

Module Assignment Cover Sheet

Module Number

PDT 4090

Module Title

Action Research for School Improvement

Module Tutor

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Date

6th may 2010

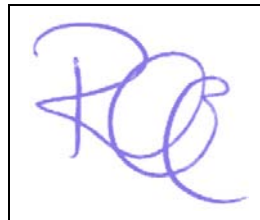
Submitted for the first time? **Yes**

Re-submitted **No**

Declaration

Please sign here

I declare that this is my own work.



Executive Summary

| | | |
|---|--|----------------------------|
| Title of the Work | Getting Emotional about RM | |
| Author | Rory O'Connor | Date of Completion 05/2010 |
| Institutional Contextual Details E.g. Phase | <ul style="list-style-type: none"> • State Funded Secondary School • Key Stage 3 – Year 9 | |
| Major Needs Identified | <ul style="list-style-type: none"> • explore ways of measuring the emotional aspects of students' resistant materials technology experience. • Investigate the impact of collaborative creation of a whole class design and make outcome upon student emotions and achievement. | |
| Methods used to collect data. | <ul style="list-style-type: none"> • Emotional Response - Self-Assessment data • Comparative teacher assessment and observation. | |
| Summary of Major Findings (Or recommendations to others) | <ul style="list-style-type: none"> • It is possible and useful to measure student emotional response to their work in D&T. • Collaborative whole class projects can be used to widen student experience and raise attainment. • A high quality whole class collaborative outcome does not necessarily lead to improved levels of pride and confidence. | |
| Impact of the Project (And evidence source) <ul style="list-style-type: none"> • Knowledge • Practice • Pupil/Student learning Experience • Pupil/Student Learning Outcomes | <ul style="list-style-type: none"> • Increased researcher knowledge about students' emotional response to their work. • This will impact on further research and widening of the study. • This will feed into curriculum design. • Much wider range of student learning experiences in collaborative project. • Development of collaborative and team working skills • Increased student attainment in collaborative project | |
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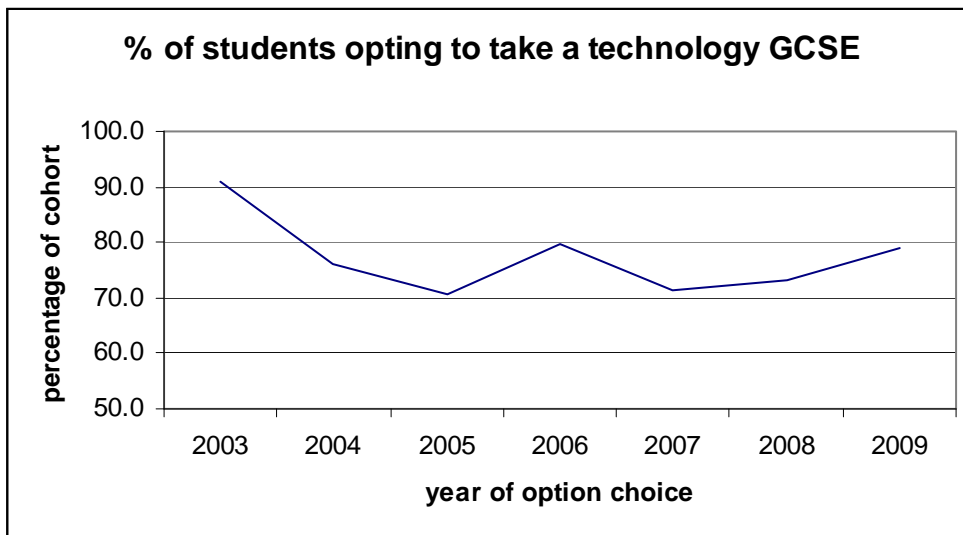
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Getting emotional about 'resistant materials'!

Introduction.

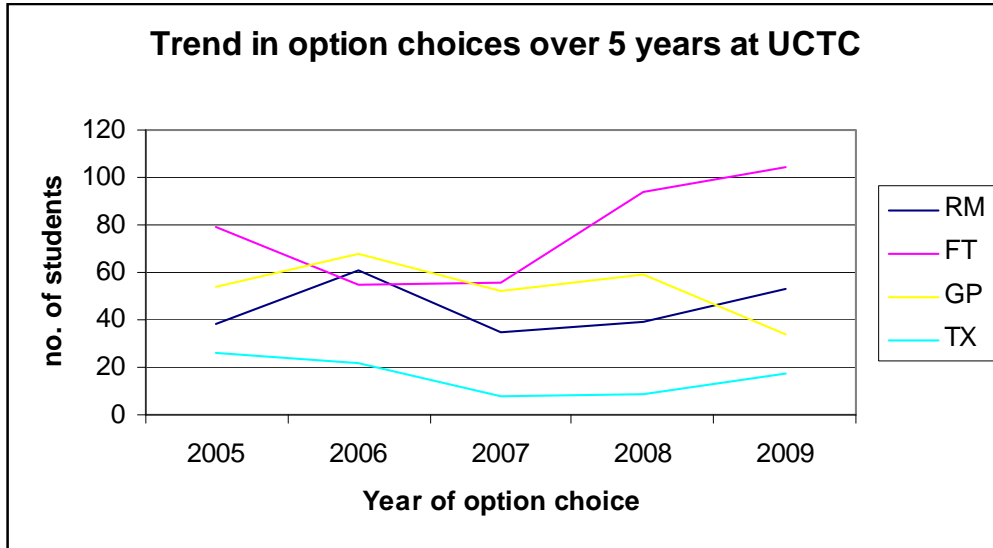
I work in a technology college where the study of Design and Technology (D&T) at KS4 is supposed to be compulsory. However in the last 5 years as the range of options available to students has increased, especially in terms of vocational education, we are seeing an increase in the number of students dis-applying themselves from technology at KS4. Many of these students are following vocational courses which take up to 40% of their curriculum time. This means that most of the rest of students' time in college is devoted to the core curriculum. However, there is also a cohort of students who follow a traditional timetable but who do not opt to take a D&T GCSE. The graph below shows that the percentage of students opting for a GCSE in technology at UCTC has dropped from 90% in 2003 to the 73% in 2008.

There are also increasing numbers of students opting to take food technology. The graph below shows the numbers of students opting into the four material areas offered at Uckfield over that last 5 years. Close to 50% of the current year 9 cohort have opted to take food technology. This is currently putting a great strain on the departmental resources and has meant that some students are forcibly being directed to study their second choice of technology material area instead of Food technology option they prefer.



The D&T department has been highly successful for many years and it has relied upon tried and tested projects. However the current KS3 projects have remained unchanged for many years. The students have few opportunities for collaboration and they each produce individual outcomes. The range of materials used by students is currently quite limited and systems and control is taught through ICT simulation software rather than hands on, tangible experiences. There is also very little direct cross curricular linking in D&T.

I intend to explore how yr 9 students feel about their learning experiences in resistant materials technology and work with them to identify how these learning experiences could be improved.



Initial Foci

The initial foci of my inquiry are to;

- explore ways of measuring the emotional aspects of students' resistant materials technology experience.
- Investigate the impact of collaborative creation of a whole class design and make outcome upon student emotions and achievement.

Within these foci I am expecting to include elements that address;-

- Developing creative thinking skills.
- Collaborative problem solving and decision making
- Developing interdependence.

What questions will I try to answer?

- Do yr 9 students feel negative about their resistant materials technology experience across existing projects?
- Is it more emotionally rewarding for students to work collaboratively towards a shared goal/outcome in resistant material technology?
- Do students achieve better quality end products when working towards a single whole class collaborative outcome?

My hypotheses are that;

- Year 9 students currently feel some negative emotions with regard to their learning within existing individual outcome projects in resistant material technology.
- Working collaboratively and creating a collaborative outcome can be emotionally rewarding for students.
- Working collaboratively and creating a whole class collaborative outcome will lead to a higher quality end product.

These questions are important to UCTC and to me because;

- The emotional and social aspects of learning are central to student success and exploring ways of measuring these in technology is a starting point in a journey of ensuring student needs continue to be met by our curriculum.
- Students today live in a dynamic, technology rich world and it is my role as an AST to ensure that our curriculum can meet the changing learning needs of today's students.
- As an AST I must explore new and exciting ways of taking design technology education forward to make it relevant and engaging for today's students to address possible weaknesses in the current curriculum.
- It is critically important that students are able to engage with all areas of the D&T curriculum in our **technology** college.
- Our students are not given sufficient opportunities to develop the skills necessary for productive collaboration, in particular we are particularly ineffective and creating learning experiences that require student inter-dependence.
- The PILTS agenda has not yet been embedded in the ethos of designing learning experiences in D&T.

Contextual information to bear in mind?

- Students will all be year 9 students in mixed ability groupings.
- Students in the group are likely to have shared the same year 7 and 8 D&T learning contexts in terms of teachers, projects and working environments.
- Students normally have the same teacher for both food and textiles in each year
- Students normally have the same teacher for both Graphics and Resistant materials technology in each year.
- Students come from a wide range of home background contexts in our broad socioeconomic catchments area.

Summary chart of my professional development needs

| At the end of this programme I will be able to:- | Sources of evidence that outcome is needed: | My professional development needs: |
|--|---|---|
| Articulate a meaningful methodology for measuring student emotional responses to Design Technology learning experiences. | <ul style="list-style-type: none"> • Social and emotional aspects of learning agenda. • Personal learning and thinking skills agenda. • Every child matters agenda. | <ul style="list-style-type: none"> • Acquire a thorough appreciation of the body of literature on measuring emotions and how emotional responses affect learning outcomes. |
| Describe the effect that working towards a whole class collaborative outcome has on student emotions. | <ul style="list-style-type: none"> • School data indicating that the proportion of students opting for resistant materials technology is declining. • Personal learning and thinking skills agenda. • Social and emotional aspects of learning agenda. | <ul style="list-style-type: none"> • Acquire a thorough appreciation of the body of literature on learning through collaboration and the emotional aspects of collaboration. • Understand the components of an effective collaborative project. |

Overview of my professional developments needs

Over the last six years I have moved from the role of Curriculum Manager to become an AST for D&T. In this strategic role I have developed a degree of expertise in the teaching and learning of D&T and I have strived to ensure that new technologies are adopted in a manner that makes a real difference to student learning. For the last few years my work in Uckfield Community Technology College (UCTC), and my work for the School Improvement Service, has been very much focused on Key Stages 4 and 5. I now have an opportunity to re-focus on key stage 3 in UCTC. Through my initial investigations it has become clear that there has been little fundamental change over the last few years, in terms of the types of student experiences on offer.

I am a social constructivist in my approach to teaching and learning and therefore it is not surprising I am excited by collaborative aspects of teaching and learning. My recent experience tells me that collaborative approaches have worked very well in improving motivation and autonomy at GCSE. Further, enjoyment, motivation and quality of outcomes are extremely high in both the collaborative working environments of the Greenpower Electric Car Club that I run as an extra-curricular club and in the extra curricular Spiritus Carnival Club at the school. I observe that both these clubs combine rigorous designing and making in a range of high quality 'modern' materials, with large scale collaborative outcomes. Individual students or small groups contribute parts towards the single collective whole. The collaborative outcome appears to inspire feelings of collective and personal pride in those who have contributed. I am interested in exploring the importance of the 'feel good factor' in learning and how that might affect student choices in D&T in year 9.

I believe that a major part of my role as an AST is to help provide insight and expertise to shape technology education at department, school and maybe even county level. I see this programme as an opportunity to continue my own learning journey into exploring the practical possibilities and to ground these explorations in the wealth of research literature that already exists.

Currently the Key Stage 3 technology curriculum focuses very strongly upon individual outcomes in all practical activities. We are keen to promote 'ownership' of outcomes and this has been a successful approach; students achieve well when compared to national and local standards, and this is reflected in GCSE and A level results.

However the percentage of students opting to take GCSEs in D&T has fallen over the last 6 years from 90% to 73%. Of these students the proportion opting for Resistant Materials technology has fallen at a more significant rate. These trends suggest that prior to the options process in yr 9; students are finding Resistant Materials technology less attractive than previously.

The D&T department at UCTC has not really addressed the trends reflected in the options choices data. They have just reacted to the challenges that this has created in terms of rooming, resources and staffing.

The curriculum has remained largely the same and the range of materials offered is very standard. Despite the many breakthroughs and developments in materials technology over the last 10 years there are no 'smart' or modern materials currently used. As the range of materials available to teachers has increased and their cost decreased so we should have seen more and more exciting materials being made available to our students but this has not happened at UCTC.

The school development plan includes many references to the need to increase Personal Learning and Thinking Skills in our students. We are committed to exploring the Social and Emotional Aspects of Learning.

Nationally D&T has recently been 'downgraded' as a subject from the 'Core' to a foundation subject. This implies that it is not one of the key 'essential' subjects and since D&T is an expensive subject, opens the door to potential marginalisation. It is particularly important to those of us passionate about the benefits of a rounded and meaningful technology education to ensure that student enjoyment and motivation are at the heart of course design.

The Every Child Matters agenda, emerged as a result of the restructuring of Childrens services in the UK 2003/4. The emphasis is now on providing joined up services for children. For schools this means meeting the challenge of providing 'personalised learning' and developing thinking skills. The 'Personal Learning and Thinking Skills' framework comprises of six groups of skills; independent enquirers, creative thinkers, reflective learners, team workers, self-managers, effective participators. The Every Child Matters agenda focuses quite rightly on Enjoyment as a fundamental principle.

I want to instigate real and meaningful modernisation and change in Resistant Materials D&T at keystage 3. This year I will focus on:

Methods I can use to capture meaningful data about students emotional responses to their learning experiences in D&T
Exploring more formally students' emotional responses to working together towards a collaborative outcome.

My professional autobiography.

In order to contextualise this study and my place, as researcher, in it, it is important to reflect briefly on the journey that I have made to get to this point. I need to be clear about the influences and experiences that have shaped my thinking.

Education is in my blood; my father was an HMI and my mother a lecturer at London College of Furniture. I trained as a silversmith when I left school and I worked in the silversmithing industry for over 10 years but unable to resist the pull of the education system I then trained as a teacher and secured my first teaching job when I was 31 years old. This was at Uckfield Community Technology College (UCTC) and I am still there. Within 2 years of my starting my first job I became head of the Technology department, then 2 years after that I took on the hectic role of head of faculty. During the 16 years I have taught there, UCTC has grown significantly in physical terms and it has moved forward in leaps and bounds in terms of teaching and learning standards. This is evidenced by the recent retention of our 'outstanding' OfSTED status.

Over the past 15 years the technology dept GCSE results have risen from 35% to 79% A* to C and we have developed a thriving 6th form community of around 60 students who are studying both level 2 and 3 courses in hospitality, food, Product Design with Graphics, Textiles and Resistant Materials.

My interests and strengths have always been in pedagogical issues in D&T teaching and learning rather than other management issues and consequently in 2003 I applied for and was appointed as an AST for D&T at UCTC. In this role I have been able to focus upon improving teaching and learning in many different contexts and to date I have continued to find the role challenging, fascinating and engaging.

One of the first major projects that I undertook was the reappraisal of the lesson observation system at UCTC. In preparation I undertook training in Inspection skills with OfSTED and successfully received full OFSTED inspector accreditation. This training has proved invaluable as it has equipped me with knowledge and skills that now enable me to quickly determine whether effective learning is taking place in a lesson and to identify whether students are making progress. I have now created a lesson observation system that was deemed 'Robust' during the last two OFSTED inspections at UCTC and I continue to maintain the integrity of the system by training new staff and newly appointed heads of department.

My role leading the assessment of teaching and learning in lessons naturally progressed into me becoming much more involved at management level in advising on ways to improve teaching and learning. I spearheaded the implementation the Assessment for Learning initiative (Black and William) across UCTC and my work continues with embedding the AFL principles across the college. The work to date has involved the delivery of whole college INSET sessions and working closely with curriculum managers on methods of implementing AFL in their subject areas. We used an Action Research model to explore the opportunities, benefits and barriers to implementation and the results were consistently very positive. Since then research by the Senior management team (SMT) has shown that AFL principles underpin the majority of lessons observed at UCTC.

My work on AFL brought into focus for me the challenges of meeting the needs of every student in the class who is making progress at their own unique pace, as well as the value of collaborative learning. Whilst throughout my teaching career I have always informally created opportunities for collaborative learning and peer review, it had never formally played an integral part in my course delivery.

In 2007 I completed a project for the QCDA as part of the New National curriculum consultation process. My project examined ways of enhancing creativity in D&T and it focused especially in developing assessment systems

that reward risk taking in design. One of the outcomes from this project was to highlight the important role that collaboration plays in developing creativity.

In 2008 I completed a research project that investigated the use of Web 2.0 technologies to facilitate collaborative review in design work with GCSE students. I found that Web 2.0 technologies, the use of working groups and peer comment scaffold the iterative design process. Students returned to their design work to refine and develop it in response to peer comment. There were measurable improvements in attainment, motivation, autonomy and out of lesson participation. The findings and techniques I used have been shared with my colleagues and many departments are now using this technology with students. Both the Art departments and the English departments have reported very impressive outcomes.

There are a number of factors that have affected my selection of focus for this research project;

- Changes in the classification of technology to a foundation subject by the DCFS point to a possible marginalizing of D&T.
- The attainment of a second Specialist Status (Applied Learning) for my school has reduced the pressure on the Senior Management Team to promote a technology requirement for all at GCSE.
- There are an increasing range of courses on offer at GCSE.
- Trends in GCSE options choices made by students in year 9.

Reviewing Literature

My research objectives are to;

- Explore ways of measuring emotional aspects of students resistant materials experience.
- Investigate the impact of collaborative creation of whole class design and make outcome on students emotions

It is clear that I have to have a basic grounding in emotional responses to learning as a first priority. Within this domain I have identified the following key questions.

1. What are emotions?
2. What is the evidence that emotions affect learning?
3. What emotions should I be measuring?
4. What techniques can I use for measuring emotions?

What are emotions?

The body of literature about emotions represents a very wide area of research with a long history of enquiry and theorising, from the ancient Greeks to the present day and interesting scholars from many disciplines including psychology, philosophy & medicine.

It is apparent that from an evolutionary perspective emotions are linked to survival mechanisms. They guide approach and avoidance behaviours in humans (Nico Fridja ,1986). This approach gives two clear categories to explore and measure, positive/negative valence (attractiveness) and intensity of feeling.

If we accept this evolutionary perspective, it implies that emotion is likely to be fairly universal across cultures, and experienced similarly by most people. It must also be a powerful behaviour driver if it is linked closely with human ability to survive.

Emotions are manifest in four key phenomena;

- Behavioural reactions for example approaching or running away.
- Expressive reactions for example smiling.
- Physiological reactions; for example increased heart rate or blushing.
- Subjective feelings; for example feeling amused or irritated.

The mechanics of emotions

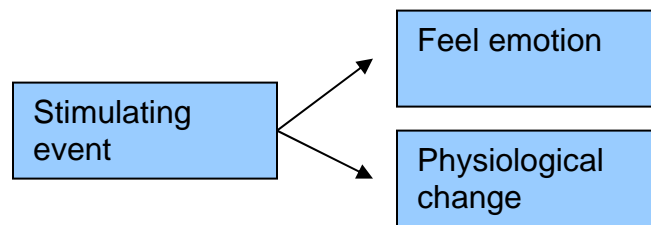
There have been many theories about how emotions actually work and if I am to attempt to measure emotional response in my students I need to have a basic understanding of these theories.

James–Lange theory (1884) suggests that emotions result from the experience of a physical change, we feel sad because we cry, as opposed to the more common idea that we cry because we are sad. James suggests that the perception of the physical change is the emotion. This view is supported by later experiments (Laird, 1974) that show that by altering the physical state the emotion can be produced. In its simplest form this might be interpreted as the act of smiling makes one feel happy, and is the basis for ‘laughter therapy’.



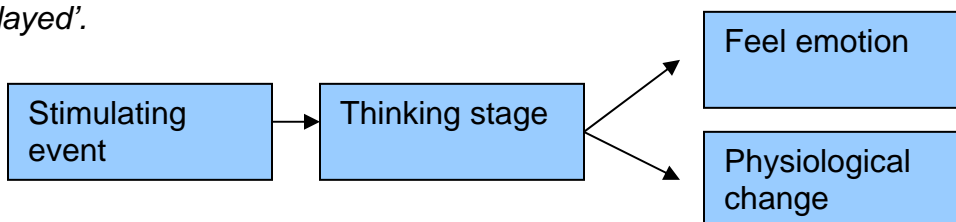
If my aim is to increase feelings of pride and self esteem, I could ask the students to adopt a prideful stance while no I’m not so sure this is the way forward.

James-Lange theory was refuted in the late 1920s by Cannon (1927). His studies showed that when a stimulating event happened we feel emotion and physiological changes simultaneously rather than one being the trigger for the other. This might be illustrated with the example, ‘*My work is held up by my teacher and publicly praised, I feel proud and smile simultaneously*’.



A student of technology at UCTC will face many situations which could be the ‘stimulating event’ in this instance. Many teenagers attempt to control the physiological evidence of both positive and negative emotions in order to maintain the status quo with their peers.

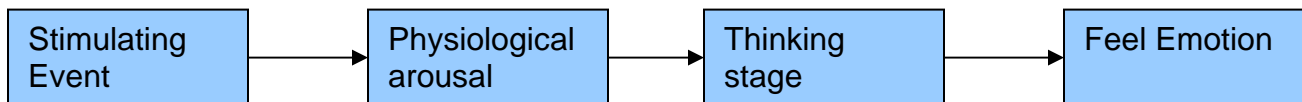
Cognitive Appraisal Theories of Frijda (1986) later developed by Lazarus (1991) suggest that we decide what to feel after interpreting or explaining what has just happened. Two things are important in this: whether we interpret the event as good or bad for us and what we believe is the cause of the event. This supports the earlier work of Cannon and Baird but crucially has an additional thinking stage. An example of this might be, ‘*a fellow student’s work is chosen to be displayed in the school foyer, I feel resentful if I think that my work deserves to be displayed*’.



The inclusion of the thinking phase in this model is important to my thinking because it implies that if I engineer a thinking stage into my measuring process it will promote the examination of the student's emotional state and so will improve the clarity and veracity of the feedback.

Two factor theory of emotion uses a different model and is supported by the experiments of Schacter and Singer (1962). They proposed that the first step in experiencing emotion is physiological arousal (similar to James-Lange theory) and that we then apply reasoning to deduce our feelings and label emotion at a subconscious level; thus we don't just feel angry, happy or whatever: we experience feeling and then decide what they mean.

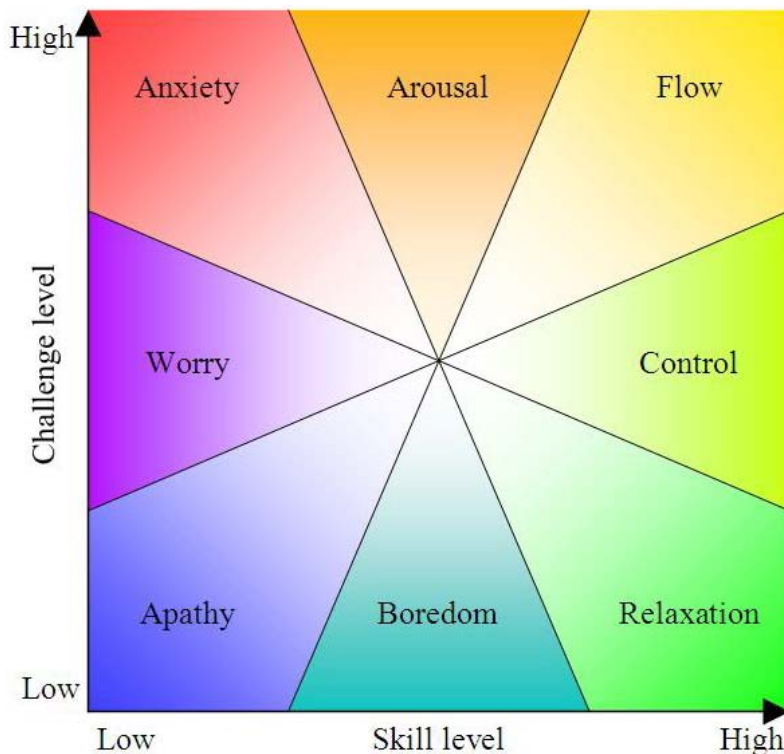
An example of this might be, *'a fellow student's work is chosen to be displayed in the school foyer rather than mine, I feel aroused, I reason that, as my work is better, this feeling is resentment'*.



What is the evidence that emotions affect learning?

The influential psychologist and professor Mihaly Csíkszentmihályi (1988) noted for his work on happiness and creativity is best known for creating the notion of 'flow'.

He identifies seven emotional states; arousal, anxiety, worry, apathy, boredom, relaxation and control and adds to this 'flow'



Flow is the state where a person is fully immersed in the task or activity they are engaged in, and is characterised by a feeling of great absorption and fulfilment. Often outside issues such as time, hunger will go unnoticed in a state of 'flow'.

This diagram created in 1997 by Mihaly Csíkszentmihályi depicts the relationship between one's perceived skill level and the perceived level of challenge. The centre point of the diagram represents average skill and challenge. This model suggests that to set tasks that do not sufficiently challenge students will lead them feel relaxed or bored. If challenge is too high in relation to students perceived skill level they will feel worry or anxiety. This model is supported by my experience in the classroom, but it does add one important aspect to the equation; student self esteem or confidence. Because we are discussing an individual's **perceived** skill level rather than **actual** skill level, if they feel that are under-skilled they are likely to fall into states of anxiety, worry or apathy; dependent on the level of challenge. Consequently when designing tasks it is essential that I focus not only on setting appropriately challenging tasks, but also upon ensuring students *feel* 'empowered' with appropriate skill levels. Thus confidence of students is a really important aspect in the promotion of desired states or arousal, control and flow.

Professor Barry Kort (2004) in his lecture 'Cognition, Affect and Learning' delivered at the 2004 IEEE Education Society LearnTec conference proposes that learning is not a smooth journey, and that in the process of learning we must go through a sequence of emotions and that this is paramount to the learning process. He describes a learning path where as you start to investigate an area of learning, progress is rapid, curiosity gives rise to initial feelings of satisfaction as you construct your first limited mental models. In phase two as we begin to make predictions we encounter problems with these initial mental models this causes us to feel anxiety as we have to re-assess, un-learn and discard misconceptions. As new mental models form, that take account on the new knowledge or understanding, so the cycle is repeated.

Part of Professor Kort's (2004) contention is that for people to learn successfully and construct knowledge, we have to go through periods of anxiety, confusion and dispiritedness. This means that when planning my students' experiences in the classroom, I should not seek to avoid states of anxiety or frustration because they are required in a successful learning journey. When measuring student emotions I need to take into account the stage of the journey that the students are on. Further in any learning journey I must endeavour to make sure that students end their learning journey with positive emotions rather than negative ones like anxiety, frustration or dispiritedness.

Which emotions should I be measuring?

Many of the models for measuring emotion focus on two key areas:

- Valence which classifies emotion in terms of positive/negative feeling. These can be linked to attraction/repulsion or approach/retreat impulse.
- Arousal which classifies emotion in terms of intensity of feeling (Russell 2003)

A third focus for measurement is dominance/control. This classifies emotion in terms of the degree of control experienced.

I am trying to understand and measure if students feel negative about their experiences in D&T, thus Valence must be one of the measures. Since the degree of student positive or negative emotion is also critical to my understanding, I will also attempt to measure Intensity, and I as I am interested in developing a more creative D&T experience I will also measure the degree of control that students feel over their work. I am working under the assumption that students feel less control over a rather narrow 'focussed practical task' than an open ended 'Design and make' project.

Additionally I am seeking to define some of the positive or negative emotions to add 'colour' to the rather 'black and white' measures discussed above. My original hypotheses suggest that students' feelings of pride are important in motivating students and affect their option choices for GCSE course choices.

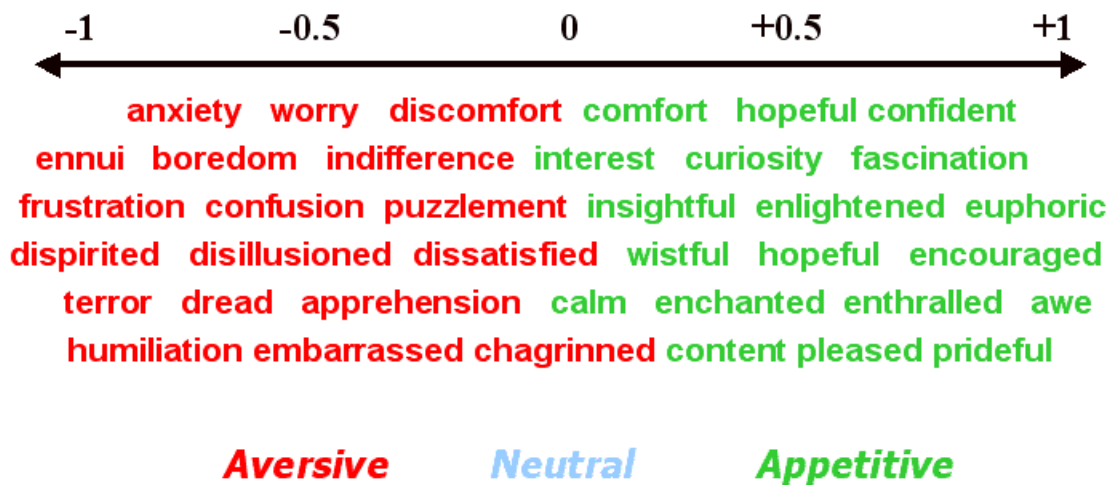
I anticipate that measuring a range of distinct emotions will help me to understand the emotional landscape within my classroom, Further it will enable me to cross-reference the consistency of the self-reported levels of student valence and intensity by comparing the positive/negative scores with other specific emotional measurements. For example, if a student reports positive Valence it might follow that that student self reports a positive score for other emotions.

How to verbalise and arrange diverse range of emotions.

Dr Barry Kort (2004) seeks to identify and focus on emotions relevant to SMET (Science, Maths, Engineering and Technology) learning. He identified 6 candidate axes of emotion:

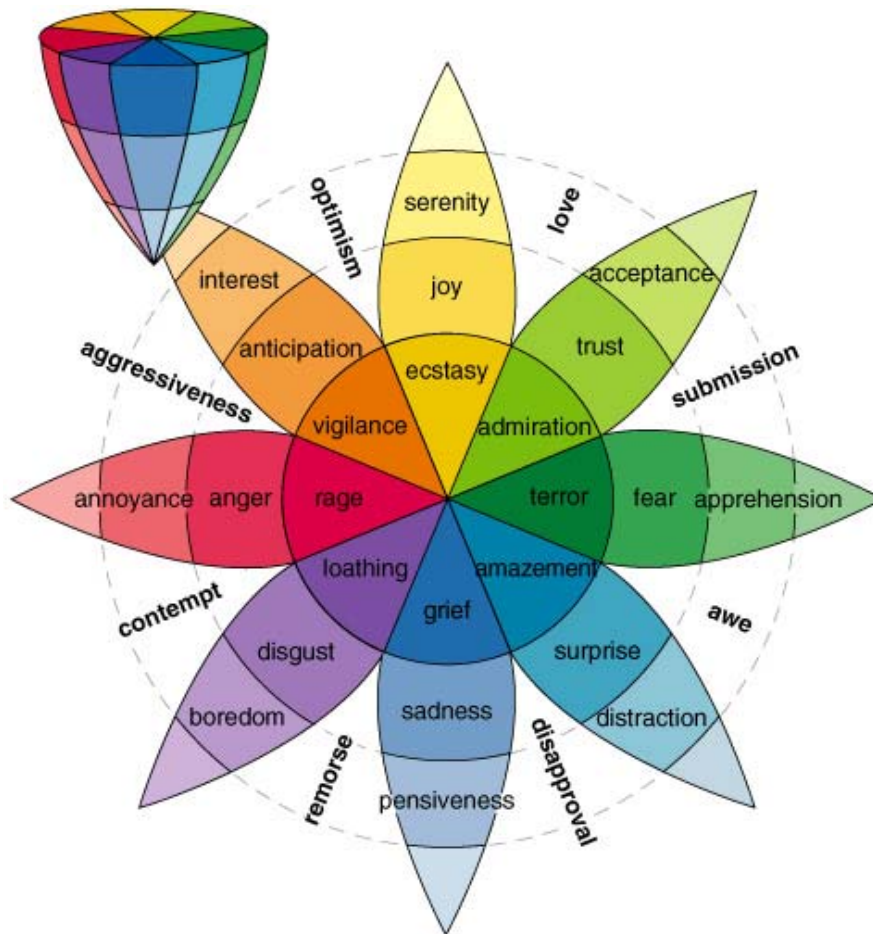
- Anxiety-Confidence
- Boredom-Fascination
- Frustration-Euphoria
- Dispirited-Encouraged
- Terror-Enchantment
- Humiliation-Pride

These axes are arranged in an emotional taxonomy.



This is of great interest to me as it is directly related to learning and it also includes an axis for humiliation – pride; students’ feeling proud of their work is something I really want to ensure.

Of the axes Kort (2004) has identified here, the axes ‘Anxious to Confident’, ‘Humiliation to Pride’ and ‘Dispirited to Encouraged’ are most applicable to my project, because I am interested in obtaining summative judgements about student sense of achievement from a particular project or activity, rather than an ongoing emotional response during an activity, as suggested by the other axes.



Dr Robert Plutchik (1980) has used the analogy of a colour wheel to create a model of emotion interrelationship.

Plutchik's Wheel of Emotions.

In this model the emotion of 'loathing' (negative valence emotion) is the opposite of 'admiration' (positive valence). Watered down 'loathing' is 'boredom' (lower intensity). In Plutchik's (1980) model a mixture of low intensity rage and loathing (boredom and annoyance) will be interpreted as 'contempt'.

This model is of interest to me for several reasons. It reduces the total number of key emotions to eight, which is a manageable quantity of emotions to measure in a classroom context. Further, it facilitates interpretation of emotional intensity into a range of shades or much more subtle emotions. The model also illustrates how of a mix of two emotional shades can be interpreted as a third and separate emotion. Additionally the model is aesthetically pleasing.

This model is a sophisticated attempt to understand and illustrate how emotions interact with each other to produce the infinitely subtle emotional landscape of a human being. However, I am concerned that the use of Plutchik's wheel of emotions in this study may well yield a hugely complex data set; that would require more time to analyse than a busy teacher has available.

Conclusions.

Having examined and clarified my understanding of emotions I have decided that I will attempt to measure;

- Valence- To generate a picture the positive or negative feelings my students have about their work in D&T.
- Arousal- To generate a picture the intensity of the emotions that my students feel about their work in D&T.
- Control - To generate a picture the level of control my students feel over their work in D&T.
- Anxiety to Confidence axis - To generate a picture confidence levels my students feel at the end of a unit of work in D&T.
- Dispirited to Encouraged axis - To generate a picture of how encouraged my students feel by their progress at the end of a unit of work in D&T.
- Humiliation to Pride axis - To generate a picture of the level of pride my students feel about their work at the end of a unit of work in D&T.

What techniques can I use for measuring emotions?

There are two main approaches to measuring emotions used by researchers, non-verbal techniques and Verbal techniques.

Non-verbal techniques

These are objective tests and measure physiological responses to emotional stimulation. Facial expression, voice tonality and posture can all be used to gather information and derive data on emotion. Ekman(1993) Petty and Cacioppo (1986) used electrodes attached to the skin to measure extremely small muscle movements in the face and Picard (2000) used activity in Automatic Nervous system to generate data on the emotional response of individuals to stimulus events.

Non-Verbal techniques tend towards very accurate assessments of valence and intensity but are less successful in measuring a range of emotional shades such as those identified by Plutchik or Kort.

The use of physiological testing of this sort is clearly outside the possibilities of this study because I haven't the resources or the expertise to conduct such a study.

Verbal techniques

These are subjective and utilise self report systems. This relies on the subject verbalising conscious awareness of emotional state using a set of grading prompts.

There are several problems with the use of verbal self assessment of emotion particularly of a group of children.

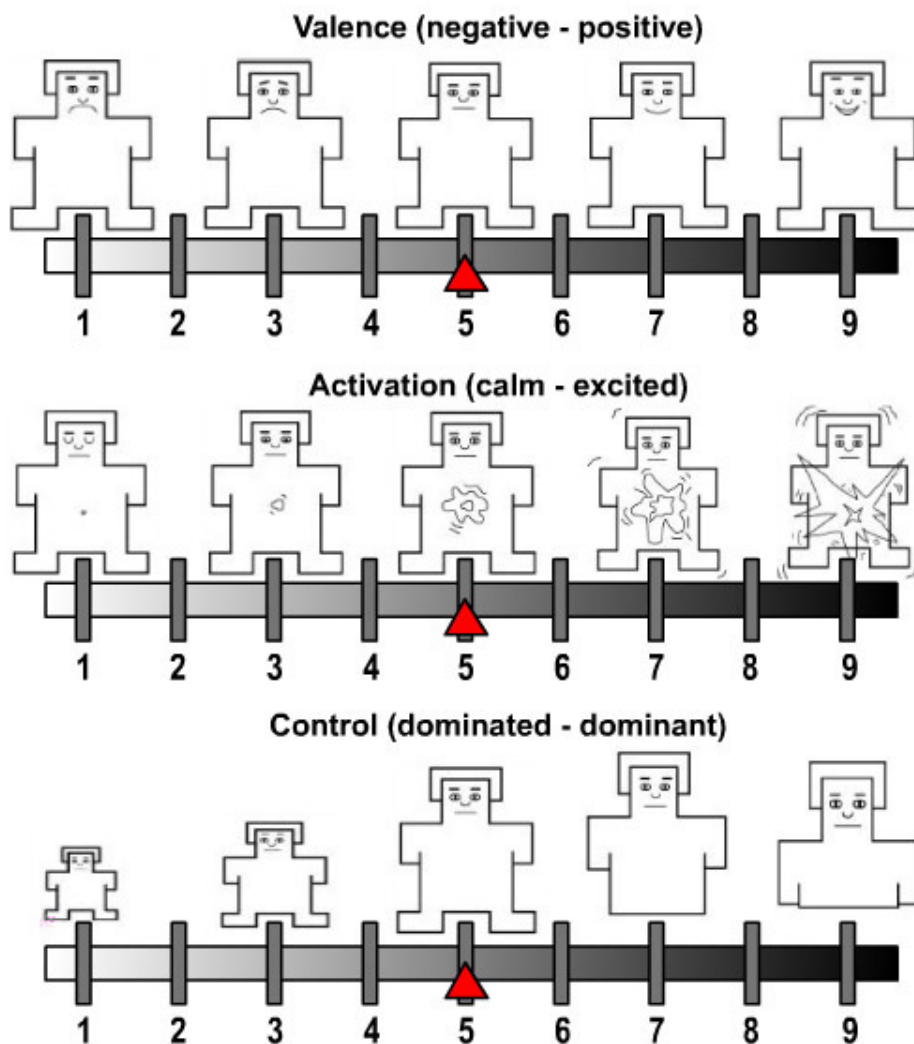
- Differences of understanding. It is entirely possible that the word **pride** might be understood differently by two students, it could have positive connotations to one but negative to another, 'pride comes before a fall' this might well lead to differences in self assessment. This is further complicated by the possibility that speakers of English as an additional language might not have the language skills to access the tests accurately.
- Degree of 'emotional maturity'. Students in year 9 have a wide range of maturity levels particularly in relation to their sense of self. The act of self analysis or evaluation will be far easier for some and might be simply rejected by others.
- Subjective levels of intensity. What a high level of anxiety feels like to one student is likely to be different to another and so levels of self assessed emotion cannot be directly compared across two respondents, they might actually have identical levels of anxiety but rate it differently
- Cultural differences. Quite apart from linguistic differences, the culture or ethnicity of the respondent might lead to a different emotional 'language'
- Honesty of the self-assessor. There is also the possibility that the respondents might not be honest in their self-assessment. It might be quite difficult for some students in year 9 to admit to feeling of humiliation for example.

In an attempt to minimise these problems researchers have devised systems of prompts.

The Self-Assessment Manikin (SAM) devised by P.J. Lang (1980) is such a system. It has been cited as used in many studies and exists in a number of variations both pencil and paper and as an interactive ICT application.

SAM was designed to assess the 3 dimensions of Valence, Arousal and Dominance. As can be seen in the version below, graphic figures representing responses in each of each of the dimensions are presented. Respondents mark on a 9 point scale their emotion response.

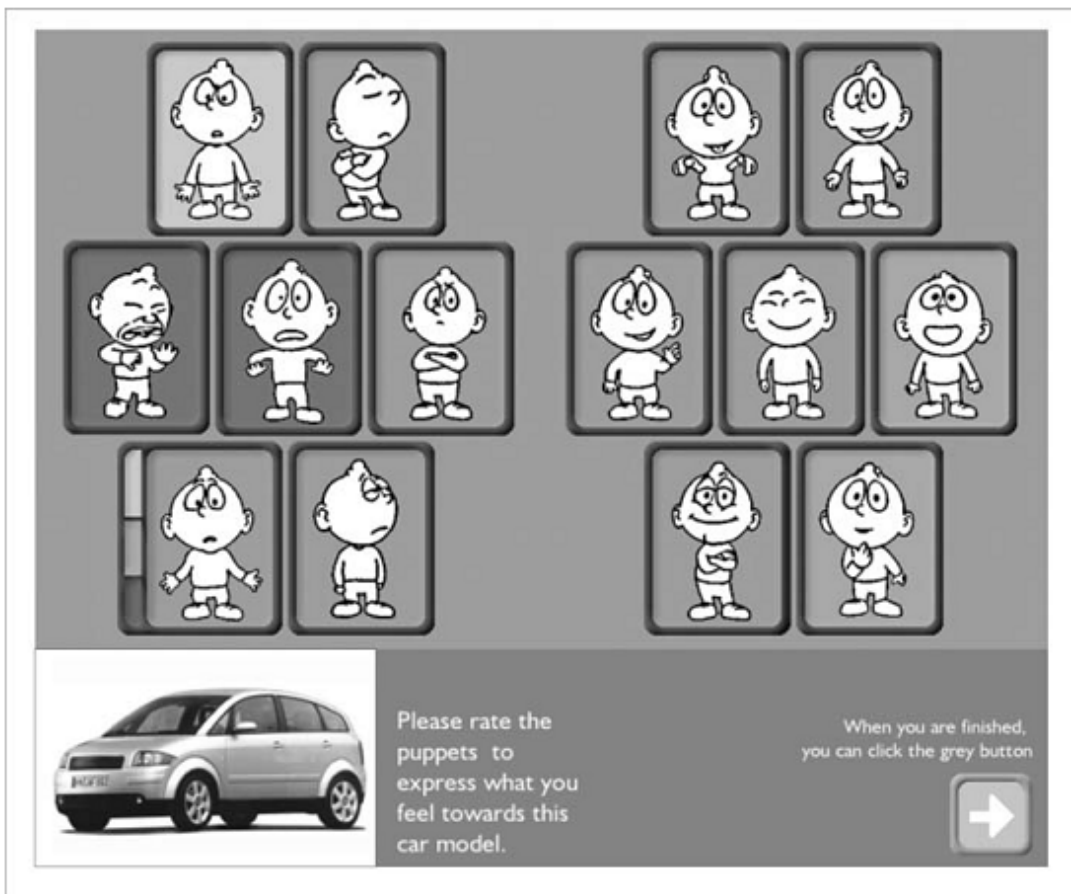
Given that SAM is an established emotional response measuring tool, and it is quick and simple to administer, I consider that SAM would be a highly appropriate starting point for measuring my students VAD responses. The question is; Can it be extended to include the axes including pride, confidence and encouragement?



TRUE - Testing platfoRm for mUltimedia Evaluation - <http://www.salle.url.edu/tsenyal/true/>

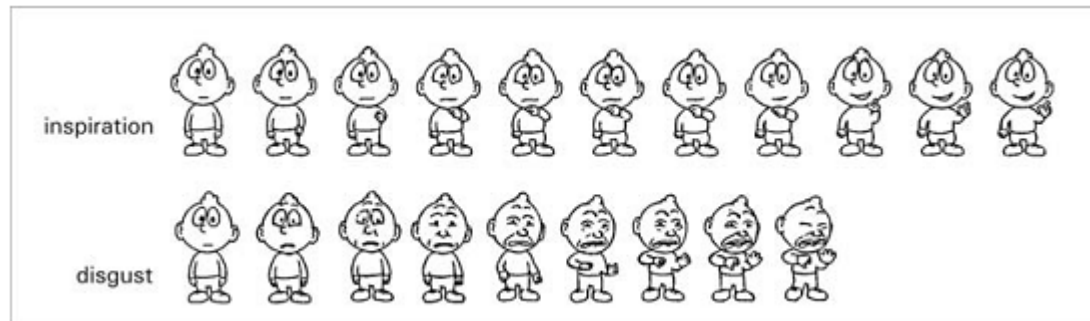
Pieter Desmet (2002) took the SAM concept further in his work, developing a system that seeks to measure individual emotional response to products. In developing his PrEmo Instrument to measure emotional response to products, he identified 14 emotions 7 pleasant and 7 unpleasant. These are presented through a computer interface. For each emotion there is a 3 part scale, (I feel this, I feel it a bit, I don't feel this emotion) hidden behind the button. He used a complex system to identify the 14 emotions relevant to his study as

Admiration Contempt Satisfaction Dissatisfaction Fascination
 Boredom Desire Disgust Pleasant Surprise Unpleasant
 Surprise Amusement Indignation Inspiration Disappointment



Screenshot of Desmet's PrEmo Instrument

One of the key features of this system is that Desmet has developed an animation with vocalisation that exemplifies the emotion. This allows him to be very specific about the emotions he is seeking to measure and his research indicates that the feedback is accurate and also cross cultural.



Examples of Desmet's animated sequences

This sort of system to measure emotional response to learning would certainly be a pretty powerful tool but I'm afraid that I lack the resources to develop this in the time frame available. However, this approach could be simplified and adapted to provide a figure for opposite ends of each axis of emotion, Proud and Humiliated, with a 'I feel this emotion, I feel this a bit, I don't feel this emotion' indication box. This would give me a 6 point scale for each axis. Alternatively for 500 euro's I could buy a version of Premo for use in small scale studies. This isn't actually as crazy as it sounds because if I find that adding some sort of emotional feedback to students project evaluation would be useful and worth developing across the department and possibly whole school, it might well make sense to start with an ICT based system; a future direction that my research may ultimately create the evidence to justify.

In this study I have decided to use a combination of the SAM matrix and three of Kort's emotional axes because I needed a system that:

- has a built in self reporting accuracy checker for me to use to cross reference responses
- yields consistent and comparable data
- yields data that can be analysed numerically and which makes sense when amalgamated,
- is quick and easy to administer

How best to conduct my study

The teaching and learning context within which I conduct my emotional response research is fundamental to the research outcome. The methodology I adopt for measuring student emotional responses, both in terms of the measurement tool and administration of this tool to students will likely have a significant impact upon my findings, as will the make up of the research cohort.

The group of students that I'm intending to use for this study are a particularly interesting group of year 9 students. They are a mixed ability group with a fairly average ability profile compared to all the other year 9 groups in D&T at UCTC. What is unusual about them is a particularly low achievement in D&T compared to FFT target data. Teacher assessments at the end of year 8 tell an interesting story!

| | EOKS Target UCTC Key Stage 3 Targets | Att Y8 T6 Y8 Term 6 | Difference in sub-levels |
|------------|--------------------------------------|---------------------|--------------------------|
| Subject 1 | 7C | 4A | 7 |
| Subject 2 | | 4A | |
| Subject 3 | 5A | 5C | 2 |
| Subject 4 | 7A | NA | |
| Subject 5 | 5B | 4A | 2 |
| Subject 6 | 6C | 4A | 4 |
| Subject 7 | 7A | 5C | 8 |
| Subject 8 | 7A | 5C | 8 |
| Subject 9 | 6A | 4A | 6 |
| Subject 10 | 7A | 4A | 9 |
| Subject 11 | 7B | 4C | 10 |
| Subject 12 | 7C | 4A | 7 |
| Subject 13 | 7C | 4B | 8 |
| Subject 14 | 7C | 4B | 8 |
| Subject 15 | | 4A | |
| Subject 16 | 6C | 4A | 4 |
| Subject 17 | 7A | 4B | 10 |

The end of Key stage targets at Uckfield Community Technology College are based on KS2 SAT scores and put through the Fisher Family Trust 'mincer', the chance graphs produced are interpreted by the management at UCTC in a pretty demanding manner to be aspirational!

Even taking this into account the differences are pretty startling given that 6 sub-levels is deemed a reasonable target over an entire key stage.

There are a number of factors that have contributed to this difference. The grouping has been together in D&T and Art since yr 7. In this time a set of behaviours has become entrenched that have become serious barriers to

achievement. This group is pretty dysfunctional, group interactions are extremely difficult to manage, and some characters are very dominant. A culture of disruption and distraction are usual. All group interactions are routinely punctuated by put downs which undermine others students contributions. Due to staffing issues last year this group did not have a good deal and it is likely that this poor quality experience contributed to this situation.

This does however give me an ideal opportunity to experiment because it is essential that these students have the opportunity to produce some high quality work and develop some group collaboration skills.

My strategy is to combine several approaches to measuring these students' emotional response to their work. It is key to remember that I'm looking at their 'feel good factor' emotions and that this is as a result of their achievements in Design & Technology activities. This suggests a summative measure as part of the evaluation process. I will design a self assessment feedback sheet that will allow students to record their emotional response to the outcome of their projects easily and quickly. This will be used at the end of several units of work across the disciplines of D&T.

I will be able to compare the data from individual projects with that from a specially designed collaborative project and draw conclusions that will inform future project design in D&T and if appropriate across the college.

In order to gain an understanding of the basic emotions felt by my students I will use Lang's Self Assessment Manikin. This will reveal the valence, intensity and dominance of pupils' feelings towards the outcomes of their project work.

I will combine this with more focussed axes of emotions; an approach drawn from Kort's work. (This could be developed along the lines that Desmet has taken to develop an interactive tool.) Using axes of emotion which address the particular emotional responses I'm interested in, will allow me to cross reference the two approaches and check correlation.

I will borrow from Barry Kort's axes but I will reduce the number of descriptors and provide a scale to allow students to plot their feeling against. Kort's language uses words that are open to misunderstanding or misinterpretation for a group of year 9 students in the UK and so I will reduce the number of words and change the tense of others so that they are consistent.

| | | |
|-------------|--------------|------------|
| Anxious | Comfortable | Confident |
| Humiliation | Contentment | Pride |
| Dispirited | Dissatisfied | Encouraged |

These are my candidate axes as these are the emotional responses that are most appropriate in the summative evaluation of a D&T activity or project. I will use a 9 point scale so that I can be consistent with the SAM scale and this will allow me to see if there is a correlation to valence intensity and control.

Since one of my objectives is to track the impact of emotionally satisfying project outcomes against GCSE option choices I will also include a question about probable option choices in D&T. This will give me a further layer of data to correlate and cross reference.

It is essential that the students have the project outcome in mind when completing the emotion self-assessment data sheets. In order to facilitate this I will provide the students with the task of cutting out and mounting a photograph of their project outcome onto the evaluation sheet. This will give me some baseline data for comparative purposes on the feelings students have about their project outcomes.

It is also essential that, as I will be unable to directly compare one students response with another students responses, I should be able to track one students responses over a period of time to assess whether there is any degree of consistency, I shall do this by comparing student responses against my teacher assessment of the quality of the work in question. I will conduct the test over 3 projects to get some base level data.

Since my original hypothesis states that students who achieve at a level below that of the highest achievers feel more negative and so are less motivated when tackling individual tasks, I must provide an opportunity for my group to work in a different way so that all students feel ownership for a collaborative project. This will allow me to compare their emotional responses to a collaborative project against those from individual project outcomes.

Key foci for the design of my new unit must be;

- Enhancing group identity.
- Enhancing group ownership.
- Increasing students' responsibility for the direction of the project and completion of the various elements within it.
- Developing the collaboration skills of the students
- Developing effective communication within the group.
- Promoting the use of 'modern' materials.
- Providing an 'audience' for the outcome of the project.

About the Special Project. – ‘Watch this Space’

Making my project a cross-curricular project has many benefits. The school is keen to experiment with cross-curricular projects in the wake of the New Secondary Curriculum. It also will give my students more time to complete an ambitious project and it will allow me to work collaboratively with other teachers to develop the project. In the light of this I have formed a partnership with the Art department. The project will be delivered in regular timetabled lessons for both Art and D&T ensuring that, if successful, it can be replicated and built into SoW in subsequent years.

The context of the project will be an area of the college, the foyer area and stairwell of the new Performing Arts and MFL block. This is quite a large area and has no visual interest or focus. The task for the students will be to produce something that adds interest and personality to this area of the college.

In order to enhance group identity students will have a special T-shirt with ‘Watch this Space’ logo provided which they will be allowed to wear on Mondays rather than standard school uniform. Students will also be given special sketch books to work in.

The direction that the project takes will be decided by the students. They will be given the opportunity to attend and contribute to planning meetings and will be given tools to allow effective decision making; because all key design decisions must come from them.

Project planning, task allocation and time management will be shared with the students throughout the project and they will be given the opportunity to work within a range of collaborative groups; both defined by teachers and self-directed. Collaborative tasks will be built into the project throughout, so that no part of the outcome is ‘owned’ in its entirety by any one student, thus each student will have contributed, at some level, to several parts of the design, making and outcome.

In the project there will be an emphasis on exploiting high quality, modern, durable materials and technologies. This will hopefully lead to the production of a high quality outcome!

Methodology of Action Research

‘Action research is simply a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out ‘ (Carr and Kemmis 1986: P162).

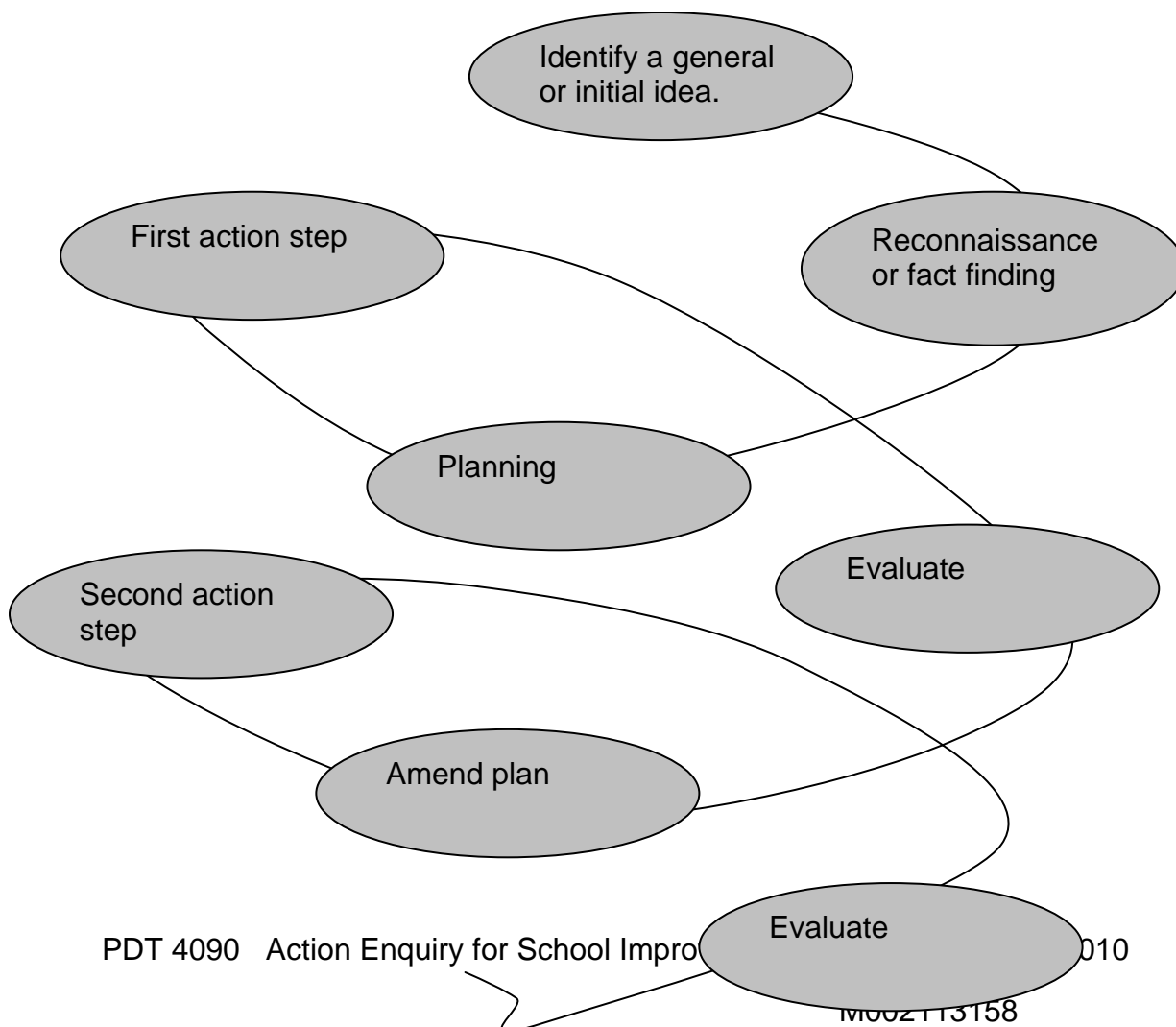
Carr and Kemmis' (1986) definition of Action Research views it as research directly related to practice and dependant on self -reflection. Implicit in this is the view that the research findings must be applicable in the context for which it is carried out and transferable for use similar contexts for it to usefully inform future practice by either the researcher or a wider audience.

As such it clearly is an appropriate model of research for this study because I am a practitioner researcher working in a very specific context on a very context specific issue. In order for my findings to have scalability and use to other practitioners, I need to ensure that the process of research is rigorous and the findings have validity.

The term 'action research' is generally attributed to Kurt Lewin (1946). His approach uses several stages or steps arranged as a spiral of iterations.

'The research needed for social practice can best be characterized as research for social management or social engineering. It is a type of action-research, a comparative research on the conditions and effects of various forms of social action, and research leading to social action. Research that produces nothing but books will not suffice'

(Lewin 1946, reproduced in Lewin 1948: 202-3)



This action research model is established in the British education sector as the predominant in school research model.

I will be conducting a small case study of one group of 18 year 9 students. By conducting some tests for baseline data from the 'normal' D&T curriculum and then making some radical changes in their lesson experience I will be able to make conclusions on the accuracy of my emotional measuring tools and also the effect of the radically changed experience has on student feelings and motivation.

If the measuring tools prove to be useful and the adapted project proves to be effective in raising self-esteem and motivation in lower achieving students without having a negative impact on higher achieving students, this project model could be incorporated into the standard curriculum for year 9 students at UCTC in future years.

Since this is a very small scale study with a large number of variables particularly in the strategies to be incorporated into the 'special' project element, it would be dangerous to make sweeping generalisations from the outcomes. It is possible that some of the individual strategies used might engender much anxiety in the students for example. In order to monitor this element I will test the students at regular stages throughout the project. Using Barry Kort's model of learning and emotion, I would expect students to go through a number of cycles of anxiety, relief, confidence, anxiety etc. during the course of the project. It must also not be forgotten that my student study group are actually unique individuals and that their responses are likely to be as unique as they are.

Key to determining the truthfulness and validity of the research will be in the effectiveness of the emotion measurement. As I have already discussed in the literature review, interpretation and perception of the key emotions will not be consistent with students of varying experience and emotional maturity. Since I am relying on self-assessment, I will be relying on the truthfulness and or ability of individual students to accurately self-assess. This is likely to be easier for more emotionally mature students and more challenging for the less mature students. In order to assess the validity of the self assessment I will cross reference the emotional feedback from students with my assessments of the students work and with FFT target data to triangulate the findings.

One of the advantages of constructing a cross-curricular project and involving the art department in delivering it is in diluting the involvement of the lead 'researcher'. It is imperative that I collect and report unbiased feedback from colleagues with no vested interest in proving my thesis!

Data to be Collected

- Emotional response sheets to establish baseline data for student group over three short projects.
- Option choices at GCSE to establish preference of technology area. I will be able to track these over time to see if there is a change in preference as a result of the 'special' project.
- Teacher assessment of student outcome levels and FFT target data. I will use this to triangulate self-assessment data.
- Observations to assess the group cooperation and collaboration.
- Photos of students working
- Video of students presenting and discussing ideas and to find evidence of collaboration and group decision making and ownership.

When administering the self-assessment task. I will instruct all students to cut out and stick a photograph of their product onto the self-assessment sheet to ensure that all students are equally focussed on their product.

Watch this Space. - An account of the project.

The first phase of the watch this space project included introducing the 'new way of working' to students. This included;

- Emphasising how 'special' the student group was.
- Giving the students detailed explanations about the nature of my research.
- Explaining how the cross-curricular project would be organised.
- Getting the students to elect two representatives to be invited to all planning meetings.
- Designing and screen printing T-shirts with the 'Watch this Space' logo on, which students were allowed to wear instead of school uniform on days when they have a 'Watch this Space' lesson.



- Providing each student with a high quality sketch book.

Introduction to the space.

Students were introduced to the space by conducting a memory test to see if they could answer a set of simple questions about it. (e.g. What colour are the walls painted?) It was clear in the feedback session that the space was not at all memorable.

The task was then set, which was to design and make something to go in the space which would add interest or personality to it.

Then the students conducted a series of collaborative investigative tasks. These involved photographing the space and mapping the space. These were tasks which the group found extremely difficult to complete due to limited ability to effectively team work.



Students then moved on to make a simple installation for the space. This was a teacher-led task, and was formed from large numbers of origami birds, in a range of sizes which we strung from wires.

It was a pretty quick exercise and was completed within two hours of lesson time. It was immediately clear to students what an impact even a simple sculpture could have on the space.



The next phase was a series of creativity exercises; designed to widen the horizons of the students. (the first and very popular suggestion had been to paint graffiti style designs on the walls!)

A wide range of resource images and YouTube clips were projected onto the walls of the space. This was to contextualise the resources into the space and thus to link them in the minds of our group. Students selected images and



resources they liked and noted them down.

Students also spent some time investigating smart and modern materials.

The next step was to write a specification for the product. Students identified that the product should be vandal resistant, durable easy to clean etc. but also that it should contain some elements of movement, be in some way interactive and in some way reflect them.

We set the students some personal research targets which a few of the students responded to really positively, others at only a very superficial level.

Generating Designs Phase

The first step was for students to conceive an idea; this needed to be communicated to others in any way that was appropriate. (I was anxious to ensure that those with limited drawing skills were not excluded from this section.) Students were put into dyads and each dyad was asked to distill an idea from their original ideas. The imperative was that it should be different to either of the initial ideas. We then grouped students into fours and repeated the task.

These groups then were asked to present their best and final development in a Dragons Den style presentation which was video recorded and observed by one of the College Deputy Principals. Below are the five ideas presented.



This idea proposed a sculpture of a Panda, made from Bamboo and featuring a charity collection box for WWF.



This idea features the faces of the group cast in plaster and attached to the wall, as seamlessly as possible. They are interactive and feature lighting up eyes, noises and inflatable tongues when people come close to them.



This (left) idea hangs from the ceiling and is based around an iced waterfall and includes a two metre lava lamp!

Fourth idea features patterned silhouettes of group members attached to the walls with Velcro so that they can be arranged and re-arranged by viewers.





Final idea is based on the Channel 4 'Ident' and is a butterfly that is made in section and moves so that as you walk round it, the component parts suddenly line up and it is clear that it is a butterfly.

All these ideas were really well presented and the quality of the discussion about the way forward was excellent. The group decided to combine the butterfly, the silhouettes and the talking faces ideas to develop a

Sculpture that was based on cut up silhouettes of their bodies which moved when people approached and suddenly would line up to be clearly made of figures.

There were many divergent ideas at this stage and the decision making process was difficult and time consuming.

The group decided that the figures should be based on them so, a group of students armed with cameras took photos of each other in the space.



These were translated into a series of small models using card, polystyrene and kebab skewers. Again students were paired and each dyad made and refined figures. Each time we paired or grouped students we ensured that they were with different partners, this was to ensure that the path of the dominant ideas were obscured, it was hoped that each student would feel that they had been a part of the process and so all owned it a bit.



It was becoming much clearer that the final outcome would be scaled up versions of these small models. At this time there was a variety of ideas about how and where these figures would be in the space. Some students wanted them to arch across above the stairs forming an arch and moving towards each other. This would have been really technically difficult in the time we had available and this was one of the very few times when I directly intervened in the decision making process.

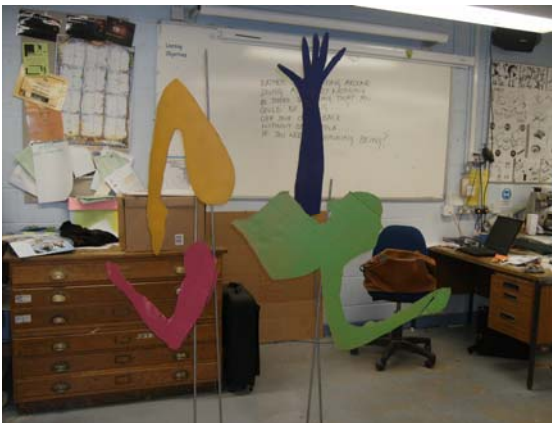
Making the sculpture

At this stage we identified four areas that needed to be developed to allow a final product to be made, and students were given the opportunity to decide which area to work in. The four teams were;

- Aesthetics-
- Engineering-
- Woodworking-
- Electronics and control-

The Aesthetics team was the largest with 5 girls and a boy. They developed the small models into full size spray painted card model and then selected Polypropylene as a suitable material. After experimenting with a range of systems for joining the polypropylene pieces they settled on stitching them together with fishing line through 1mm holes drilled through the polypropylene. They then had to make the 9 pieces necessary for the sculpture.

This group were the most 'laid back' with a couple of students really working hard and several taking huge amounts of time to complete a single piece. Towards the end of this stage I began to really put pressure on students as the deadlines came closer and this group were particularly unaffected by this.



The engineers were a group of three boys and a girl. They quickly got down to working out the lengths of all the poles required and cut them. They made nice little connectors to connect the 6mm motor shafts to the 8.5mm aluminium rods. They learned how to use the CAD/CAM lathe to make brass bushes to hold the rods in the plinths. And they designed and made the system that allows the fixing and positioning of the polypropylene figures on the poles. They spent a great deal of time independently using lathes, drills and taps and dies to make threads. They took full responsibility for their tasks and came in at lunch to complete jobs.



Members of the engineers using a lathe and tapping a thread.

The Electronics team was a group of three boys. They researched ways to activate the sculpture, and identified an infra red beam, a clap detecting switch, a shock detector as used on burglar alarms and a PIR (passive infra red) motion sensor as possible solutions. They sourced 12volt kits for the clap detector and the beam, and for a 12 volt timer module. They also sourced a 12 volt PIR motion detector. We were unable to find a 12volt shock or vibration sensor so that idea was discarded. I bought in 7 timer modules 5 PIRs and the clap detector and the red beam. They then spent several days soldering non-stop! (Not all the circuits worked perfectly and when it came to actually wiring them up I opted to simplify the system and use four PIR and four timer circuits)



ipr



The woodworking team designed and built the plinths and the motor mounting system. This team was made up of two girls and two boys. The plinths are boxes made of MDF and this team produced cutting lists and assembled the boxes from kits of parts which I produced using the circular saw. These are finished with white emulsion paint.



Final assembly and installation.

A big management issue centred around installing the sculpture, the students installed the basic boxes and figures but I had to take responsibility for the final wiring and installation of the sensors and the power source etc. This was because it was impossible to include the whole group in these activities. Retrospectively this section of the project should have been better planned to enable the students to have more input.

The final product.

The final product is installed and works off a single 8.5 amp 12volt supply common in schools. It has eight 3D polypropylene figure parts, seven mounted on aluminium poles and on the wall. Each of the seven poles is mounted on a 12volt geared motor (4rpm and 15rpm). There are 4 PIR motion sensors mounted around the room with limited fields of detection. These activate timer modules mounted in one of the plinths; each of these operates 2 motors.

As students staff and visitors move through the space the sculpture responds, by rotating various sections for about 10 seconds, effectively shuffling the image. Every now and then the sculpture reforms and it is possible for a group of students to reform it intentionally if they work together to activate the various PIR sensors.

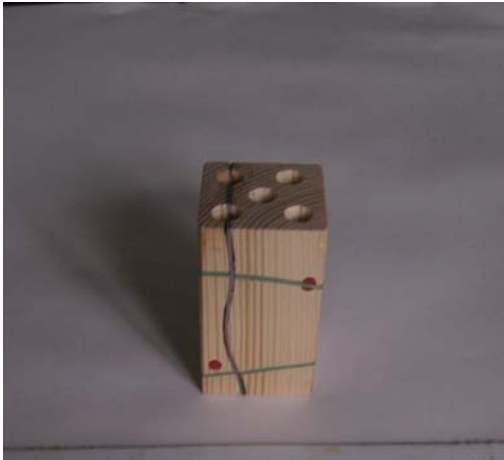


Overall the outcome is a complex and high quality product. A level 7 outcome when assessed using the NSC level descriptors. There are clear assessment issues in assessing students achievement using a collaborative whole class project, particularly one where a sizable proportion of planning effort has been used in blurring the boundaries between who has contributed what. However if we do take the final whole class project grade and allocate this grade to all who contributed then it represents a considerable improvement in quality of outcome for **everyone** in this group.

Emotional response data from each of the three existing D&T projects

Geobox project.

The Geobox is a six week focussed practical task based unit of work which is actually designed to develop graphic communication skills. However this is combined with making a simple decorative box using coloured veneers. This can be finished with a lid or using plastic test tubes as a vase. Some students choose to finish it as a pen stand for a desk as in the example below.



Because of the teacher lead nature of the project and the shortage of time in which to complete it. It is only really possible for students to access NC level 6.

Most students in the group completed this project to a good standard. Most students paid 50p to enable them to take it home showing that they were generally positive.

Geobox results from my emotional measuring tool.

| name | EOKS Target | TA yr8 | geobox | | | | | | | | geobox | |
|------------|-------------|--------|---------|---------|---------|----------|-------------|-------------|-----|----------|--------|----|
| | | | valence | arousal | control | anx/conf | humil/pride | dispirit/en | ave | option | grade | |
| Subject 1 | 7C | 4A | | | | | | | | | | 5c |
| Subject 2 | | 4A | 4 | 2 | 6 | 6 | 3 | 4 | 4.2 | textiles | | 4b |
| Subject 3 | 5A | 5C | 5 | 4 | 5 | 6 | 6 | 8 | 5.7 | rm | | 5a |
| Subject 4 | 7A | NA | 7 | 5 | 6 | 6 | 4 | 6 | 5.7 | food | | 4a |
| Subject 5 | 5B | 4A | 7 | 5 | 6 | 7 | 6 | 8 | 6.5 | rm | | 5c |
| Subject 6 | 6C | 4A | 7 | 5 | 9 | 8 | 8 | 8 | 7.5 | ? | | 4a |
| Subject 7 | 7A | 5C | 4 | 5 | 6 | 4 | 5 | 5 | 4.8 | grafix | | 5c |
| Subject 8 | 7A | 5C | 7 | 3 | 7 | 7 | 8 | 8 | 6.7 | food | | 5a |
| Subject 9 | 6A | 4A | 7 | 5 | 7 | 7 | 5 | 5 | 6.0 | food | | 5c |
| Subject 10 | 7A | 4A | 7 | 5 | 8 | 7 | 7 | 6 | 6.7 | food | | 5c |
| Subject 11 | 7B | 4C | 6 | 4 | 5 | 5 | 6 | 6 | 5.3 | rm | | 5c |
| Subject 12 | 7C | 4A | 5 | 9 | 8 | 9 | 7 | 7 | 7.5 | grafix | | 4b |
| Subject 13 | 7C | 4B | 6 | 1 | 9 | 5 | 9 | 9 | 6.5 | food | | 5c |
| Subject 14 | 7C | 4B | 5 | 6 | 7 | 7 | 8 | 7 | 6.7 | food | | 6c |
| Subject 15 | | 4A | 9 | 8 | 9 | 9 | 8 | 9 | 8.7 | rm | | 6c |
| Subject 16 | 6C | 4A | | | | | | | | | | |
| Subject 17 | 7A | 4B | 6 | 5 | 7 | 7 | 6 | 3 | 5.7 | grafix | | 4a |
| | | | 6.1 | 4.8 | 7.0 | 6.7 | 6.4 | 6.6 | 6.3 | | | |

Geobox analysis and findings.

Two students (1 and 16) failed to complete the feedback form, 1 because she was absent for several lessons and 16 had an extended absence and did not complete the practical task.

A score of 5 implies a neutral response less than 5 negative and more than 5 positive.

Is the self-assessment honest and accurate?

Are all there any obvious patterns in the emotional self-assessment grades for any one student? If a student responds with all 1s or 9s or 1,2,3,4,5,6, this would suggest that that student is not fully engaging with the self-assessment and their data should be questioned.

I can see no obvious patterns in the data table above and this would suggest that the students have engaged with the question and answered honestly.

Subject 13 has reported a profile that doesn't look very likely, neutral valence and very high levels of intensity, control, pride etc. for a not very good product! Subject 13 has a very high differential between his KS3 target and his yr 8 assessment and he is a student who displays many of the behaviours associated with immaturity.

How does the self assessment reflect the quality of the product?

Because the scales are so subjective, it is not possible to say that all the highest quality products were scored as the most positive. However Subject 15 made the biggest jump in attainment from end year 8, 4a to 6c and scored the project at an average 8.7. The two subjects with the lowest average score made least progress from their end of Yr 8 grade. These two students both reported low valence.

Are there any patterns that suggest the process is flawed?

Two interesting outcomes from the overall picture emerge. Students rate themselves very strongly in control in this test. The project is a focussed practical task and although there are some design decisions to be made, they are within very narrow parameters. The project is quite closely controlled by the teacher.

Despite very positive scores generally in this test, students scored it quite low for the Arousal aspect. This would imply that they were generally positive and proud of what they had made but not terribly excited by it.

Graffiti Cushion project

Graffiti Cushion is a 6 week textiles project which uses an ICT vector drawing software to produce a design based on a Graffiti theme. This is output to Iron-on transfer paper. Students make a small cushion with the design ironed on.

Again this is a focussed practical task with a small degree of design freedom built in. It is designed to give students a quick textiles input before option choice time. We have virtually no boys opting for textiles at UCTC.

Graffiti Cushion project results

Graffiti Cushion emotional response self-assessment ,and teacher assessments.

| | LOKS Target | TA yr8 | Geobox grade | valence | arousal | control | anx/conf | humil/pride | dispirit/en | average | grade | option |
|------------|-------------|--------|--------------|---------|---------|---------|----------|-------------|-------------|---------|-------|----------|
| Subject 1 | 7C | 4A | 5c | 9 | 5 | 8 | 9 | 9 | 9 | 8.2 | 5a | rm/gr |
| Subject 2 | | 4A | 4b | 2 | 2 | 6 | 4 | 3 | 6 | 3.8 | 4a | tex |
| Subject 3 | 5A | 5C | 5a | 6 | 4 | 5 | 5 | 5 | 2 | 4.5 | 5c | food |
| Subject 4 | 7A | NA | 4a | 4 | 5 | 7 | 6 | 7 | 7 | 6.0 | 3a | food |
| Subject 5 | 5B | 4A | 5c | 6 | 5 | 5 | 5 | 5 | 4 | 5.0 | 4a | tex |
| Subject 6 | 6C | 4A | 4a | 9 | 5 | 9 | 8 | 8 | 8 | 7.8 | 5a | |
| Subject 7 | 7A | 5C | 5c | 6 | 7 | 6 | 6 | 7 | 7 | 6.5 | 5a | rm/gr |
| Subject 8 | 7A | 5C | 5a | 1 | 1 | 3 | 4 | 1 | 1 | 1.8 | 5c | food |
| Subject 9 | 6A | 4A | 5c | 9 | 6 | 7 | 7 | 8 | 9 | 7.7 | 5a | graphics |
| Subject 10 | 7A | 4A | 5c | 8 | 3 | 8 | 8 | 8 | 7 | 7.0 | 5a | food |
| Subject 11 | 7B | 4C | 5c | | | | | | | | | rm |
| Subject 12 | 7C | 4A | 4b | 6 | 9 | 6 | 6 | 5 | 6 | 6.3 | 4a | graphics |
| Subject 13 | 7C | 4B | 5c | 3 | 5 | 7 | 5 | 4 | 8 | 5.3 | 5b | food |
| Subject 14 | 7C | 4B | 6c | 8 | 6 | 9 | 8 | 8 | 8 | 7.8 | 6c | graphics |
| Subject 15 | | 4A | 6c | 8 | 7 | 8 | 9 | 8 | 9 | 8.2 | 6c | rm |
| Subject 16 | 6C | 4A | | 8 | 6 | 4 | 6 | 6 | 7 | 6.2 | 5b | graphics |
| Subject 17 | 7A | 4B | 4a | 7 | 7 | 4 | 8 | 7 | 6 | 6.5 | 5c | graphics |
| | | | | 6.3 | 5.2 | 6.4 | 6.5 | 6.2 | 6.5 | 6.2 | | |

Graffiti cushion Analysis and findings.

Student 11 failed to complete the feedback form, he was absent for most of the project and did not complete the practical task.

A score of 5 implies a neutral response less than 5 negative and more than 5 positive.

Is the self-assessment honest and accurate?

Are all there any obvious patterns in the emotional self-assessment grades for any one student? If a student responds with all 1s or 9s or 1,2,3,4,5,6, this would suggest that that student is not fully engaging with the self-assessment and their data should be questioned.

I can again see no obvious patterns in the data table above and this would suggest that the students have engaged with the question and answered honestly.

Student 8 completed a pretty well made cushion but completed a very negative feedback sheet. However when compared to the quality of his work in the Geobox project he has dropped 2 sub-levels, so although his cushion was decent it was not up to the standards he had achieved earlier.

How does the self assessment reflect the quality of the product?

Apart from student 8, most students are fairly positive about this project. Degree of positive emotion is consistent with the increase in teacher assessment level from the Geobox to the Graffiti Cushion.

Are there any patterns that suggest the process is flawed?

Again the students are consistent in their scoring of the control and arousal. Students rate themselves very strongly in control in this test. The project is a focussed practical task and although there are some design decisions to be made, they are within very narrow parameters. The project is quite closely controlled by the teacher.

Despite very positive scores generally in this test, students themselves as pretty unexcited by it (quite low for the Arousal aspect.) This would imply that they were generally positive and proud of what they had made but not terribly excited by it. Again this is consistent with the Geobox project.

Interestingly of the two students aiming to opt for textiles, both were fairly negative in their emotional feedback.

Pop-up Card project



The third of the control tasks is the Pop-up card project. A mini graphics project lasting six weeks and exploring, in a focussed practical task format, two types of card mechanism and then asking students to design and make a card for a specific occasion using one of the mechanisms.

Pop up card results

Three students did not complete a card. Subjects 2 and 4 failed to complete anything they were prepared to have assessed. Subject 11 was still absent.

| | EOKS Target | TA yr8 | Geobox grade | Graffiti grade | valence | arousal | control | anx/conf | humil/pride | dispirit/enc | average | option | grade |
|------------|-------------|--------|--------------|----------------|---------|---------|---------|----------|-------------|--------------|---------|----------|-------|
| Subject 1 | 7C | 4A | 5c | 5a | 8 | 5 | 8 | 9 | 9 | 9 | 8.0 | rm/gr | 5a |
| Subject 2 | | 4A | 4b | 4a | Did | Not | make | card | | | | | |
| Subject 3 | 5A | 5C | 5a | 5c | 6 | 4 | 5 | 5 | 5 | 5 | 5.0 | food | 5c |
| Subject 4 | 7A | NA | 4a | 3a | 9 | 9 | 9 | 9 | 9 | 9 | 9.0 | food | |
| Subject 5 | 5B | 4A | 5c | 4a | 7 | 5 | 5 | 5 | 6 | 4 | 5.3 | tex | 5c |
| Subject 6 | 6C | 4A | 4a | 5a | 5 | 1 | 4 | 3 | 4 | 3 | 3.3 | ? | 5c |
| Subject 7 | 7A | 5C | 5c | 5a | 2 | 2 | 6 | 3 | 3 | 3 | 3.2 | rm/gr | 4a |
| Subject 8 | 7A | 5C | 5a | 5c | 4 | 3 | 5 | 5 | 1 | 5 | 3.8 | food | 5c |
| Subject 9 | 6A | 4A | 5c | 5a | 6 | 5 | 6 | 5 | 5 | 6 | 5.5 | rm | 5c |
| Subject 10 | 7A | 4A | 5c | 5a | 6 | 5 | 9 | 5 | 4 | 4 | 5.5 | food | 5c |
| Subject 11 | 7B | 4C | 5c | | Did | Not | make | card | | | | rm | |
| Subject 12 | 7C | 4A | 4b | 4a | 7 | 9 | 8 | 7 | 7 | 7 | 7.5 | food | 4b |
| Subject 13 | 7C | 4B | 5c | 5b | 8 | 5 | 8 | 8 | 6 | 7 | 7.0 | food | 5c |
| Subject 14 | 7C | 4B | 6c | 6c | 9 | 7 | 8 | 9 | 8 | 8 | 8.2 | graphics | 7c |
| Subject 15 | | 4A | 6c | 6c | 8 | 9 | 9 | 9 | 9 | 9 | 8.8 | rm | 6c |
| Subject 16 | 6C | 4A | | 5b | 9 | 7 | 9 | 8 | 8 | 7 | 8.0 | graphics | 5b |
| Subject 17 | 7A | 4B | 4a | 5c | 3 | 1 | 2 | 2 | 1 | 1 | 1.7 | graphics | 5c |
| | | | | | 6.5 | 5.1 | 6.7 | 6.1 | 5.7 | 5.8 | 6.0 | | |

Pop up card analysis

Is the self-assessment honest and accurate?

Subject 4 has this time filled in a straight set of 9s. He failed to complete a product for assessment. This is the first instance of a student to do this. The other students declined to complete the form.

Apart from this the profiles that the students are completing are remarkably consistent overall. Given that these tasks although quite different in material area, are actually quite similar in that they are teacher lead, focussed practical task based and include some elements where the students can self express. All culminate in a product relatively quickly, that students can take home, and none of them extend students into the higher and most demanding NC levels. Therefore it should not really be a surprise that they are fairly consistent.

How does the self assessment reflect the quality of the product?

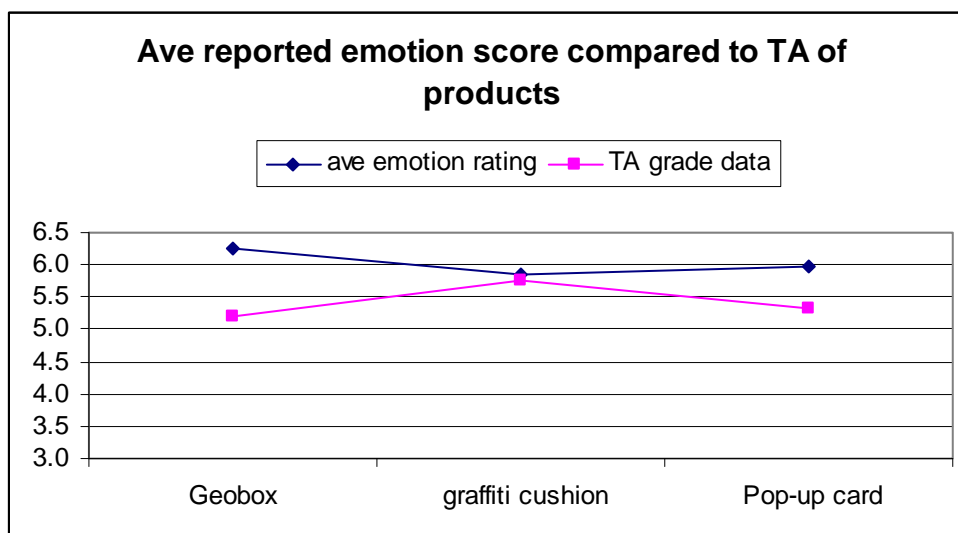
Apart from student 4, most students are fairly positive about this project. Degree of positive emotion is generally consistent with teacher assessment . There are 4 students who report negative emotion about their work and 3 of them produced lower quality work in this project than in the last.

Are there any patterns that suggest the process is flawed?

Student 8 produced a fairly decent card but again is showing some unusual self-assessment giving himself a 1 for pride /humiliation.

Discussion of the existing project data

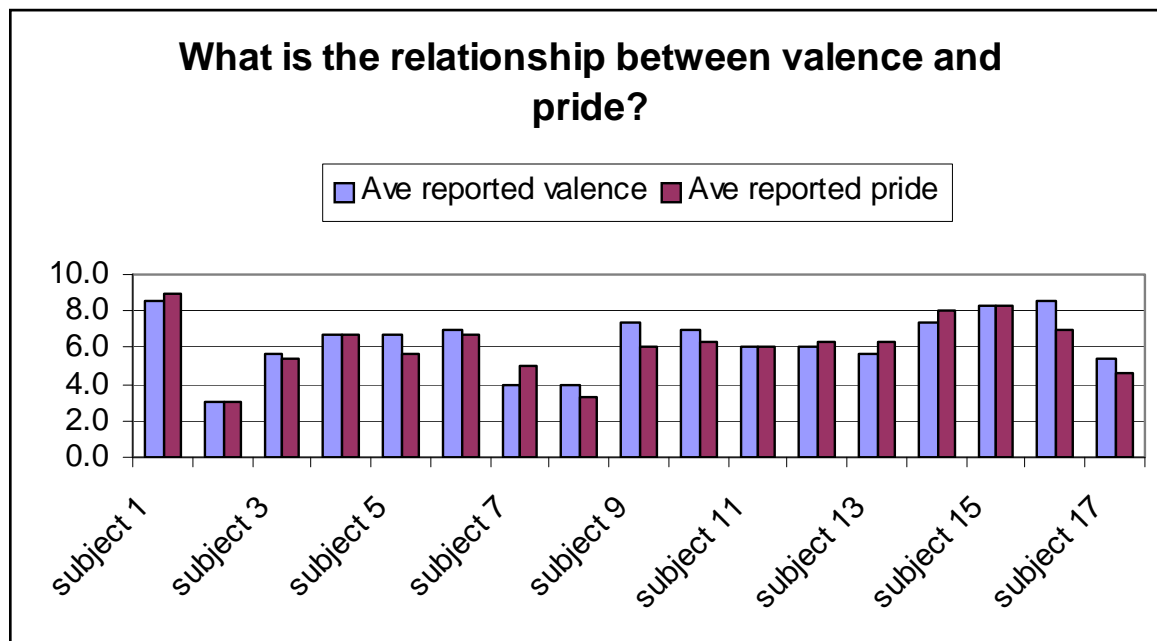
Does a higher grade mean a higher overall score in self assessment of emotions?



A higher teacher assessment grade does not directly correlate with a higher self assessment of emotional response. It would be neater if it did but there are probably too many variables. Particularly because I'm comparing different materials areas and the feelings students have towards their work are coloured by a lot more than just teacher assessed attainment.

Textiles is the least opted for subject by this cohort of students I strongly suspect that this apathy or antipathy towards textiles as a subject area has skewed my results.

Does the students reported feelings of valence correlate with feelings of pride?



Across the three projects there is a very solid correlation between valence and pride and this is one of my key tests for the validity of the measuring tool. Because the scale on which students are reporting is so personal and subjective, it is not possible for me to correlate my teacher assessments accurately and compare with individual students. However, by comparing individual students against themselves across the range of the self-assessment it allows me a degree of confidence in the accuracy of the self assessment tool. If the figures matched too closely I would also be sceptical.

Does my emotional measuring tool work?

Although not perfect I believe that I am getting some pretty reliable data from the measuring tool.

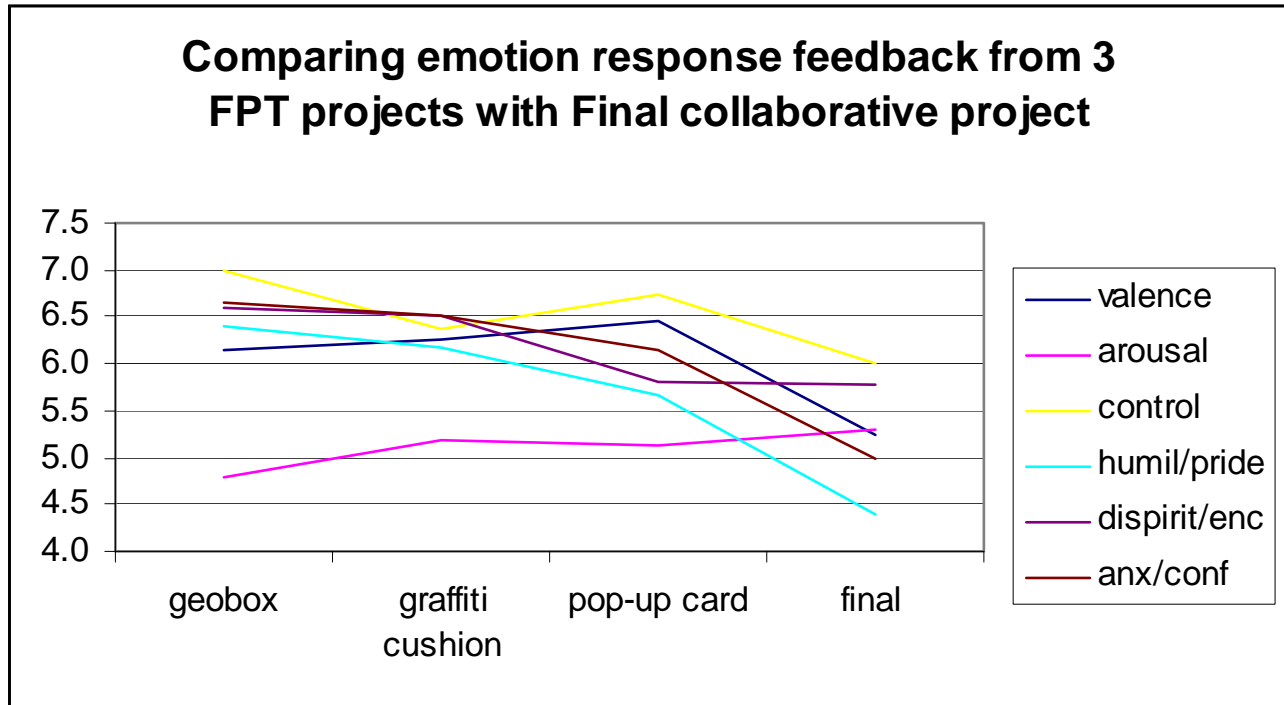
There has been only one instance of clear dishonest self-assessment.

Most of the patterns produced are fairly consistent with the outcomes of the projects.

The reporting is remarkably consistent across three very similar projects with some variations being consistent with material area antipathy as shown on the students option choices.

The comparison of valence with pride indicates the process and tools are robust.

How do the Emotional Self-assessments for the 3 FPT projects compare with the New Collaborative Whole Class Outcome Project Feedback?



The student feedback from the 'Watch This Space' project has really surprised me. It is really clear and pretty consistent across all the students that they report much more negative emotions.

How proud are the students of their work?

Only 4 of the students felt proud of their work (the sculpture). All the others report varying degrees of humiliation.

This is a really interesting result. Nearly all the adults I have talked to, think that the sculpture is fantastic, no-one has expressed any negative comments relating to it. It has been up and running everyday with no explanation or label since Easter, in an area of the school used by many students, and has not been abused or vandalised in any way.

How much control did the students feel?

Despite the group having a really high degree of control in this project compared it to the FPTs the students *felt* far less in control than they had reported for the other 3 projects.

Again a really interesting result. I surmise that in fact what they are reporting was control as in comfort. In the comfort zone of 'normal' technology lessons, the teacher is in control and therefore the students feel secure, and so in control.

In the Watch this Space project, because so much of the decision making was devolved to the students, and so the responsibility for the resulting outcome was also devolved, it is likely that the students felt that the safety net had been removed. This would have been amplified by the very public nature of the project. On an individual level the students also had to relinquish control over the design and the final outcome of the project. In the decision making process each student had to surrender some of their ideas, in order to arrive at the collegiate whole. It is possible that the end product matched not one student's preconceptions and so was a disappointment to them all.

How confident do the students feel at the end of this project?

Only 4 students reported feeling confidence, with the rest all showing some degree of anxiety. This is closely linked to the public nature of the project and the responsibility that they feel for it.

How activated do students feel by the 'Watch this Space' project?

The only self-assessed emotion to rise was Arousal. This was consistently the lowest reported emotional response from the Geobox, Graffiti, and Card projects suggesting that though students were generally positive about these projects and their outcomes they were not felt to be that stimulating or exciting. In contrast to this, the Watch this Space project was either more exciting or more stressful.

Impact of the action research project

This project has impacted upon:

- Me and my thinking about the emotional aspects of learning
- Student learning
- The theatre foyer space
- The profile of resistant materials technology across the college

Impact upon me

Given that I have been focusing upon emotions it is only fair that I explain the impact upon me in terms of the emotions I have felt on the research journey. In the beginning I was very **excited** and **positive** about the research and new D&T project idea that I had. As the project began the **degree of control** I felt was very limited indeed; leading to very high levels of **anxiety**. I think I always felt quite **confident** about the validity of my experimentation and **confident** that my hypotheses would be proven by my research. That the hypotheses were not proved has in fact turned out to be a source of great **pride** because my measurement tool seemingly works sufficiently well enough to tell me that my fabulous new D&T project still needs to go back to the drawing board. The need to revisit the drawing board also creates a sense of excitement at the wide range of possible future direction I could take this research.

At the beginning of working with the student group I felt quite **dispirited** in response to their lack of natural ability to collaborate with each other. However as the project progressed and the students practiced their collaboration skills and actually got quite good at it, I was quite **encouraged** and my **pride** increased and stayed with me until the very end.

My research journey was punctuated with visits to London to talk to tutors and other MA students about my work. Often I was **dispirited** before these sessions, believing I had not researched sufficiently, read widely enough, written up enough of my research journey. However, I always came away for meeting up in London hugely **encouraged**; a testament to the fantastically supportive nature of the sessions and the motivational skills of my tutors.

I felt enormous **relief** on completion of the student part of this project. It was massively experimental and high profile and I felt under pressure on behalf of the students to deliver a decent outcome, but of course they had the ownership and control of the project, not me, which likely contributed significantly to my **anxiety**. In the few weeks that their magnificent interactive sculpture has been on public display, the conversations it has stimulated between students and staff about sculpture and art around the college has made me intensely confident and encouraged. The reports of the pleasure that the sculpture has given to those who have encountered it and watching it make people laugh, puzzle out the way it works, experiment with it by moving around the once empty space to 'stimulate' it have all made me **proud** and **excited**.

Significantly, by focusing upon how students feel about their learning I have embarked upon a learning journey of my own that has helped me to make connections between learning and PLTS that I had not made before. I now understand more fully that the work a student produces does not tell the whole story of their learning. I am now appreciating that an independent learner may well be developed through the skills learned by collaborating on projects. The way that students feel about what they have made and what they have learned may indeed be a very significant variable that we need to take careful note of, if we are to design projects that stimulate positive emotional responses as well as help the student develop their meta-cognition. Reflective learners need opportunities presented to them by reflective practitioners perhaps.

In summary, the main impact upon me has been to stimulate a fascination with exploring how the measuring and analysis of student emotional response to their learning can help us to develop better learning experiences.

Impact upon student learning

Within my student study group collaboration skills have developed very significantly amongst all group members over the course of this project. I have witnessed sub-teams taking collective responsibility for their work. They have developed task-focused, achievement orientated communication skills, showed they can be organized, independent and co-dependent and, at the end of the project, they delivered the goods. Given the groups starting point, this is something to celebrate.

A much wider range of engineering skills than they would normally encounter in Yr 9 have been developed amongst the students. For example the use of the CAD/CAM lathe, manual lathes, taps and dies, use of advanced electronics etc. Even when one particular skill is only learned by a subgroup of students within the group, the awareness of the techniques and technical possibilities amongst other students is massively raised and students share their 'how to' knowledge freely with each other. It is clear that when a student group is given a wide range of D&T skill learning opportunities within a project, quite simply they learn a wider range of skills, either directly or indirectly. This has significant implications again for project design....

Impact upon the space

The space has been transformed from a place people passed through to a place where people pause to look at, to talk about, and to interact with the sculpture. A place where kids experiment by moving around the space to make things happen, to test out informal 'group hypotheses' (e.g. 'I bet if you go over there and wave your arms it will...'). The space is amusing and interesting and attractive with the sculpture in it, where before it was just another corridor, wider than average, more lilac than average but just a corridor.

RM profile in the whole school

The sculpture has given RM a public face within the school, working closely with the Art department on such an exciting project has meant that there are many discussions about the possibilities of future RM and Art cross curricular links being forged.

Ways forward

for the research

I will continue to gather research data on my group of students for the remainder of this academic year. They are now working, again on an individual outcome project, a 'Design & Make' assignment that will generate their end of Key Stage Grade. I will continue to ask them to use the emotional self-assessment tool and will be excited to see how the much more open ended D&M task affects their emotional responses. I will also be observing and 'engineering' some opportunities for collaboration in the D&M task to see if the skills developed continue in this new project. It will also be interesting to see how many of the designs developed by the students draw on the experiences of using materials and processes they have gained during the 'Watch this Space' project. I will also be hoping to observe that the higher standards of outcomes they know they can be part of, will lead to higher individual aspirations in students and an end of project assessment grade that is much closer to the aspirational targets' supplied by the college!.

Analyse the data further

I am very conscious that there is a great deal more analysis of the data needed to further refine my thinking. My data analysis has been complicated by my data collection techniques and the large amount of data generated for a relatively small cohort of students. Tracking the individual emotions for each student and using data comparison tools might well help to refine my understanding of the data and also prompt me to further refine the measuring tools and data collection techniques.

I will use this second more refined iteration of the self-assessment tool to test with other year groups in RM and Graphics. I will enlist the help of another technology teacher to administer the tests in Food and Textiles. This will give us a range of data to help in evaluation of the technology curriculum.

Taking it out and beyond

It would be a fairly simple task to develop a computer bases version of this measuring tool. I will work with ICT department to look at ways of getting a version of the tool to test.

If we can get to a stage where we can generate and process data from this tool effectively, it should be possible to roll it out, through all the D&T material areas, and ultimately through a range of subjects. I envisage this tool contributing to and stimulating the development of PLTS in our students, in particular to the development of reflective learners. If we have the capability to ask students to quickly and easily assess how they **feel** about a piece of work, it would naturally

stimulate a conversation about what they could have changed to allow them to feel better about it.

There is an obligation on us, as pedagogues, to listen to our students. The use of data on students emotional response to their work can play an important part in giving students a voice in the iterative curriculum design process that we want to embed as a philosophy in the D&T department at UCTC and ultimately in the whole school. Any tool that prompts us as teachers to reflect critically on our own practice has to be valuable in my school, our partner schools and across the county.

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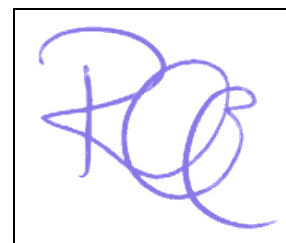
Ethical Statement and Submission

| | |
|-----------------------------|--|
| Name | Rory O'Connor |
| Module Name and Code | PDT 4070 Action research for school improvement |
| Title of the Work | Getting Emotional about RM |

| Ethical Codes and Guideline | Tick |
|---|-------------|
| I have checked my institutional policy for concerns about ethical behaviour. | ☺ |
| I have checked the BERA code of practice | ☺ |
| I have checked the Mdx School of Arts and Education policy for practitioner research | ☺ |
| Voluntary Informed Consent | |
| I have informed relevant managers, participants, stakeholders, and parents | ☺ |
| I have asked for the consent of relevant managers, participants, stakeholders, parents and others involved or connected with the research to carry out the research | ☺ |
| Participants have given their consent freely and without duress or inappropriate use of power. | ☺ |
| The right to withdraw from the research process has been made clear to appropriate participants | ☺ |
| Rules for confidentiality | |
| Managers, participants, stakeholders, and parents have been informed about the rules for confidentiality that the study will use. | ☺ |
| I agree that I can maintain anonymity in the Mdx submitted work. | ☺ |
| Purpose and Audience | |

| | |
|---|---|
| I have clarified with participants that the purpose of the research is to improve practice, to generate knowledge and to gain a qualification. | ☺ |
| Participants are aware that their permission relates only to the purpose of the research project and that any further use will be renegotiated with them. | ☺ |
| Participants have been informed that the purposes will be to maximise good and minimise harm to individuals and institutions. | ☺ |
| I have made clear to participants that the audience is | |
| • the University and tutors | ☺ |
| • other participants of the professional development programme | ☺ |
| • appropriate staff in the school | ☺ |
| • a wider audience | ☺ |
| Legal requirements of the Data Protection Act have been addressed. | ☺ |
| The research data will be kept securely. | ☺ |
| Rights of response | |
| I have agreed with participants the rules for feeding back reports to them and allowing a right of response. | ☺ |
| Truthfulness | |
| I commit to using my scholarship and research skills to producing research, which is honest, truthful and verifiable. | ☺ |
| I commit to ensuring that the research will not deliberately advantage or disadvantage any specific individuals or groups. | ☺ |
| Disruption | |
| I have minimised the disruption the research exercise creates. | ☺ |
| I agree only to collect sufficient evidence for the research project purposes. | ☺ |

Signed



Verification by Workplace Advocate or Senior Manager

I have overseen the project above and am satisfied with this ethical statement.

Signed.

Andrew Wright (Deputy Principal, Uckfield Community Technology College.