Factors Contributing Towards Low Ability and Disaffected Pupils Having a Positive Perception of the Relevance of Design and Technology: a case study in a Welsh secondary school

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Abstract
Discussion of the relationship between pupils' perceived relevance of an activity and their levels of engagement has appeared on the UK educational agenda, (Ofsted 2005:51-52, Davies et al, 2004:147, Daniels et al 1998:5.5, Denton, 1992), but not with the frequency which might be expected.

Initial research in the primary author's school found that a group of low ability and disaffected pupils had a very positive perception of the "relevance" of design and technology. In contrast the literature reviewed suggested that pupils in their samples had a low perception of the "relevance" of design and technology.

Pupil understanding of the term relevant / relevance has previously been explored by the authors (Thomas and Denton, 2006). Developing on this the findings from this paper suggest that there are a range of strategies employed to promote the relevance of the subject in classroom practice, departmental documentation, policies, development plans and schemes of work. The implications of these strategies for educational practitioners and other stakeholders are discussed.

Key words
Design and technology, relevance, low ability, disaffected, Special Educational Needs, engagement in learning

Introduction

This paper reports work completed as a part of a longer term action research project by one of the authors, the Head of design and technology in an 11 to 18 comprehensive school in Wales. This project began with a case study that had as its primary research question:

What are the features of design and technology lessons that motivate disaffected and low ability pupils to engage in learning? (Case study 1)

This appeared to show that these pupils had a positive perception of design and technology at the school. A subsequent case study, (Case study 2) identified a range of factors that contributed to the development of the pupils' positive perception of the subject. Factors such as good relationships between staff and pupils, the practical nature of the subject and the use of group work emerged. A significant factor appeared to be that these pupils had a positive perception of the relevance of the subject. This was explored in a further case study, (Case study 3), reported in a previous paper, (Thomas and Denton, 2006:45).

This next phase, with a group of low ability and disaffected pupils, explores how a positive perception of "relevance" of the subject is promoted at the school. It draws on feedback from the pupils' perceptions gathered in the three previous case studies. It then adds data and analysis based on observations of teaching and learning in design and technology lessons with this group. Members of staff used a semi-structured observation schedule to look for examples of teaching that promoted a positive perception of relevance. These observations were fed into a staff Delphi group (Toffler,1970: 462) for analysis and the results fed back to the pupils for checking. This paper presents a summary of the background to the work, the methodology employed is explained, results presented and then discussed. Finally conclusions are drawn relating to how this action research project will develop.

Background

The case study school has a high proportion of pupils with special needs and is located in an area of general deprivation. At Key Stage 4 (age 14 – 16) design and technology staff operate a system in which particularly disaffected and low ability pupils are taught as a distinct group.

Both terms 'low ability' and 'disaffected' have a variety of meanings and are open to a range of interpretations. Both have been discussed in a previous paper (Thomas and Denton, 2006).

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The group of participants in this study are all located in the bottom 20% of the year group's results, (data collected from school academic records). All the pupils in the sample have a reading age of at least 2 years behind their chronological age.

This case study frames the expression "disaffected" in terms of Hustler et al, (1998:14 – 15) who identify four strands that are indicative of the disaffected: Pupils perceive school as irrelevant, have negative relationships within the school, have problems outside of school and have low self esteem.
The group being researched embodied many of these characteristics.

Case study 1 sought the perceptions of this disaffected and low ability group in relation to design and technology, school and themselves. This research identified that 80% of the group had been temporarily excluded from school at some time. The pupils were in the "bottom sets" for all subjects and had extra lessons in English and mathematics. They were labelled by staff as the "bottom set" and used similar titles to locate themselves; they were clear where they stood in terms of academic pecking order. Three pupils of the sample had a statement that identifies them as having Attention Deficit and Hyperactivity Disorder (ADHD). Relationships in some lessons had broken down. Some staff refused to teach the group and would not enter them for external examinations.

In design and technology, however, it was evident that this group, taught separately, were performing to a better standard that they were producing in other subject areas, yet still continued to be disruptive and disaffected in other lessons, (data collected from school academic and behavioural records and external examination results). Case study 2 used pupil interviews to identify factors that engaged these pupils in learning in design and technology. The findings resonate closely with the findings of Davies et al, (2004:147) who undertook research into approaches to teaching pupils with behavioural, emotional and social difficulties in design and technology. Both pieces of research found that approaches that promoted group work, raising self-esteem, praise and relevance were found to support engagement in learning. Many of these factors also resonate with findings in the literature, (Rogers, 1998:196 –208, Brochocka et al, 2001:23-29, Tufnell et al, 1997:226 –227, Pollard and Triggs, 1997:245 and Geen, 2001:34). The identification of perceived relevance, however, appeared to conflict with research undertaken by Brochocka et al (2001:23-29), Growney, (1996:75-79) and Atkinson, (1993:17:25). These researchers found that pupils in their samples did not perceive design and technology as being relevant. However these samples were not specific to low ability or disaffected pupils.

Cambridge Advanced Learner's Dictionary (2003) defines 'relevant' in two ways: firstly, connected with what is happening or being discussed, secondly, correct or suitable for a particular purpose. The first is connected to the present; it is situational, whilst the second connects more with preparation for a particular purpose. A previous paper (Thomas and Denton, 2006:45), found that the pupils in the target group subscribed to both interpretations but that they favoured the first definition - connected with what is happening or being discussed. The previous case studies identified factors that contributed towards the pupils having a positive perception of the relevance of design and technology at this school. It is acknowledged that there are many factors that contribute to this occurrence. However, to further focus the research two questions are posed:

1. What factors can be observed in design and technology classroom practice that contribute towards pupils having a positive perception of the relevance of design and technology at this school?
2. What factors can be identified in departmental documentation; policies, development plans and schemes of work that contribute towards pupils having a positive perception of the relevance of design and technology at this school?

Using the previously pupil generated factors as a framework, members of a staff Delphi group observed lessons and analysed departmental documentation. This offers the research combined levels of triangulation, (Cohen et al, 2000:113). The factors identified as significant from interviews with the pupils are tested by the observations of the Delphi group; triangulation between methods.

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Methodology

The primary methods employed were: observation, interviews and the use of a form of Delphi group (Toffler-1970: 462). This consisted of the researcher, a design and technology teaching colleague, the Special Educational Needs Coordinator, (SENCO) and a teaching assistant with experience of working with the target group. The dynamics of this group were well established. They had worked together for at least eight years in a supportive environment where listening to colleagues is an essential factor. This allowed for a more longitudinal perspective to be applied. The Delphi group was utilised to explore issues emerging throughout the action research and to limit the danger of single observer bias. In this case study, due to teaching commitments, the observations were carried out by the SENCO and the teachers' aid. Both these supported the class in all areas of the curriculum. At the start of the research it had been agreed to focus specifically on design and technology lessons. Inevitably comparisons with other lessons would be drawn. However, for ethical reasons, (Thomas and Denton, 2006a), any allusion to data from observation of other lessons would have to be negotiated with the subject teacher and would serve as a reference point.

The form taken by observation can range from highly structured to unstructured. Cohen et al, (2000:311–313) provide a comprehensive list of elements that need to be included. They suggest that numerical data can be generated from the structured observation schedule. This allows for comparisons to be made between settings, situations and frequencies. Patterns and trends emerge and can be numerically calculated. However, events of significance may occur outside of what is prescribed on the structured observation schedule. To alleviate this problem a semi-structured observation approach was adopted (Cohen et al 2000:245). Any observation schedule needs to be carefully piloted. Checks need to be made to ensure that all relevant categories are covered and that the observer is physically capable of recording the information during the observation. A pilot study was carried out to assess the effectiveness of the observational proforma and the results and recommendations for the operational observations themselves reported below.

Developing a semi-structured observation schedule supported the Delphi group in carrying out observations. The same schedule would be used by each observer; offering triangulation within this method. A basic framework was developed to guide the pilot observation. This framework was based on the findings of the previous Case studies and a published paper, (Thomas and Denton, 2006:45). An opportunity to record other observations deemed significant was also included. These could then be developed into new categories that could illuminate issues that were not predicted in the original research. Care was taken to ensure that colleagues were consistent and followed a common approach to entering the data.

The four principle ways of entering data onto an observation schedule are: event sampling – a simple mark against each category each time it is observed, time sampling – the researcher records what is happening in each category at a specific time interval, interval recording – the researcher records what has happened in the previous time bound interval, and, rating scales – the researcher makes a value judgement whilst recording an event. Event sampling and rating scales were selected for this case study as observers could enter data effectively and relatively unobtrusively using these methods.

The scale selected was a 6-point version of the Likert, (1932) rating scale ranging from 6 = very strongly agree to 1 = very strongly disagree. The 6-point scale was selected to avoid the neutral mid point that may have provided an easy option for observers to select without much thought. The scale can also indicate the intensity of agreement / disagreement. However, the assumption cannot be made that the scale between intervals is mathematically accurate. A person who records 1 as a response does not necessarily have 3 times the intensity of disagreement than the person who scores 3, (Oppenheim, 1992:190-5).

The two observers had particular roles and status within the school as SENCO and teacher's aid. Staff and pupils perceive these people differently. Equally their perceptions of the same event could differ. In an attempt to address these issues, after carrying out their observations, both were interviewed separately and asked to reflect on their observations. Their responses were recorded and transcripts checked with

them for accuracy of meaning. This technique resonates with Kvale's, (1996:183) proposition that: "Interviewee's statements are not simply collected by the interviewer, they are in reality, co-authored". Conclusions from the observations and interviews would then be discussed with the pupils in a form that they could identify with. Inconsistencies between what the pupils perceive and the two agreed transcripts could be identified.

Analysis of departmental documentation was achieved by members of the Delphi group reading the documentation, discussing it and then reflecting on interpretations. They were instructed to read through the documentation and note any reference to relevance. The Delphi group also reflected on other activities that the department takes part in to promote relevance. The example discussed below is the design and technology exhibition. This exhibition celebrates the success of pupils across the age and ability ranges and work from the target group is often displayed.

Pilot study comments

The observational proforma included details on:

- Context – physical setting, time of day, weather conditions.
- Timing – within the lesson.
- Persons – the people taking part, their characteristics.
- Activities – aims, and sequence of activities.
- Resources – deployed.
- Reactions – pupils reaction to the activities identified above.
- Feelings – what people feel and how this is expressed.

Also included were the two definitions: (A) "relevant" connected to the present, situational; What the teacher is teaching is being clearly linked to the task in hand; What the pupils are learning is clearly linked to the task in hand.
(B) "Relevant" preparation for a particular purpose; what is being taught is made explicit in terms of its usefulness in later life; A skill for life; Preparation for a job. There was also a space to record the number of incidents and to make any other comments.

The pilot was carried out by the SENCO who observed a design and technology teacher taking a lesson with the target group. Identifying the references to relevance, (A) and (B) was quite simplistic. However, the teacher used his experience to add real world relevance. For example, a conflict between 2 pupils was resolved by drawing a parallel between the incident in school and what might happen out in town on Saturday night. This issue was discussed with the Delphi group. They recognised the device and agreed that some teachers used it effectively. The discussion concluded with the group agreeing with the inclusion of an additional category in terms of relevance - (C) pastoral relevance - where a behavioural issue was resolved by relating it to a real world situation.

Pilot observation conclusions

The proforma was effective as it enabled a quick record of references to relevance to be made. This record could then be amplified by adding a note at the end of the lesson. Data collected in the pro forma could be easily numerically referenced. The context of the reference to relevance and other qualitative data would require follow up interviews to clarify meanings before cross-referencing could take place. The task was focused and would not intrude greatly on time.

The major issue to emerge from the pilot observation was sensitisation, (Cohen et al 2000:116). My colleagues and I knew that the aim of the research was to gather data on the use of relevance. Could teaching colleagues have referred to relevance a disproportionate amount of time because we were aware of the aims of the exercise? To address this issue the observers were encouraged to reflect on their experience of the last 8 years and to record if their observations were felt to be a-typical as a result of the teacher over or under reacting to the situation. Cohen et al, (2000:113) comment that studies in the social sciences are often conducted at one point in time. This can lead to certain effects being ignored or accentuated. Time triangulation, in this case a longitudinal approach, offers an opportunity to reflect on observations over a much longer period.

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Amendments to be implemented as a result of the pilot observation:
An additional category of pastoral relevance was added and a longitudinal approach would be adopted. The findings from the observations carried out as part of the research are reported below.

Findings – Lesson Observations – *how relevance is promoted in classroom practice*
The observations took place over a 2-week period. There are 25, 1 hour teaching periods in a school week. A total of 6 design and technology lessons were observed. All the lessons included the members of the target group who were present on that day.

Both observers found a high incidence of references to relevance in design and technology. Using the semi-structured observation schedule the SENCO recorded 21 references and the teacher's aide recorded 16 references to relevance in the 3 separate lessons that they had each observed. The history and RE departments both agreed to have their lessons recorded by the observers using the same schedule. Both observers found a low incidence of reference to relevance as defined by this research in these subjects. The incidence of any reference to relevance is recorded in table 1.

Table1		
	SENCO	T Aid
design and technology	21 in 3 lessons	16 in 3 lessons
history	3 in 3 lessons	4 in 3 lessons
RE	5 in 3 lessons	2 in 3 lessons

Quantitively these findings have some similarity to the findings of the previous case study, (Thomas and Denton, 2006:45 – 59), that looked at how pupils perceive the relevance of certain subjects, (reproduced below as figure 1). Note that the methods of recording differ. Event sampling was used to record this particular data in this case study whilst a rating scale was used in the previous case study. However, there does appear to be a link between the number of references to relevance recorded by the observers in a lesson and the pupils' perception of the relevance of that lesson. The pupils perceived design and technology as highly relevant whilst the pupils perceived history and RE as being low in relevance.

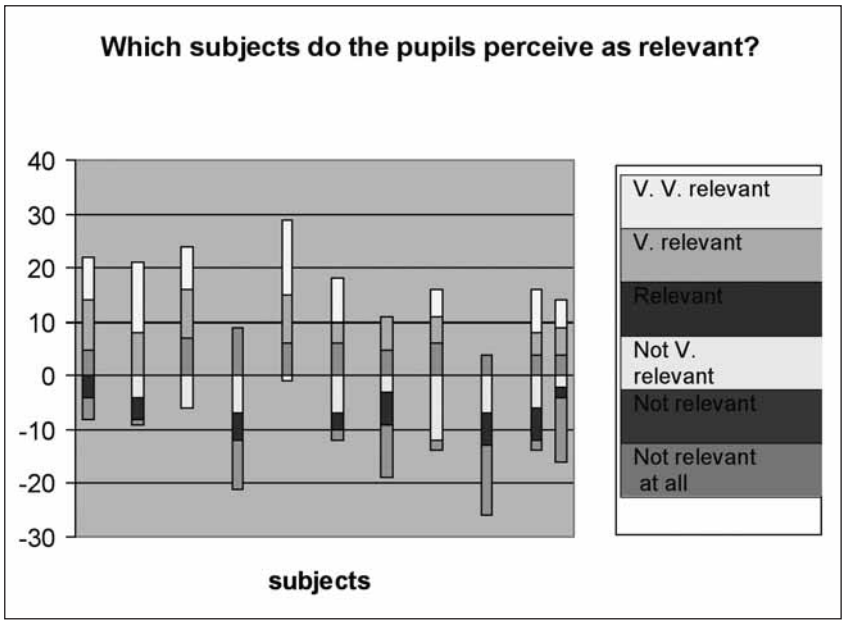

Figure 1. Which subjects do the pupils perceive as relevant?

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Findings – post observation interview with SENCO and teachers' aid

It was inevitable that comments were made on other subjects. Both the SENCO and the teachers aid supported the group of pupils in other lessons. All teaching staff were aware that research was taking place at the school but would not necessarily be as aware of the present theme of "relevance". The Delphi group was very aware of the relevance theme and noted a low reference to relevance in other lessons. Both observers commented that this was not atypical. In some lessons relevance was never alluded to. Although this may not relate directly to the research question it does create a reference point against which frequency of use can be measured against.

Would the incidence of reference to "relevance" in other subjects been higher if staff had been made as aware of the issue as the design and technology teachers? Here are two responses. Firstly, the SENCO and teachers' aid were both briefed to use a longitudinal perspective and to note if the teacher's use of "relevance" was atypical; they both reported that their observations were typical. The use of "relevance", as they perceived it, was far greater in design and technology than other subjects. Secondly, Woods, (1996:83) describes researchers who adopt a qualitative approach as those who: "Seek lived experiences in real situations. They try not to disturb the scene and to be unobtrusive in their methods in an attempt to ensure that data and analysis closely reflect what is happening." Informing participants of every development would disturb the scene and would make the research more difficult to manage. There would also be a greater risk of reactivity, (Lave and Kvale, 1995:226).

Both interviewees noted that the use of relevance was widespread in the pedagogy of design and technology lessons observed – "design and technology lessons always pick up on the relevance theme", (SENCO), "Design and technology lessons are always peppered with references to relevance" (TA).

Both interviewees noted that the use of relevance was regulated to have effect at intervals throughout the lesson – "announcements are made at intervals throughout the lesson", (SENCO), "design and technology lessons are structured a bit at a time, You all tell or show these pupils something at regular intervals throughout the lesson, " (TA). In response to the follow up question what is an "interval"? The SENCO defined it as a critical period of time that was the duration of the classes' engagement on a task. It depended on the class, the task and the teacher's ability to sense when things were shifting away from engagement. The teachers' aid gave a time of anything between 2 and 15 minutes. It depends on how things are going in the lesson.

Both interviewees noted that the use of relevance was explicit. The pupils were instructed that what was going to happen next or was taking place at that moment was relevant to them – "Make announcements at intervals throughout the lesson which herald the relevant bits ...a tendency to punctuate the lesson with "This is important.. You need to know how to do this" (SENCO), "You all tell or show these pupils something at regular intervals throughout the lesson…. The lesson continued with a structured demonstration, step-by-step, on how to produce a simple 2 D design drawing. "To get this on your screen you will need to do this, this and this", (TA).

On the issue of being over sensitised both interviewees commented that their observations were representative of their experiences over much longer periods. "My formal recording of observations may be over a short period but my experience of teaching and learning across the subjects in this school is over a period of 10 years", (SENCO). "I have worked at the school for 8 years and supported in lessons for that amount of time. I believe that my recorded observations over the week of lessons are an accurate picture of what happens, in general, in most lessons. I am more aware of the use of relevance in design and technology because that's where I notice it the most."

There was little disparity in both sets of interview. Both interviewees were in agreement with my interpretation of their observations. This could be for a range of reasons. After 2 years of being directly involved in action research and 18 combined years of informal observation it could be argued that the SENCO and teacher's aide had sufficient skill to carry out meaningful observations, or, they had become so aware of the use of relevance in design and

technology they were unable to identify it as readily in other subjects. The focus of this research is design and technology; it could be argued that the perceived low incidence of the use of relevance in other subjects is a separate issue.

How is relevance promoted in design and technology documentation at this school?

Analysis of the departmental documentation was selected as a starting point to establish if "relevance" was systematically built into departmental policy, schemes of work and lesson plans. The departmental documentation; policies and development plans provided little direct reference to the systematic use of "relevance". However, the schemes of work showed considerable reference to "relevant" connected to the present, situational; what the teacher is teaching is being clearly linked to the task in hand; what the pupils are learning is clearly linked to the task in hand. The group then analysed schemes of work from four other subjects and found that these used relevance in a similar way. A scheme of work is intended to link teaching and learning to the task or lesson that it refers to. The analysis of departmental documentation found that "relevance" was not systematically built in.

The Delphi group and departmental members reflected on ways in which the department promotes relevance in its procedures. The department markets itself positively by using strategies to engage with the community. An example is the design and technology exhibition. This is an inclusive event that celebrates the success of pupils across the age and ability ranges. Work from the group being researched is often displayed if it meets the criteria of being a "best effort". The exhibition is open to the community and to parents. There have been occasions where it has been the only event that a parent has voluntarily attended. Contact with the school for these parents can be confrontational with the Educational Welfare Officer or disciplinary hearings. They tend not attend parents evenings. Gutteridge, (2005) found that parental non-attendance to parents evening was a typical symptom of the disaffected child.

The exhibition can act as a bridge and engage the parents of a disaffected child into a positive relationship with the school. Including work from this group of people may be for some the first tangible acclamation the school has given them since early primary school. Some pupils found that through having worked displayed and thus achieving acclamation the subject was relevant to them in terms of definition (A), it was connected to what they were doing and it was enjoyable at the time.

It should be acknowledged that other factors contribute to a pupil's perception of a subject. The school and its curriculum emit messages that can be interpreted differently by different people. The term "curriculum" is problematic and open to a range of interpretations. It can be interpreted broadly: "Encompassing the experiences of everyone in the institution… Curriculum does not just refer to the written intentions of teachers, but to the sum of all the messages sent and received," (Potts & Armstrong, 1995:78). In this sense it is inevitable that other factors contribute. What impact does: The display of work have? The tone of voice that the head teacher uses to speak about the subject? The way in which the subject is perceived within the community? All are valid questions and are worthy of further research. At the moment, however, they lie outside the scope of this research that is based on classroom practice.

Conclusion

This paper represents the fourth case study in an action research project. Any conclusions must be viewed within the context of the research. The research is based on a target group of pupils who are identified as low ability and disaffected within the context of this school. They are taught as a discrete group of 16 as a maximum. The conclusions will help to direct the next phase and may be of interest to a diverse audience.

In response to the research question "How is relevance promoted in design and technology classroom practice at this school with the target group of pupils?" The answer appears to be that in the observed design and technology lessons the use of relevance is widespread, and explicit. The children are told in each lesson, throughout each lesson and clearly during each lesson that design and technology is relevant to them. This persistent reminding is reinforced by tangible, relevant activity within the lessons observed. For example, a lesson on vacuum forming began with a chocolate box insert: *how was it*

made in the real world? Then an introduction to the vacuum-forming machine: *health and safety, hot surfaces.* Then the design of the mould: *exemplar moulds and products.* Then activity: *to make their own moulds for an insert.*

There are similarities with critical point inputs –a short, focussed teaching strategy at carefully selected points within a lesson that supports learning. Denton, (1994:61) comments that critical inputs can be effective in helping children recall and transfer previously learned knowledge. He suggests that they are particularly effective in supporting project work in design and technology. Critical point inputs can help to focus lessons, share developments and learning from different on-going projects, and, if well managed could be a motivational tool. This strategy could be particularly useful with low ability groups. Academic Engaged Time, AET, is a term used to describe a pupil's application to a task and positively correlates with achievement, (Leech and Ingram, 1989). Denton, (1992) found that AET rises when children recognise the relevance of specific learning to their own future.

The previous paper, (Thomas and Denton, 2006:45 – 59) showed that this group of pupils' favour the first definition – *"relevant" is connected to the present it is situational.* These pupils had more difficulty in recognising the relevance of specific learning to their own future as opposed to recognising the relevance of specific learning to the situation that they were in. The classroom practice appears to accommodate this learning trait by the widespread and explicit references made to relevance.

The early research resonates with the philosophy embodied in the "listening to learners" agenda, (Estyn, 2004, Ofsted, 2004). This case study has used the data gathered from the pupils and tested it through classroom observation by a Delphi group. The findings of this case study support the findings in earlier research regarding the pupils' perceptions of what promotes relevance in design and technology. However, additional data has been gathered, for example the issue of pastoral relevance. The Delphi group were also able to articulate their observations more readily than the target group of pupils.
The Delphi group reflected on this case study and identified the following factors as contributing to the widespread and explicit references to relevance.

These factors were also discussed with the target group of pupils using appropriate language. The pupils were able to recognise the majority of factors identified by the observers. In particular factors that related directly to their own practical experiences, for example, relevant subject matter and the use of health and safety. These key factors are summarised below.

The three main categories of relevance:

- Relevant for the future/for a career/for an examination?
- Relevant for the present/need to complete a task/enjoyable/health and safety?
- Relevant in a pastoral sense/relate to real world situations?

Examples of activities relating to relevance
Before the lesson starts – is the subject matter relevant to the pupils? How much input have the pupil had in the selection of a relevant topic? Has any prior discussion been teacher-led to direct towards certain topics, for pupils to gain ownership?

At the start of the lesson – explicit aims – short-term – check for understanding

Activity – timing gauged by pupil engagement to the task

Re-focusing / critical point inputs –
Immediate relevance – *need to know to do this*
Real world – *in a factory they do this*
Future career – *if you are thinking of being a…you would need to do this*
Future life – *this will be useful for you when you have a house of your own*
Health and safety – *watch this or you may hurt yourself*

Use of praise/exemplar material
This is good work that John has done

Reduce fear of mistakes
We all make mistakes, everybody learns from mistakes, you learn more when you don't get it right first time

Self assessment/group assessment
What do the class think? What do you think?

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This case study has raised awareness of the design and technology staff at the school regarding their use of relevance as a teaching strategy. Data collected indicates that their use of relevance had been widespread but not systematic. The staff had been unaware in some instances that they were making any reference to relevance. However, since the case study has raised their awareness staff have become more systematic in their use of the above strategies. These staff will be interviewed after a term to assess if, in their opinion, a more systematic approach to the use of theses strategies has increased pupil engagement in learning.

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