).



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