

The Study of Tears

An evaluation for Project Volume funded by the Wellcome Trust Arts Awards

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Acknowledgments

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Project Volume commissioned DWC Ltd to conduct an evaluation of its Wellcome trust-funded project ***The Study of Tears*** (2010). This is the report of that evaluation.

1 The Wellcome Trust's Arts Awards

The Arts Awards support projects that stimulate interest, excitement and debate about biomedical science through the arts. The Awards fund projects, which employ imaginative ways of engaging and educating young people in the field of science. The Study of Tears project was designed to address the following specific objectives of the Arts Awards:

- to stimulate interest, excitement and debate about biomedical science through the arts;
- to encourage new ways of thinking;
- to encourage high quality interdisciplinary practice and collaborative partnerships in arts, science and/or education practice.

The Wellcome Trust advises organisations receiving Arts Awards to evaluate the *value and quality* of a project as well as the *process of learning* from a project, in order to improve performance or outcomes in the future. This evaluation addressed *value and quality* by collecting evidence of young people and teachers' reactions to The Study of Tears (section 7), and addressed the *process of learning* by examining how Project Volume approaches working with young people with learning disabilities, and the pedagogy it employs to teach an aspect of biomedical science through dance, art and video (section 6).

2 Project Volume

Project Volume is a dance organisation, committed to providing opportunity, access and advocacy for people with learning disabilities thereby raising their potential, profile, voice and visibility within our society and challenging perceptions of dance and disability, through the evolution and profiling of high quality dance education and performance. Susan Norwood, Project Volume's Artistic Director, favours the term *learning differently* to convey the notion that some young people who have difficulty accessing education in conventional ways, can nevertheless learn and develop successfully through unconventional teaching strategies, learning activities and resources. Susan Norwood's ideas are explained in more detail in section six of the report.

3 The Study of Tears

This project was designed to enhance learning in science through dance, art and video with pupils at **Selly Oak Trust School** and other young people with learning disabilities in the region. The learning and teaching was structured so as to help the young people involved to

learn about the biological function of tears in relation to the eye and, crucially, to explore the phenomenon of tears and emotion. This offered a challenge, particularly to young people with autistic spectrum disorders.

Project Volume articulated their aims in this way:

'The primary objectives of the project are to stimulate a creative as well as an analytical approach to learning the science of tears, using multimedia art and dance to facilitate learning and communication among pupils who may struggle with traditional forms of learning. The Study of Tears also seeks to support and engage those participants who have autism, for whom studying an emotional context on its own may be difficult, unless also supported by the functional role of tears.'

Teaching about basal, reflex and emotional tears as biomedical concepts was central to the Project. But the selection of art forms as vehicles for The Study of Tears was also crucial. Video was used as a medium for teaching and learning because of the obvious optical qualities of the camera lens. Art was used as a medium for depicting the eye, both diagrammatically and expressively. Dance, like forms of visual art, was employed as an expressive medium, which is more accessible to those with learning disability who tend to see language-based learning as ultimately something they cannot succeed with.

Selly Oak Trust School in Birmingham, where the Study of Tears was based, is a secondary special school and specialist science college. With a school roll of 386 and over 100 young people in years 12 and 13, it is believed to be the largest school of its kind in Europe.

Project Volume sought to address the aims of the Wellcome Trust's Arts Awards by *stimulating interest and excitement* among the young people who participated in the project and by engaging the school staff in *new ways of thinking* about how young people who learn differently understand scientific concepts. *Interdisciplinary practice and collaboration* was structured into the project through Project Volume's selection of three different art forms as the medium for the work and through collaboration with the school staff, particularly with the science staff.

Project Volume expressed the objectives of the Study of Tears in the following terms:

- to teach the science of crying: basal tears, reflex tears and emotional tears;
- to encourage an excitement around learning, creativity and science for these young people with learning disabilities;

- to encourage peer learning and peer-to-peer interaction throughout the project;
- to break down barriers to learning through supporting different learning styles through the different physical and visual art forms;
- to create an evolving dialogue with the science and art departments within Selly Oak Trust School and to exhibit the pupils' contributions;
- to see if exploring the emotions through science allows for greater understanding of this subject by those pupils with autism.

4 The remit of the evaluation

The evaluation was designed to contribute to knowledge about approaches to learning in science for a group of young people with learning disabilities who may learn differently. It sought to address the following questions:

- Can we recognise learning and understanding about the functions of tears in this group of learners? In particular can young people on the autistic spectrum engage with the concept of emotional triggers for tears?
- Can we describe and explain Project Volume's distinctive approach to facilitating learning in this area of biomedical science?
- Can we identify and describe instances of ownership and autonomy in learning among this group of young people?

The evaluation involved three days observing the teaching and learning, one day at Selly Oak and two days at Birmingham DanceXchange. Interviews were conducted with two Selly Oak teachers, three of the project leaders and Dr John Tiffany, the scientific adviser to the project. In addition there were informal discussions with some of the students involved. Finally, this evaluation drew on another study of the project by Professor Rita Jordan, Emeritus Professor in Autism Studies at the University of Birmingham. Professor Jordan's focus was specifically to:

'... see if, by working in dance and film, with both the function and the emotion of tears, whether this helps, or triggers any greater 'understanding' of the emotional aspect, by participants with autism ...'

5 The Structure of the Project

The sequential structure of the project was as follows:

Susan Norwood spent 1 day planning the science scheme of work with science teacher Clare Trevitt, so that the work reflected Project Volume's teaching philosophy.

Susan Norwood led a 4 day introduction to film and dance before the students were offered the choice of which art form to work in.

Clare Trevitt led a 3 day scheme of work on the Study of Tears for a group of year 12 and 13 students with learning difficulties.

Students spent two days filming and one day at Vivid studios edit suite in Birmingham to learn about film editing. This also informed their eventual choice of art form.

Susan Norwood led a three day dance workshop on the Study of Tears including a day at DanceXchange in Birmingham. Students were given a choice about what art form to specialise in.

Students then spent an additional two days at DanceXchange with an additional two days editing the films.

Project Volume then led two summer schools at Dance Xchange over ten days in total, with a final sharing event for students, families and friends. The summer schools were designed to provide opportunities for the students to practice autonomy and to choreograph for themselves.

Project Volume creates the structure of its projects carefully, aligning this structure closely to the learning needs of young people with learning disabilities.

Initially Susan Norwood worked for a day with science teacher Claire Trevitt from Selly Oak Trust School. This introduced Claire to Project Volume's specific methodology and its approaches to working with young people with learning disabilities. Claire Trevitt then developed a short scheme of work exploring basal tears, reflex tears and the emotional triggers that cause tears. The scheme incorporated music, interactive diagrams, practical tasks and examining models of the eye.

Claire then taught the scheme of work to a group of young people, all aged 16-19, supported by Susan Norwood and also by Dr John Tiffany, a recently retired expert who headed the Oxford University research group in ophthalmological biochemistry, which identified the unique combination of ingredients that make up tears. During this period the students were able to question Dr Tiffany, who was introduced as a 'talking book,' and to

interpret what they were learning through visual art. One highly intelligent autistic student was able to reveal and share his extensive knowledge of the eye with Dr Tiffany and this student also went on to research different film makers which Riccardo Iacono, who led the project's film work, suggested he should research in relation to his own artistic development.

For Susan Norwood:

'Working in this structure of the science module before the creative aspects allows for repetition of science concepts in later creative work, whilst approaching them differently. This allowed greater time for students to learn at differing speeds and to gain greater confidence to engage and to contribute their own responses and ideas. For those with attention deficit disorder, it also offered different areas to focus upon and different routes through exploring the same information.'

Susan Norwood also pointed out that:

'The pupils at Selly Oak School were introduced to the science aspect as the key research aspect that they needed to undertake, in order that they may begin to make their own creative choices about the work they would make.'

She emphasised that this mirrored the approach of professional artists, choreographers, writers and filmmakers who initially research an area of interest to inspire their creative work. Drawing also played a large part in the initial stages of learning and teaching and young people drew the parts of the eye and observed eyes from the front and from the side view. They drew diagrams of two eyes with arrows to drawings, symbols or words about the emotions that trigger tears. They experimented with lettering which reflected different emotional triggers.

The young people then took part in two intensive, introductory three and four-day courses involving dance and film making with Susan Norwood and her colleague, Riccardo Iacono, a film maker. A young professional dancer with learning disabilities, Frances Weir, supported the dance workshops and provided a role model for the other young participants. Susan Norwood described the rationale for this:

'Bringing in professional disabled and non-disabled artists to the project allowed for different aspects of aspiration and peer learning to take place. Dancing alongside

learning-disabled dancer Frances Weir, appeared to have the most dramatic effect on their learning leap, as they saw what she was capable of; this then seemed to instil in them a greater sense that perhaps they could achieve this too.'

Riccardo followed Susan's design brief, and filmed the drawings young people made during their science lessons. For Susan Norwood, this was an important element in *The Study of Tears*:

'The aim of filming their drawings was designed to develop pride in their work and also see that we saw it as valuable. Riccardo developed this design by asking the students to talk about the drawings and the ideas behind them, as they filmed them. The talking about the science and creative ideas in direct relation to their own work seemed to put them at a greater ease, rather than the format of direct question and answer sessions. Giving students with learning disabilities the arts as an additional form of communication can bridge the communication gap sometimes left, when words and structuring of sentences become initially difficult.'

Following the dance and film intensives the students were given the choice to specialise in film or dance for the next stage, which was to be held in professional spaces, to underpin their professional development and pride in their learning. Susan Norwood explained that:

'The introductory course in dance and in film was to ensure that the students gained the knowledge they needed to make their own decisions on which art form they wished to specialise in. Students had the opportunity to study this way, so that we could make no assumptions about which art form the student would choose.'

As part of the intensive course, the group worked at Birmingham's professional dance studios, DanceXchange. The video-making group then went on to work for a further two days in the edit suite with Susan Norwood, Riccardo Iacono and Claire Trevitt. The film makers worked with Riccardo, experimenting with ways to capture on film the ideas behind tears, by filming those who had chosen dance. The different art forms were employed both to support learning in different ways, but also to give autonomy and choice to each young person, so that learning was not passive but interactive and exploratory for them in teams and as an individual.

Dance Xchange was also the venue for Project Volume's ten-day summer school. Seven days were given over to young talented and experienced dancers with learning disabilities and three days given to those who were just beginning and had more complex needs. This also focused on the Study of Tears and was attended by many additional students from Selly Oak Trust School as well as other young people with learning disability from the region. The summer school for the more experienced dancers culminated in a sharing of the art, video and dance work by all involved in the project, attended by their friends and families and also by those young people about to start the second three-day summer school, so that they might be inspired by the first one.

For Susan Norwood the summer school was a vital culmination of the Study of Tears since it:

'...demonstrated the [young people's] capacity to develop greater autonomy by making their own work. This group were introduced both to the subject of tears and to different approaches to making choreography, before having the opportunity to work on their own, or with partners in developing their choreography from their chosen material.

'On the day of the sharing I asked the group if anyone might like to describe to the audience the scientific background in relation to their choreography. During the afternoon, as students were rehearsing their work, some students took the initiative to write about tears and explain their work.

'For those beginning to enjoy dance, self-management played a crucial part during the second stage of the summer school. Many of these students had more complex needs related to their disability, so were used to an increased level of care and supervision. Having worked with some of these students before, I asked that they should not come accompanied by a support worker, saying that we would provide additional support and mentoring with a dancer with learning disabilities. My reason is that I wanted these students equally to experience greater autonomy within their development as people and as artists. This happened in two ways; in life skills as some of them enjoyed buying their own lunch and interacting with new people and secondly, creatively, as they took on the ideas they had seen during the sharing event at the first summer school and made them their own.'

6 The philosophy behind the project.

The Study of Tears was informed by Project Volume's distinctive philosophy about learning and teaching for young people with learning disabilities. The elements of this are described in this section.

6.1 Multi Modal Learning

Using video, art and dance to engage with learners who have learning disabilities is an example of what Susan Norwood describes as a *multi modal learning* strategy, since her view is that each of these art forms contributed in unique ways to understanding the science of the eye. Project Volume's use of the term *multi modal learning* refers to the conviction that young people with learning disabilities should be offered a range of activities and materials to support their learning. They often avoid engaging with propositional knowledge involving numeracy and literacy in the belief that they will fail. Multi modal approaches give parity of esteem to visual, kinaesthetic, spatial, emotional and other forms of learning. The Study of Tears project therefore contributed to the understanding of multi modal learning in science for young people with learning disabilities.

The concept of multi modal learning has some connections with Howard Gardner's theories about Multiple intelligences. In *Frames of Mind* (1983)¹ Gardner offered a taxonomy of seven forms of intelligence and attempted to show that individuals deploy these forms of intelligence in various combinations, depending on the individual and the activity he or she is doing. Educators recognised, in Gardner's work, the implication that much traditional learning and teaching is focused narrowly on pupils' linguistic and numerate ability to detect patterns, reason deductively and think logically. When learning and teaching are focused exclusively on logico-deductive reasoning we fail to recognise the combination of other forms of intelligence which pupils can demonstrate.

In her evaluation of the project, Professor Jordan recognised the potential benefits of multi modal learning for students with autism:

'The multi-modal approach to teaching is also likely to benefit those with autism who will thus have many explicit cues to each emotion.'

And Professor Jordan saw the potential of using a range of art forms for young people with autism:

¹ Gardner, Howard. (1983; 1993). *Frames of Mind: The theory of multiple intelligences*. New York: Basic Books.

'The arts have a great role to play in helping people with autism connect with their world in a subjective way but their preferred learning style means they can best access this through explicit 'scientific' teaching. This project has great potential, therefore, in utilizing both avenues of learning. The dance studio meant that the students danced surrounded by mirrors. This gave them direct experience of performing movements and at the same time watching themselves perform those movements. This is a valuable technique for helping them connect their inner with their outer senses – something that is an issue in autism.'

6.2 Professionalism Another of Project Volume's key approaches is to emphasise *professionalism* at every level; by employing learning disabled professional dancers such as Frances Weir as role models, by giving access to professional cultural spaces such as DanceXchange and Vivid, by employing professional artists, film makers and science experts, and so giving esteem to young people with learning disability by placing the work in a professional context. So drawings were filmed, films were uploaded onto a blog, young people interacted with, and choreographed, professionals.

Susan Norwood espouses the, 'professional model of learning, to encourage from the outset both the development of professional and autonomous competencies.' These professional elements are intended to convey the message that education for young people with learning disability is valued. It was also designed to lift the self esteem of these young people and encourage them to practise autonomy and make creative decisions within the project. She believes that this professional emphasis in projects can nurture certain qualities in young people with learning disability, such as:

'Team working: the pupils were introduced to the professional understanding that though we may not always like each other, in working with the arts we need to collaborate and in dance we need to build up trust with each other to be safe, both physically and emotionally.

Independent enquiry: time was given to allowing students to explore their thinking within the science module and within the creative sessions, taking time to allow for questions which may first appear random, yet honouring them and following them through.

Self-managing: this can be explored in different ways. Performance requires a great deal of self-management. Within dance and performance, there can be an aspect of 'improvisation' which can link many of these autonomous qualities together, since

creating improvised material requires a constant level of decision-making within each student and this works by linking the thought processes of direction, subject, self awareness and team awareness.'

6.3 The 'Spiral Curriculum' Susan Norwood espouses an approach which has much in common with Jerome Bruner's (1960) concept of the 'spiral curriculum'². Bruner held that:

'A curriculum as it develops should revisit basic ideas repeatedly, building upon them until the student has grasped the full formal apparatus that goes with them' (1960, 13)

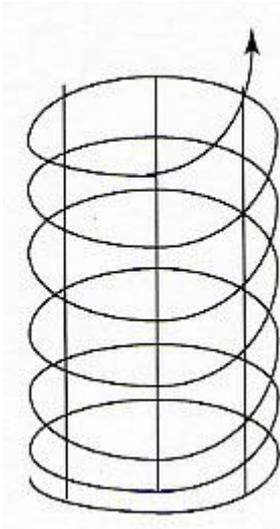
So Project Volume's approach to teaching young people with learning disability is to keep an outcome in mind but to work round it to allow for repetition, choice and, in particular, personalisation for each learner. An important pedagogical technique used by Project Volume is to employ repetition without it seeming to be repetition to the learners.

'These young people have learning disability but are not disabled *from* learning. We need to find ways they can learn differently.'

Susan Norwood Comments:

'Within creative sessions, though there is a desired learning outcome to be achieved, how that is reached may vary considerably. This is because the teaching alters in accordance to the information being received from the group. I will continually make adjustments to my 'teaching' in relation to the observations I am making as I work to accommodate each individual, responding to their tangents, ideas of pupils, and continually adding greater complexity when I sense they are ready. If I were to ask you to draw a diagram it would be a line illustrating the intended outcome but a spiral route of creativity in the approach to reach that point.'

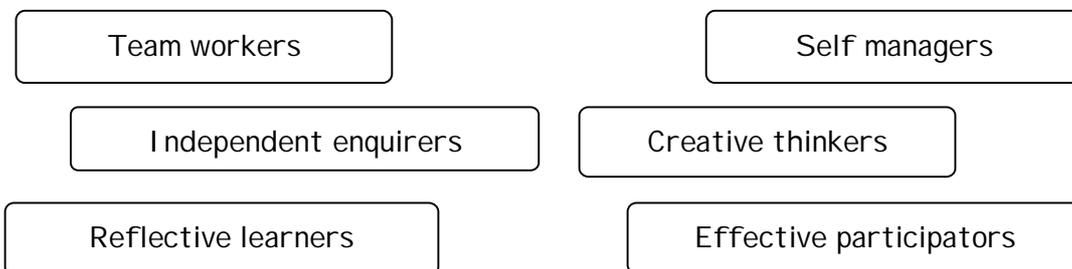
² Bruner, J. (1960) *The Process of Education* London: Harvard University Press.



In fact Project Volume's approach echoes Bruner's landmark text in many respects: in holding that much learning takes place intuitively, in believing that educators often delay teaching important concepts because they assume that these concepts are beyond the developmental grasp of the learner and in valuing repetition.

6.4 Personal Learning and Thinking Skills

Project Volume is also influenced by the Qualifications and Curriculum Authority (QCA) framework of personal learning and thinking skills. These, the QCA state, are, 'essential to learning, life and work:'



A common assumption, according to Susan Norwood, is that young people with learning disabilities will not be able to practise these autonomous and enterprising skills. But she believes it can be applied to these young people as well, and so opportunities to practise these skills were built into The Study of Tears, and to all Project Volume work. She explained that:

'It does this in stages, to allow for the confidence, the skills building and the stamina of focus to develop...in order that they can begin to then take on skills which enable them to contribute more fully to our society.'

6.5 Choice

Another part of Susan Norwood's pedagogy is to emphasise choice, since she believes it is likely that these young people will have had extensive teaching in highly structured and directed activities to practise life skills like taking a bus. But in *The Study of Tears* young people were encouraged to take their own direction at several points. Project Volume deliberately highlights choice in order to: 'challenge a culture within disability whereby making choices and decisions can be more limited than that of you and I.'

'Disabled people have limited choices in everyday life, due to the nature of our built environment or inaccessibility of established programmes, projects and activities. This can majorly affect our ability to make decisions when there are a plethora of options presented to us, as we will always assume we'll be excluded from some. I think this experience can also affect our artistic ability to think big, have ambition and aspirations and actually feel confident to make the choices we want to make.'

(Caroline Bowditch Disabled Artist speaking about the issues of developing professionally as an artist.)

Making creative choices also provides a useful learning experience, according to Susan Norwood:

'...the creative process demonstrates to [students with low self-esteem] that making mistakes can be an important and valuable part of the process. This release can enable students to take more learning risks and begin to understand the choice making within the process of taking what they want to edit or create into choreography.'

Professor Jordan also saw the concept of choice as vital to young people with autism:

'The level of consultation with the students, and the degree of choice in the project meant that the students were able, at least to a large extent, to be in control of their own learning. This gave them a helpful degree of autonomy, not only choosing broad aspects like their specialisation but also myriad decisions over choreography in dance, camera angles in videoing and so on. The degree of support was also high, from working alongside 'experts' and the constant drawing of attention to what they were doing and its effects. Thus, they began to learn about their own intentions and how to achieve them. I predict that this will have significant long-term effects on their learning.'

6.6 Metaphor Both the course leaders and the young people used metaphor as a learning tool. The course leaders used metaphors at every stage to convey the scientific concepts, for example by physicalising the journey of a tear or the reflexes sending messages to the brain. But also young people had ample opportunity to use film, art and dance to create metaphors as an artistic choice, having encountered metaphors as a way to absorb abstract concepts.

Susan Norwood's decision to juxtapose dance with visual art in the project was a deliberate part of the philosophy:

'The visual art aspect was brought into the science module, as I have previously observed how drawing can enable the pupil to focus on the subject for longer periods of time, as it breaks up the listening, whilst allowing other routes for processing information to take effect.'

She recognised the metaphorical potential in visual art and dance:

'The drawings were observational as they drew models of the eye and of each other's eyes, before we encouraged greater creative exploration. Each student was asked to draw two eyes, but from this starting point to think about how they wanted to draw, or depict the different emotional triggers that form tears in any way they thought fit. This allowed symbols, or words and the emotion to be depicted through the way the words were written. Having been advised by the school that many of the students would not draw, all of the students exceeded themselves.'

7 Interviews with Teachers and other Participants

The school staff most closely involved in the project – the assistant head of the sixth form and a science teacher – both stressed that promoting alternative methods of communication from traditional forms such as literacy and numeracy was central to their approach to special education.

Malcolm Pomroy, Selly Oak's Assistant Head observed the work and canvassed the views of students and their families:

'They all got a tremendous amount from the work, from those who were accessing dance as a tool to explore science for the first time to those who were more

experienced in this art form and were more confident to use movement and film in their exploration.

The benefits go beyond the understanding of scientific concepts, important though they were. Self esteem, confidence and the chance to show what they could do in a creative and accessible way meant more. They were valued and able to contribute their ideas on equal terms.'

He emphasised that Project Volume's approach to learning and teaching through the arts was in sympathy with his own philosophy.

Claire Trevitt, the science teacher involved in the project, explained that she used role play, kinaesthetic learning and other alternative methods to get across difficult scientific concepts:

'[Pupils with learning difficulties] find the concepts in science quite hard to visualise so if you can make it into something that moves it's more memorable.'

She felt that typically science teachers tried to fit too much content into every lesson, and that more could be absorbed by pupils with learning disabilities if lessons covered less ground but were more absorbing, 'fun and interesting.'

Susan Norwood gave an example of this:

'Claire and I found that we had to break down the information giving into shorter chunks as this group struggled (at first) with the listening aspect. When, for example, we looked at exploring reflex tears through a physical game, we both observed that the students then had a game to associate with the memory of what reflex tears meant.'

Claire felt that the artwork, which young people had produced during the scheme of work, was exceptional for the group and expressed their emotional and scientific response to the work with remarkable insight. She felt that Project Volume's approach and the experience of the pupils who had worked with Project Volume should be disseminated to other pupils in the school. Finally, Dr Tiffany offered his reaction to the work as an objective observer of this approach to learning science:

'I was greatly impressed by the development and commitment of the students since I first saw them. They will have gained tremendously in self-confidence and application... I am still surprised by how much you have achieved with them.'

Among the project leaders, Frances Weir felt that seeing a learning disabled professional dancer was important to the project:

'I think they watched carefully. I think seeing me dance helped them concentrate on the work and to try harder to get involved. Some of them didn't think they could dance but watching me helped them to have a go I think. Yes I did enjoy creating my own choreography. Having a subject to work with helped me to focus on what I was trying to do.'

For Susan Norwood, interspersing drawing, filmmaking and dance with the use of language makes learning and teaching accessible to those with learning disabilities, since the dominant mode of learning usually involves listening and responding. Susan said, of this multi modal approach to learning:

'The media you use allows the way particular people learn to be facilitated. A key reason for learning through the use of art forms is that pupils with learning disabilities tend to assume that they will fail to complete activities involving literacy and numeracy. So they see themselves as bad learners, rather than learners who may succeed if taught differently.'

In Susan's view the traditional teaching format of discussion, question and answer sessions needs to be used sparingly with people with learning disabilities since they may struggle with:

- 'ordering the memory;
- understanding the question to give the right answer;
- constructing sentences;
- communicating with people they do not know/or figures of academia;
- fear of getting it wrong, so keeping quiet.'

During the workshops, therefore, Susan Norwood used a range of teaching techniques, which exemplify multi modal learning and set up physical activities through dance to symbolise the functions of tears. She conveyed the concept of basal tears through

continuous movement and repetition as each participant created choreography based on the concept of blinking. Reflex tears were explored by games that illustrated how irritants trigger responses and messages in the body to produce tears. So participants lined up as 'message centres', responding to the stimulus of an irritant. This, she felt, had a profound effect. 'That dance of the reflex tears has never left them.'

Susan was particularly interested to explore how *The Study of Tears* would also support and engage participants on the autistic spectrum, for whom studying an emotional context on its own might be difficult, unless also supported by the functional role of tears. Emotional tears were therefore explored from many angles, as it was particularly important, when working with autistic participants, to show that emotions could be misinterpreted, misread and that people may respond differently on experiencing different emotions. Laughter was explored through the group testing out the contagious nature of laughter. Also, each participant contributed a movement from an emotion and different group sequences were then created from these. So she encouraged participants to 'perform' emotions:

'The emotional triggers was first introduced in the science lessons, to set out an understanding that we are all different in how we respond and interpret emotions and to validate this, to ensure that the young people felt able to be individual and that it is important to respect the differences in others.'

'The professional structure of the learning also enabled us to stress that we worked with professional respect and made each other feel safe to explore our emotions.'

Both Selly Oak Trust School teachers and Project Volume staff were unanimous in believing the students' artwork was remarkable for the way it communicated, often through the use of symbol and metaphor. This provided evidence that even students on the autistic spectrum were recognising the role of emotional tears and identifying certain emotions.

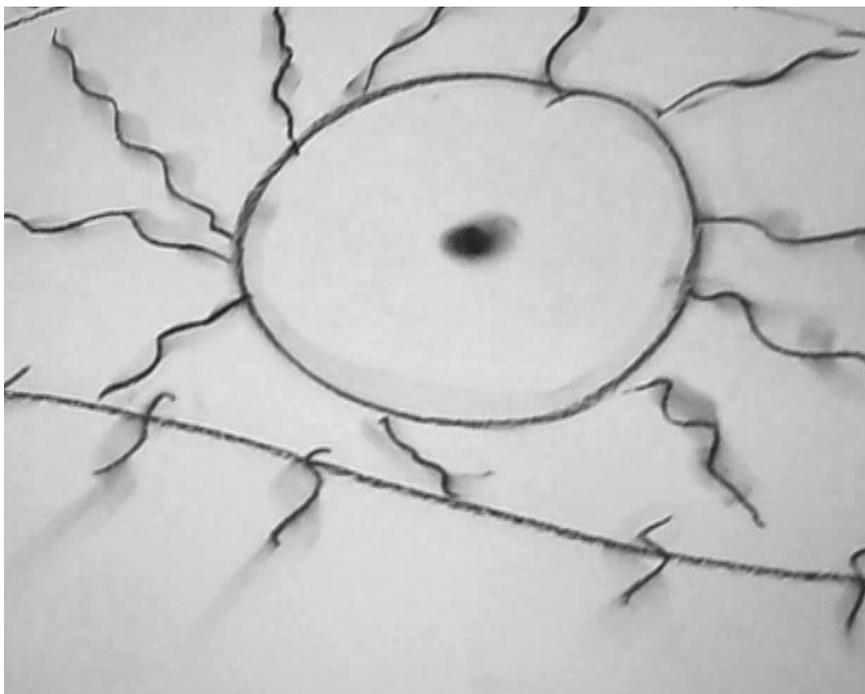
'The drawings have surprised me in terms of the creativity and imagination of the discussions' 'The media produces bridges – art succeeds where the limits of language fail.' (Claire Trevitt)

Riccardo Iacono took up this theme when he described his own education.

'I wouldn't say I had learning difficulties when I was young, but through art, when I took up art, I became more confident, more articulate and analytical.'

Professor Jordan also noted the way in which young people with autism responded to the emotional context of The Study of Tears:

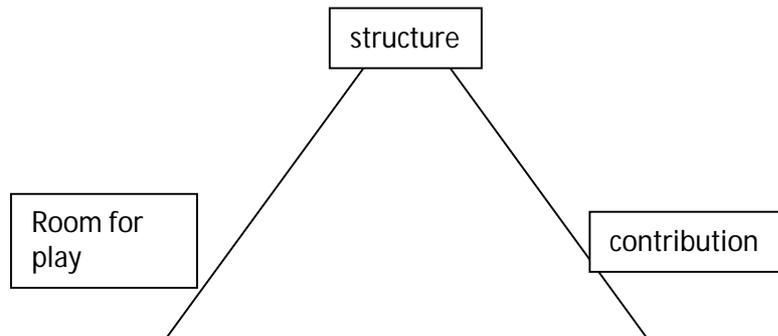
'[student] is able to articulate his own emotions clearly and explain the symbols he has used. At one point he is questioned about the meaning of both a brick wall and a squiggle (which he says is a drawing of fire) in a picture on the emotions. The questioner is puzzled by his insistence that both symbols express 'happy', but I think it is clear that for [student] these represent experiences that do in fact make him happy. It may be worrying that fire makes him happy but it is clear that he understands what 'happy' means and that his representations of it are true to his own feelings and certainly not stereotypical...What this project has given him (or at least, helped to foster) is explicit insight into his emotions and a vocabulary with which to express his viewpoint to others.'



One of the objectives of The Study of Tears was for the students to practise autonomy. Susan Norwood felt that they were practising autonomy in choosing the art form they worked with and Riccardo Iacono said choosing the edits they liked was an example of autonomy. Moreover, both interviewees felt it was important to them to give students opportunities to work alone as well as in groups. So some young people choreographed dance on their own and all of them drew alone. Riccardo Iacono felt that different media are suited either to social or solitary activity:

'But even film can be social. They realise they have to skill share. There is lots of room for skill sharing.'

Susan Norwood uses a particular format of activities for young people with learning difference, comprised of three elements: **Structure, contribution, room for play**. She feels it is important that they have a supportive structure when they undertake new work:



'I think that the structure of this sort of learning should involve giving skills, demonstrating very creative ideas and then providing freedom for play. Make people feel safe and then slowly release them. If you force the pace – then they feel they are being asked [logico reasoning questions] something they know they are not good at. Being told that making 'mistakes' is part of the creative process with time dedicated to play, to explore ideas can help participants relax into their learning, without fear. When 'fear' did or does arise, explaining that it too is part of the natural course of performing, again validates participants' feelings.'

Similarly, her film maker colleague Riccardo Iacono attempted to teach about tears and the eye through play, exploring the camera as a lens, and the action of water on the eye. So the students pointed the lens of the camera through the lenses of people's spectacles. They filmed water running through their hands and painted under water to symbolise the liquid aspect of tears.

The young people responded positively to The Study of Tears:

'It showed me how people produce tears.'

"I thought there is more to the eye than I thought before."

"It helped me express how I could see different things."

"Yes it helped to understand what was going on so I could contribute."

Professor Jordan felt that those young people with autism had a very positive: experience:

'Their level of understanding and expression of emotions, for example, is higher than would be expected in those with autism (especially with additional learning difficulties, where this was the case) and I think the helpful teaching styles, as detailed above, led to this. It is not just that they could dance or draw or use a camera, as many individuals with autism can do this, but that they seemed to be able to access their own emotions and intentions, be more aware of those of others, and express them in ways accessible to others.'

8 Observations

In the first group of young people from the school there were two girls and six boys, two of whom were on the autistic spectrum. The second group comprised one boy and three girls. Most of the remaining young people had moderate learning difficulties, speech language and communication disorders and some social and emotional difficulties. Observation of the work over three days focused on any evidence of young people's **ownership of the learning** as well as, **autonomy** and **understanding** of the bio-medical and emotional functions of tears.

There was evidence that nearly all the young people took ownership of the learning and sought to understand the material. There was a range of visual expressions of absorption. One boy rehearsed the appropriate facial expressions while Susan demonstrated moving from one emotion to another. Another girl struck a kneeling pose and covered her face with her arm, with her unseeing eyes focused on the far distance. She used very subtle touches to convey emotion such as 'breathing into' or 'pulsing' her sadness, as Susan Norwood described it.

As far as conceptual understanding goes, Susan Norwood and Riccardo Iacono reiterated the three types of tears on several occasions on the days, and some of the young people used the correct vocabulary by describing basal or reflex tears. Susan very directly encouraged interaction by directing young people through several exercises when they had to respond to emotions danced by others; three boys did this very well. When young people formed the audience to watch what their peers had been working on, they, too, mostly showed absorption by, for example, mirroring the facial communication of emotions portrayed on stage. Susan's explanation about how to 'read' emotions in movement also seemed directly to address interaction and communication for young people on the autistic spectrum. At least three of the group responded to Susan's request for them to use very small movements by striking up very memorable poses. As a climax to a session with the larger group Susan asked them to put together a sequence of three to five movements.

Most of them were totally absorbed and inventive when they showed this sequence, and, together with the music, the movement sequences were, in most cases, striking and engaging.

The second group were said to comprise young people who were less able than those in the first. Their ideas were perhaps a little more literal and predictable but they were all absorbed in the work. However, once or twice they still demonstrated emotions and showed themselves skilled at responding to others' emotions. The exercise when this group changed from one emotion to another resulted in a very focused piece of improvised dance. Susan then tried to refine their work by asking them to move more slowly from one emotion to the next. The teaching assistant supervising the class volunteered the information that she was, 'absolutely amazed,' at how they had expressed themselves in dance. She felt that it was amazing to see what they could achieve using a different medium than the traditional ones.

Susan Norwood's observed that this group:

'... made the biggest learning leap. Having progressed from short chunks of information sharing within the science module, they matched the other group when coming together for the specialisation stage with equality of focus and responses. Equally, during the final discussions with the scientist, this group took part with equal confidence. I was amazed at how the group took on theatrical exercises that I had studied during my degree. I mention this because of the sophistication and the complexity of the work that these students produced.'

On the day at DanceXchange the mirrors and the wide spaces seemed to prompt an even stronger sense of absorption. The video group concentrated on their 'flick animations,' booklets of drawings which, when flicked through, created the illusion of movement as in a cartoon. One young person's grasp of mirrors, glass and lenses as a metaphor for the eye was demonstrated when he asked, 'Can [student E] film me looking through one of the windows?' The pair then filmed each other through a mirror and later through the spectacles which two of them wore. Riccardo stood behind a camera and pointed in various directions for one young person to follow his eyes. Then the pairs stood very close together and remained focused and silent for an hour and a half in the studio. As well as showing them technical skills in using the equipment, he was giving them creative ideas. He asked them about the reasons why the eye is slimy and so re-emphasised the concept of basal tears. Two students used the words *reflex* and *continuous* to describe tears. One suddenly asked

why babies cry and they discussed the fact that this is the only way babies can communicate.

Professor Jordan's evaluation also picked up the potential of the camera for young people with autism:

'...the camera was used as a specific tool to address some of the key learning needs in autism. By focusing on where the camera was pointing, rather than having to notice where eyes are pointing – a key deficit in autism, it was easier for the students with autism to understand different foci of attention...'

In the dance there was also an even higher level of focus and absorption in going from silent laughter to silent tears. Susan stressed to them that they should take their time in transition from one state to the next. Susan claimed she had a bad memory in order to encourage them to recall the sequence of moves. Several of them remembered the moves before Susan described them. One student led the sequence using very sensitive timing. One of them mentioned their interest in the mirror. At points in this work it was possible to disregard the learning disabilities of this group of young people because of their sensitivity and absorption. For example, one girl made movements in jerks in time with the music and then, with her head back, she flexed her jaw back and forth with the music. Susan then gave them time to be inventive with new blinking movements. So the complex and abstracted concepts central to the science of tears were realised in spatial form. Susan asked them to repeat a movement as a metaphor for the function of basal tears. She asked them to interpret the movements as either fast or slow.

It was clear that young people were committed to *The Study of Tears* and demonstrated understanding of the concepts involved. Structured and directed activities seemed to be the most prominent aspect of Project Volume's three-part strategy described above, *Structure, contribution, room for play*. So, creative ideas in film and in movement were quite closely directed, although this may give young people a more creative vocabulary to take their ideas forward independently. On the other hand, the level of absorption was very high in both media.

Young People on the autistic spectrum quite clearly engaged with the emotional function of tears. In a video recording, one student discussed with Riccardo a symbolic and abstract drawing in response to the concept of tears:

'Each [mark] has a different emotion underlying them.....in the middle in representing that a nose almost an exclamation mark. Sort of shocked emotion...a shield...like defensive. Sort of like that real scribble means that you're frustrated like you don't know what to do. All things that you could do but it ends up backfiring. This last one is that you don't know mainly what to do.'

Riccardo: 'This one is a really beautiful mark. It's like a drawing not of a word but of a sound.'

So, for those with and without autism, talking directly about their drawings seemed to support real discussion about emotion and concepts:

*'...mapping those moments when disability replaces itself, when it goes beyond what is expected...'*³

In conclusion, teachers, workshop leaders and participants alike were positive about the *value and quality* of *The Study of Tears*, and most teachers and leaders emphasised the striking quality of the work. The project provided a worthwhile and informative opportunity for Susan Norwood and her Project Volume colleagues to dissect the *process of learning* science for these young people and to articulate a philosophy which contributes to our knowledge of learning disability and how to approach it.

³ (Mercieca, D. & Mercieca, D., (2010) Opening Research to Intensities: Rethinking Disability Research with Deleuze and Guattari *Journal of Philosophy of Education* 44.1. 79-92.)

Appendix – the Study of Tears: Evaluation with respect to students with Autism

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Brief

I was asked to conduct a small-scale qualitative evaluation of the “Study of Tears’ project conducted by Susan Norwood of The Project Volume. The Wellcome Trust, part-funders of the project, had suggested that there should be particular evaluation of the aim of the project to:

... see if, by working in dance and film, with both the function and the emotion of tears, whether this helps, or triggers any greater 'understanding' of the emotional aspect, by participants with autism ...

The questions I was asked to address were as follows:

1. Whether the content and methodology of the project might lead to particular difficulties or advantages for students with autism.
2. Whether the general points made in the draft evaluation applied equally to students with autism
3. To pay particular attention to the work of Andrew, Nathan, Luke, Steven, Samantha and Emma – students presumed to be on the autism spectrum.

I was also asked to comment on the following observations by Susan Norwood:

- 1) *I observed that for some of the autistic learners, having the opportunity to show their love of fact and detail flourished when talking to the scientist. I witnessed the translation in some cases of research from books or Internet then relayed to the scientist and an opportunity to demonstrate in some cases a high level of intelligence. This also made me aware of how perhaps difficult it must be if you are operating on a highly intellectual level, but because of the autism aspect be within a school for people with learning disabilities who may have a lower intellect.*
- 2) *I observed that in drawing the diagrams and symbols of the triggers, which caused emotional tears. Much was revealed of the individual's thinking about emotion, either directly in conversation about their own drawings or in the way they depicted emotion through the manner in which they drew or wrote the word of the emotion and this was very clear. Much seemed to release from the subconscious. So for example the drawing allowed for a translation of the inner mind, from student to paper to voice description to camera to viewer.*
- 3) *I gave all of the students a choice about whether they specialised in dance or film. I thought that many of the autistic students may choose film/video but that was not necessarily the case. For those autistic students who did choose video, I noticed something I had not previously thought. That of the camera allowing the autistic student to participate, whilst being given permission (by the camera) to stand alone, be a part of the group but with permission to be separate.*
- 4) *In the performed emotion through dance I was anticipating more difficulty than I saw. I made it clear in the instructions that we all responded differently to ourselves and each other and that it was easy to misread emotional signals, as I wanted to make sure the students felt safe to explore their reactions and responses through dance. I did observe that in-group situations where they were exploring laughter, this is where some of the autistic students stated they did not find it funny, or if I presented something for some (but not all) autistic students that seemed too abstract more time was needed for that student to access that route. I also*

observed for example in the summer school that after the dance technique class, when the teacher said and now 'free style' one autistic student made a point of not liking that bit, this same student excelled in her explanations of the science in relation to her dance and in her absolute decisiveness as to the music she wanted to use. So, I also noted that this focus on developing the 'autonomous' learner allowed for this clarity of decisiveness.

- 5) *I noted you talked about music. I often use music to allow students who are learning about dance and performance as a support to their ideas and so they do not feel alone on the stage'. As students develop this can be taken away as they begin to rely upon their own musicality. I noted that when I gave 'permission' for students to not think about anyone else but themselves as they developed one of their dances, how completely absorbed they became in their dance and music and how completely physically conscious some of them became to the beat and rhythm.*

Method

Three days were given for this evaluation. Time was spent in talking to Susan Norwood and some of the participants in the projects. I also spent time observing the students taking part in the dance project, a video session and a discussion session based on video reviews of artwork. In addition I read a draft evaluation from David Wood and I reviewed all materials posted on the blog as well as a private video of the responses of a student with autism being asked questions about his artwork (sent to me privately for reasons of confidentiality).

Issues in Autism that May have Relevance for this project

- *Autism & Emotion:* Problems in identifying emotions in self and others is a key characteristic of autism. Emotions are represented in the brain at three different levels (Damasio, 2000), the first two of which (general arousal and hormonal responses) develop normally in autism, but do not involve conscious awareness of the emotion. It is the third level, through which conscious appraisal of emotions arises, that is severely delayed or even absent in autism. It is not known precisely how this third aspect of emotional awareness develops in typical children, but we know it is mediated through the amygdala, which is also known to be dysfunctional in autism. Thus, individuals with autism have to have explicit teaching to make them aware of their own emotions, before they can recognise emotions in others; they do not acquire this naturally or intuitively as others do. The explicit way in which emotions are taught in this project, therefore, are likely to be of particular benefit to them. The multi-modal approach to teaching is also likely to benefit those with autism who will thus have many explicit cues to each emotion. Many programmes aimed at teaching emotions to children with autism do so by trying to get them to recognise emotions in others' facial expressions but this is often confusing, when facial expressions are not an accurate guide to emotions, although some have had some success (Golan et al, 2010) In this project, there is an emphasis on whole body expressions of emotions through posture, type of movements and gestures, as well as an explicit relationship with a type of tear production. All of this should be helpful in assisting people with autism to recognise emotions in others and in themselves. The only problem is that the emotions being portrayed are not real, but imagined. This is mitigated through the use of music since individuals with autism have been found to have the same reaction to the emotional tone of music as others.

That there was some success in this was evident in the dances I saw. It seemed to help to dance to express the different kinds of tears, since this highlighted the mechanical responses of basal and reflex tears as against emotional tears. I certainly saw the participants, including those with autism, able to make differentiated dance responses and able to articulate the emotion they and others were expressing. I cannot be certain how much of this was due to the

dance itself, as opposed to the music being used, but acting on differentiated emotional responses is likely to be more memorable than just experiencing an emotional reaction. I was also impressed by the degree of explicit reflection that occurred after the dance and art sessions where attention was drawn explicitly to the way actions or art reflected emotional content – a useful cognitive route to accessing emotional understanding in autism. There was a very interesting moment in the dance session I saw in which the students were ‘copying’ the dance movements expressing different emotions. They were encouraged both to express (and articulate) the particular emotion but also to reflect later on whether the copying of an emotion made them experience it to some extent – ‘does acting sad make you feel sad?’ They went on to discuss and explore the ‘contagion’ of certain emotions – notably laughing and yawning – and this was another potentially very valuable insight for them.

There is always the danger when teaching people with autism about emotions that we just give them a vocabulary of stereotypical responses that do not relate to their real emotional responses. This is clearly happening to some extent in the artwork, for example, when tears are used to show ‘sadness’, in spite of all the work on the different kinds of tears. Yet there is some evidence that at least some of the individuals with autism are expressing real emotions in their work. Steven, for example, produced a picture of emotions and this is discussed on video. He is able to articulate his own emotions clearly and explain the symbols he has used. At one point he is questioned about the meaning of both a brick wall and a squiggle (which he says is a drawing of fire) in a picture on the emotions. The questioner is puzzled by his insistence that both symbols express ‘happy’, but I think it is clear that for Steven these represent experiences that do in fact make him happy. It may be worrying that fire makes him happy but it is clear that he understands what ‘happy’ means and that his representations of it are true to his own feelings and certainly not stereotypical.

As a final comment, I note that the training sessions used explanations of why babies cry as part of the educational content around emotions. One of the participants recalls how babies communicate through crying, so that message obviously got through. Its relevance to autism is that many individuals with autism find the crying of babies unbearable – partly the noise itself, partly the fact that it is unpredictable (for them) and its purpose not clear. I do not know if knowing in a scientific way why babies might cry and what that crying might ‘mean’ will make it easier for people with autism to bear the noise but experience suggests it may be helpful and may prevent some of the extreme responses that otherwise might occur (hitting the baby to try to shut him/her up, blocking ears and banging one’s own head etc.).

- *Autism and Agency*: Another fundamental problem in autism is the development of a sense of personal agency so that one can understand (and control) one’s own intentions and those of others (Russell, 1996). This means that it is hard for individuals with autism to understand the actions of others and to plan and monitor their own actions. They seem to experience life from an objective, rather than subjective, viewpoint. The arts have a great role to play in helping people with autism connect with their world in a subjective way but their preferred learning style means they can best access this through explicit ‘scientific’ teaching. This project has great potential, therefore, in utilizing both avenues of learning. The dance studio meant that the students danced surrounded by mirrors. This gave them direct experience of performing movements and at the same time watching themselves perform those movements. This is a valuable technique for helping them connect their inner with their outer senses – something that is an issue in autism. It also enabled them to follow others in the mirror, rather than by direct imitation. That is easier for those with autism who may otherwise just exhibit ‘echopraxia’ (copying movements as they appear to them rather than putting themselves in the shoes of the model and doing the action from that perspective) helping them take on the intention of others and adapt it to their own position. I was struck with the ease with which the

students with autism were able to copy actions meaningfully in the sessions I saw. The reflection afterwards also drew their attention to the 'meaning' (i.e. the intention) of the actions and gave a structured context in which to interpret the actions. The repetition and the spiral nature of the curriculum also helped them learn progressively from their experiences.

- *Multi-modal learning and Autism:* All the students with autism in this project had speech and could follow spoken instructions when these were explicit and clear. However, even with good levels of speech, there is likely to be a problem in auditory processing, especially following a discourse that relies on pragmatic knowledge and skill. The strength of this project is that it used language with clear and explicit references and then allowed a range of responses that utilized other ways of establishing and reinforcing learning. Visual representation, especially through a camera, enabled clear modeling of how objects and events can be seen differently, while retaining their own inherent properties. It helped the students explore the limits and possibilities of different perspectives, using a medium with which they were comfortable. It was particularly valuable to see examples of filming of reflections – through mirrors, through the lenses of spectacles and through the camera. To this was added the effects of videoing of artwork (already a singular representation of an individual) and seeing how editing and manipulating the images could extend and alter meaning. I witnessed examples of students clearly 'playing' with these properties of video and learning from the process. The structure of a common vocabulary across all manipulations helped make the experience meaningful. The more interesting and valued video outcomes of artwork added to its significance for the students. In addition the camera was used as a specific tool to address some of the key learning needs in autism. By focusing on where the camera was pointing, rather than having to notice where eyes are pointing – a key deficit in autism, it was easier for the students with autism to understand different foci of attention and to develop joint attention.

One way the dances may work is through changing scientific discourse into procedural learning, so allowing a more accessible memory of moves to reinforce and help explicate the verbal scientific accounts already given. The continued use of reflection adds to this (Jordan & Powell, 1995). All the different forms of learning all add cues to memory, which are a vital way of making memories usable in everyday life (Jordan, 2008). Thus, the same learning goals are realized with visual, proprioceptive, and procedural memory cues and the 'gist' of the memory (its key points) are emphasised through structured reflection throughout. By revisiting the same key learning points through different aspects of this project, the students are also able to experience much needed repetition without the boredom and lack of engagement that usually attends mere repetition. I am not in a position to show that learning was improved during this project but the fact that school staff were impressed by the performance of the students suggests that this is so and there are good reasons for thinking that such an approach is likely to be helpful.

- *Engagement in Learning:* It has been demonstrated that students with autism, like everyone else, learn best when actively engaged in their own learning but that in autism this needs to be explicitly supported. Students with autism are not socially motivated to please teacher, cooperate or collaborate with others or to understand and accept social pressures to conform. Thus, many of the ways in which students are motivated to learn are hard to apply in autism. Generally, they have been shown to need direct ways of engaging them emotionally in their learning and they need structure to help them activate that engagement (Sherratt, 2002). This project optimises its chances of success by using teaching tools that have been shown to motivate many people with autism: cameras, music, art. Nevertheless, like others, but more so, they need approaches that are very individually focused. People with autism find it hard to understand, and thus trust, others and so they often seek control as a way of coping with this uncertainty. Luke's description of some of his drawings of the emotions he experiences are a rather moving account of this as he describes the horrible feelings of 'being confused', 'not

knowing what to do', 'hating the unexpected noises' and 'feeling cold inside, when sad'. He is also able to articulate how it helps him to have different ways of expressing and thus coping with these feelings, through art, video and movement. Giving the students choice in their medium of expression is also a good way both of personalising the experience and giving them more control. This project gets it right in understanding that you cannot have a meaningful choice until you have had experience of the different techniques available so all the students engaged with all the art forms and with the scientific discourse to begin with and only later chose the expressive form in which they were to specialise.

Project Learning Objectives

1. *Teach the Science of Crying:* In some ways, this was a conventional curriculum approach – albeit adapted to the learning needs of those with moderate learning difficulties. The helpful aspects as far as students with autism are concerned is that it was well illustrated with visual and video supports and well-paced so that students with autism could absorb the information. There were parts that looked forward to other aspects of the project exploring the analogy of the camera and the eye. The different roles of tears were explored as lubricants for the eyes (basal tears), as communication through emotional expression (emotional tears) and as responses to irritants (reflex tears). The continual reference to a logical scientific base to the different role of tears helped make the learning accessible to those with autism as well as the other students. The later outcomes in terms of artwork, videoed discussion and differentiated forms of dance provides evidence that the basic messages about the different types of tears, and the different purposes of crying were understood and retained.
2. *Engender excitement and involvement in learning:* Observation, and the views of school staff show how successful this aspect of the project was. Undoubtedly, some of this came through having new enthusiastic 'teachers', having access to new (or slightly different) learning environments and tools and enabling choice and specialization in their expressive forms. The use of a spiral curriculum – revisiting key ideas from the science part of the project in different ways through the arts – and the use of explicit and consistent labeling through reflection at each stage, all helped to ensure the students were successful in their learning and the different learning outcomes of video, artwork and dance performance enabled them to see that their work was both successful and valued. The fact that 'staff' worked alongside the students (during photographic and dance sessions) also provided an engaging model of enjoyment in the task and of how to get engaged, which was a great advantage over a more traditional 'educational' approach of didactic learning, whereby children with autism (or other special needs) often struggle to find the 'right' answer. In much of this project there was no 'right' answer to find and students' own views were continually sought, developed and valued.
3. *Enable Collaborative Learning:* This is usually a great area of difficulty in autism but was successfully achieved in this project in collaborations for performances in dance and for videos. To be fair, the level of collaboration was not high in that the goals were largely pre-determined rather than arrived at collaboratively but it certainly involved co-operation and working together on joint projects. The secret to the success achieved here was probably that each person's role in the collaboration was clearly articulated and this has been shown to be an important step in building collaboration. The fact that students' work was videoed and that everyone was involved in reflection on it, also helped the students become aware of the role others played and how their own work contributed to the whole.
4. *Give value to learning outcomes:* The proud way in which the students introduced and explained their work to me and others demonstrated that they appreciated its value. The editing and video adapting of artwork, the explicit discussion of how it related to the scientific concepts they had

learnt and the public presentations of dance and video (and the blog) all made the students aware that their work was valued by others and to value it themselves. This was also helped by the fact that the work was not 'marked' in any conventional way (which would expose them to the possible outcome of failure) so that personal responses had their own value and they did not need to be anxious about getting everything 'right'.

5. *Supported by Different Forms of Learning:* The structure of the project ensured that the students got experience of different forms of learning and were then able to choose a medium in which they felt most comfortable or in which they were most involved. Building on strengths is the best approach to teaching children with autism, as it is for all children.
6. *Developing a vocabulary to speak of experiences:* I do not know how well the students were able to do this prior to the project, but it is a key area of difficulty in students with Autism and some were certainly able to do this effectively by the end of the project. To the extent that the project helped with this it was most likely because of its use of explicit reflection on mood and feelings, allied to emotional resonance through music and dance. The ability to do this was evident in reflective discussions on artwork and dance and in particular on explaining their own use of symbols in their artwork so others could appreciate what they felt.
7. *Use of the website and blog:* Again, I have no specific evidence of the effects of having their own website and the postings of their work, but I can imagine that it added greatly to their pride in, and commitment to, the work of the project and contributed to its success – a great idea for other teaching to emulate.
8. *Giving control over their own learning:* The level of consultation with the students, and the degree of choice in the project meant that the students were able, at least to a large extent, to be in control of their own learning. This gave them a helpful degree of autonomy, not only choosing broad aspects like their specialisation but also myriad decisions over choreography in dance, camera angles in videoing and so on. The degree of support was also high, from working alongside 'experts' and the constant drawing of attention to what they were doing and its effects. Thus, they began to learn about their own intentions and how to achieve them. I predict that this will have significant long-term effects on their learning.
9. *Stimulate the learning of science through dance film and art:* For most of the students in this project who did not have autism I am sure that this objective was successfully achieved. There was evidence from the way they could illustrate the basic scientific concepts (especially the different types and purposes of tears) through their artwork, video production and dance. They were able to produce analogies (e.g. using the shadows of waving fingers with water pouring over them to represent the action of eyelashes and reflex tears) and to dance the different physical attributes of the tears (flowing and continuous movements for basal tears, sharp reflex reactionary movements for reflex tears and narrative gestures to illustrate the building and release of emotions in emotional tears). The continued use of the same scientific vocabulary in reflection on these activities helps keep the scientific knowledge alive and relevant to them.

The students with autism were also able to demonstrate these learning outcomes but I suspect the process may be the opposite of that happening in the other students. I suspect in fact that the clear explicit scientific discourse was very accessible to them and the learning for them was using this knowledge to access the subtle and subjective aspects of learning available in art and dance. Their level of understanding and expression of emotions, for example, is higher than would be expected in those with autism (especially with additional learning difficulties, where this was the case) and I think the helpful teaching styles, as detailed above, led to this. It is not just that they could dance or draw or use a camera, as many individuals with autism can do this, but that they seemed to able to

access their own emotions and intentions, be more aware of those of others, and express them in ways accessible to others. There was a lovely moment of impatience as Steven has to 'explain' to his interlocutor that brick walls and fire symbols are representations of 'happiness' when he clearly thinks this is obvious to all, but that just illustrates how we all think our own perspectives are the 'natural' ones. What this project has given him (or at least, helped to foster) is explicit insight into his emotions and a vocabulary with which to express his viewpoint to others. In exploring their feelings, some students with autism referred back to the different roles of tears (the learning that the same 'behaviour' can mean different things) and to the fact that one's person's view of the same event may differ from another's according to the way they are looking at it and the context (learnt through different camera angles and the way light is distorted through refraction and reflection). Such learning is so difficult to teach and yet so vital for the development of students with autism, that even if this project did not manage to teach full understanding, it would be very worthwhile to have started the process.

Conclusion

I was not able to join in with as much of the project as I would have liked but I enjoyed the experiences I had and have valued this opportunity to see some innovatory and exciting teaching across important areas of learning for individuals with autism. This has been far from a scientific evaluation, but rather an impressionistic account, based on some observation, some discussions and reading and viewing some of the artifacts associated with the project. My overall impression is that this has been a very worthwhile project, that has largely fulfilled its objectives and, in particular, the broad outcome of exploring the symbiosis of art and science. Undoubtedly, the students gained a lot from the project and all appeared more skilful, more knowledgeable and with more confidence in expressing their points of view. That alone would make the project worthwhile but the long-term benefits in the awareness by staff from the school of particular teaching techniques and in the importance of high expectations (coupled with high facilitatory support) makes me believe that the benefits will be accumulative as staff at the school take account of the project in their future teaching and approach. The project is not selling itself as some special activity but rather as an illustration of how people can work together (with the students) in helping students take charge of their own learning and to understand how best they learn and function. In that respect, it has built on rather than replaced the good teaching the students already experience in their school but with the proviso that the division of the curriculum into 'arts' and 'sciences' is only a convenient fiction and that all learning can benefit from a multi-modal approach. For most children this will be using insights and experiences from art to make science more accessible; for those with autism, it might be using the logical explicit learning of science to make sense of more aesthetic and emotional aspects of life. For both, it should increase understanding of self and others and, above all, increase confidence as learners and collaborators.

References

- DAMASIO, A. (2000) *The feeling of what happens: body and emotion in the making of consciousness*. London, Harcourt Brace
- GOLAN, O., ASHWIN, E., GRANADER, Y., MCCLINTOCK, S., DAY, K., LEGGETT, V. & BARON-COHEN, S. (2010) Enhancing emotional recognition in children with autism spectrum conditions: an intervention using animated vehicles with real emotional faces *Journal of Autism & Developmental Disorders*, **40**, 269-279
- JORDAN, R (2008) Practical implications. In J. BOUCHER & D. BOWLER (Eds.) *Memory in Autism* Cambridge, Cambridge University Press

JORDAN, R.R. & POWELL, S.D. (1995) *Understanding and Teaching Children with Autism* Chichester, Wileys pp 175

RUSSELL, J. (1996) *Agency: its role in mental development*. Erlbaum (UK) Taylor&Francis,

SHERRATT, D (2002) Developing pretend play in children with autism: A Case Study. *Autism: The International Journal of Research and Practice*. Volume 06 169-180