

The Comparator Mirror as a Teaching Aid at West Buckland School By Tomas Georgeson 2015

"All children are artists. The problem is how to remain an artist once they grow up."

Pablo Picasso

My work at West Buckland school began on the 1st of September 2014 for a period of one academic year with the purpose of developing, as a teaching aid, the painting device discovered (or rediscovered) by Tim Jenison in the film *Tim's Vermeer*. In this film Tim Jenison provides compelling evidence that Vermeer's paintings were made using a version of what he has named 'the comparator mirror'.

The West Buckland School

West Buckland School is fairly typical of modern independent schools in Britain. The main school comprises approximately 450 students between the ages of 11 and 18 and a preschool of just under 180 students between the ages of 11 and 4.

The School boasts many excellent facilities but most notable of all is its arts department. This includes a very well-equipped design studio, a state-of-the-art one hundred and twenty seat theatre and a fine art department. This department also includes a dedicated art studio in which an artist-in-residence is invited to work for one academic year beginning each September. I currently hold this position.

My Background

I should explain that my background is that of a painter who has, for the past sixteen years, sought to overcome the difficulties of realistic drawing and painting, indeed to master these disciplines, in order to apply them to new kinds of subject matter, as centuries of painters have done before.

To this end, my relationship with Vermeer, whilst by no means encyclopedic or even academic, resembles the kind of unspoken, tactile understanding of the old masters which only a painter can enjoy.

Unlike an academic, my knowledge of brushwork, paint mixing and of composition has been garnered through my own attempts to speak in the language of paint with fluency and eloquence. For that reason my understanding of what it means to paint, of the various hurdles which must be overcome by anyone wishing to paint realistically, is based upon

a day-to-day relationship with painting through praxis, and in that respect it also differs from the perspective of most teachers.

It is my belief that this daily dedication to the endless difficulties and rewards of painting puts the painter closest of all to the student's perspective and it is from this point that I mean to speak about why and how the Jenison device may be of use to students.

It was with the full permission and continuing interest of Mr Jenison that I began this work with the aim of redirecting the debate from matters specifically concerning Vermeer toward the consideration that this device may have very real and very significant uses in the here and now.

Specifically, where many saw controversy, I wondered about the possibility of using the device as a revolutionary way to teach realistic painting and drawing—in short, to get struggling students past this particular challenge which presents a significant stumbling block for reasons I will explain shortly.

The comparator mirror so far

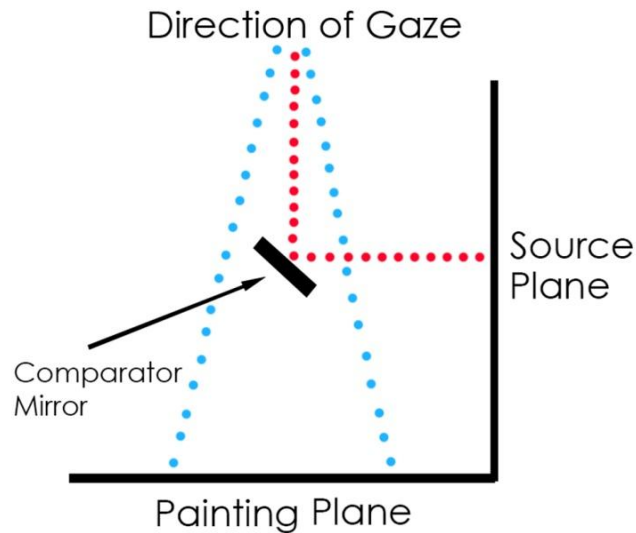
It is quite possible that the comparator mirror is a 350 year old technology which allows the user to view an image in a mirror in full colour, coplanar to, and coincident with the surface on which they are painting.

This approach solves the single issue which makes realistic drawing and painting difficult, by reducing the distance and time between observing one's subject and painting it from perhaps a few feet and a few seconds, to a few millimeters and a few imperceptible milliseconds. In short, it reduces the time between observing and doing.

What is certain at this point is that it has allowed Mr Jenison to make a painting which, in purely technical terms, is comparable to an original Vermeer with no more artistic training than a fourteen year old.

Essentially the device relies upon a certain symmetry between what I will call my 'painting plane' and my 'source plane'.

To provide a faithful reflection of the source plane, the comparator mirror must be at a forty-five degree angle to the painting plane and be equidistant from both planes.



Most pertinently Mr Jenison's film establishes the possibility that the device simplifies the process of painting to such an extent that anyone with good eyesight, manual dexterity and minimal artistic training might be able to paint as photographically as their patience allows.

For Tim it opened up a world of possibility and allowed him to enter into a stroke-by-stroke conversation with Vermeer.

For school-aged children I wondered if it might do for art what the calculator did for mathematics.

Learning to draw and paint realistically

It seems fair to say that there are two motivations for teaching realistic painting and drawing at school. The first is to equip students with a tool that will enable them to understand and interrogate the physical world for the rest of their lives. The second is to satisfy the perceived requirements of marking criteria by encouraging students to produce tangible displays of skill.

Western school curriculums almost universally require students to begin to develop skills in realistic painting and drawing from around the age of 13. Whilst a progressive, broad-based approach does see highly imaginative children with limited ability in this area achieving good grades, the student who effortlessly produces folios packed with realistic, closely observed renderings in pencil, conte crayon and charcoal will almost always enjoy the lion share of commendation.

I believe that this old bias, which is now subtle enough in many schools to be wordless, is still present nonetheless. Partly because marking schemes favor tangible evidence of ability at this age and partly because a certain default reverence for realistic painting and drawing runs very deep and a long way back in western culture.

It is quite natural for a person who has not fully apprehended a particular skill to revere those who appear equal to the task at hand. When that skill has been celebrated in a culture for a thousand years, a bias toward it

becomes even harder to shake off, despite modernism, despite the clear prioritization of concept above form in art since Duchamp and teachers are no more immune to this false reverence than anyone else.

Speaking as a painter, it remains to be said that realistic drawing and painting and more particularly the skills of analytical painting and drawing, still present a way of interrogating the physical world more intimately than almost any other. Certainly the fourteen-year-old who develops this skill and sensibility will grow into a richer and more confident adult with the potential to be consoled by, rather than to stand in awe of, a Rembrandt or a Michelangelo.

These skills also have far broader significance than their traditional association with fine art. Even as you read these words architects, scientists, archaeologists and doctors all over the world are making thought visual and deepening their understanding through analytical or imaginative drawing.

As an example, the world renowned heart surgeon Mr Francis Wells, who has developed techniques for mitral valve surgery loosely informed by Leonardo da Vinci's drawings of vortices in water, uses drawing on an almost daily basis to describe complex surgical procedures to students and more privately as a way of notating the imaginative anatomical thought required to pioneer new surgeries.

Reverence for these skills, or a detachment from art by those who have not acquired them, clouds true understanding of the old masters, of art history and most importantly of the creative potential in students who 'cannot draw'. It sets up misplaced respect for drawing and painting, and in a society where most people align themselves with the can not rather than the cans, the consensus becomes that realism *is* the hallmark of quality.

Every year a great many of the visitors to London's BP Portrait Award will walk through the doors and marvel excitedly over ever more photographic displays of realist virtuosity. Whilst it is crude to generalize, or to believe that I can know anyone's reasons for liking a work of art, this stands as an example that the skill with which an artwork is made is, generally speaking, more highly prized in our culture than the sentiment it contains.

Every time a large photorealist painting distracts a crowd from portraits made as a means of deep enquiry, something is being missed and it is possible to get a glimpse of a very significant problem which begins at school.

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The emphasis shifts in early secondary art education from imaginative creativity toward work which displays technical skill for the purposes of awarding grades. Some students have this ability naturally and their progression continues. Most do not, or require more time than curriculums allow to discover it and in the end the challenge seems insurmountable to most.

On the first day of a new academic year, the kitchen doors of one hundred eleven-year-olds may be adorned with confident, wildly imaginative paintings pinned up by their parents. By the time they are fifteen, that statistic shifts and by age seventeen, many students, starved of praise, will have begun an adulthood of passive disengagement from art or a false reverence for technique because they could not draw a bowl of fruit themselves.

The true significance of realistic painting and drawing was brilliantly surmised by Robert Hughes when, in 2006, he said, 'Painting and drawing bring us into a different, a deeper and more fully experienced relation to the object—when every inch of the surface has to be won, must be argued through, bears the traces of curiosity and inquisition and above all takes nothing for granted, it demands active engagement with the viewer as its right'.

This of course is not the only, or even the most important element of artistic expression, but it is right to emphasize its true significance here and to teach it as such. My contention has always been that lifelike painting and drawing is remarkably simple when explained systematically and that it can be done by anyone with fair eyesight, a little patience and a ruler by gradually building an image from a series of measurements, judgments of tone and colour. This however, still presents a difficult challenge because what is actually lacking in many students is not ability but confidence and what is lacking in many schools is not intelligent teaching but time.

To look at a realistic painting is to be confronted by, at some level, tangible evidence of skill. To the beginner a photorealist portrait which presents a good likeness, well measured tone and closely observed proportion may seem every bit as insurmountable as the construction of a television or a mobile phone and this has an effect on confidence.

Only with confidence will a student acquire the drive to interrogate the world through drawing and painting for their own ends and this all begins with an understanding of what a painting is and how it is made. With this practical nuts-and-bolts knowledge, when students look at a Caravaggio as an exemplar, they may enter into a conversation with it lasting for the rest of their lives. Without it, the seeds of misunderstanding are sewn and we have all the ingredients necessary for an adult who either stands in disconnected awe of technical skill or who dismisses art altogether.

Although a systematic practical approach to teaching realistic analytical drawing and painting can work, and as I have said, it can lead to lifelong fascinations, for one reason or another, the hit ratio is worryingly low. Those students who learn to draw with natural ease in the time curriculums allow, will pass through the eye of the needle, but the others will probably not. The ramifications of this discrepancy are profound.

The annual footfall for the art concession in my local department store is two million per annum and the free, ground-breaking internationally significant public gallery across the street sets its sights on just sixteen thousand. Put bluntly, the idea that a contemporary art gallery could

complete with high street fashion and domestic appliances is not considered.

The point is clear. Most people are tuned out of art, they feel no sense of permission about it and it began with disappointment at school, hard and stark leading to a lack of confidence followed by disengagement in all its various forms.

A loose hypothesis

The comparator mirror presents one tantalizing possibility—that realistic painting and drawing may at last be within the grasp of anyone with fair eyesight and manual dexterity within only a few hours. To this end I plan to establish whether or not the ease with which Tim Jenison was able to grasp the principles of realistic painting and drawing is indicative of general accessibility, particularly an accessibility to children.

If this proves to be the case, my second aim will be to establish whether or not initial confidence and enthusiasm affect aptitude. To be precise, does the child who comes to the device believing that they cannot draw stand less chance of achieving good results than the child with a track record of ability in this area?

Finally I will aim to develop specific ways of using the device to teach, as an aid to the first basic principles of observational drawing and colour theory and perhaps even as a way of allowing a child to develop an in depth nuts-and-bolts understanding of the great artists of the past by painting as they did. I will also attempt to research strategies for applying skills learned with the device to conventional, non-assisted drawing and painting.

Initial prototypes and testing (teething problems)

In the summer of 2014, before beginning work at The West Buckland School, I began to experiment with various designs of comparator mirror based on the device used in *Tim's Vermeer*. Essentially this involved a 50mm first surface mirror, or optical mirror, as recommended by Mr Jenison, supported by a boom arm which presents the mirror at an angle of 45 degrees to one's source plane (see previous diagram).

Initially I began to build an elaborate workstation with the aim of providing stability and comfort over long working times. This involved a 9mm by 12mm profile wooden boom arm at a permanent angle of 45 degrees. In the end this proved cumbersome and certainly not easily remade in multiples with a view to teaching groups of any more than a few students at a time.

Even in this early stage I quickly became aware that Tim had been correct in stressing the absolute importance of consistent lighting. Only when both planes were lit evenly could accurate comparisons of tone and colour be made. Although the skylights in my studio did make this easy to achieve I found that subtle changes in the ambient light, which eventually began to affect my painting, could be avoided by lighting my working area artificially throughout.

It also became quickly apparent that a degree of movement around the device and even the ability to move the device itself was preferable to working from a fixed position especially when making paintings with others. In this scenario the difficulty of each person's adjustment in order to use a prototype that was fixed became very apparent. Secondly the boom arm onto which the mirror was fixed was too substantial and presented an obstruction at times. What was needed was a more portable, user friendly device with a discreet yet secure way of supporting the mirror.

My second prototype was much more in line with the device used in *Tim's Vermeer*. Essentially this setup involved the source plane and painting plane as one component and the mirror attached to its boom arm as another.

This allowed for greater freedom to adjust the device to suit the working habits of each user (for instance left or right-handedness or a preference for either sitting or standing). Of course each time the device was moved it had to be recalibrated and it did take some time to achieve the exact 45 degree mirror angle and exact relative distances required to achieve a perfect planar projection.

This prompted me to conclude that the most useful design would be a single portable unit which could be moved to accommodate various working habits but in which the essential component, the mirror, remained fixed. This approach would remove the need to calibrate the device at all allowing it to be a pick-up-and-use tool suitable for use in classroom environments by young children with minimum supervision.

For the sake of clarity I should say that my test subjects in this early stage were those around me, my mother (aged 67) my partner (aged 23), my neighbours (aged 58 and 50) and their three boys (aged 14, 16 and 18). All of these volunteers presented some shyness about drawing and painting initially based on recollections of underachievement at school level.

Although during his project Mr Jenison used oil paint more or less exclusively, I had also begun to experiment with various mediums including acrylic, watercolour, charcoal and pencil in an attempt to discover the most appropriate medium for myself.

What occurred to me during this early experimentation is that the comparator mirror allows a person to build an image up directly on the painting plane without premeditation or prior underdrawing. It was this inherent plasticity in the process, the need to be able to push and tweak and bully one's medium toward the image shown in the mirror, which made oil paint, with its far longer drying time, the medium of choice from the outset.

I felt it was important to establish a firm grasp of the essentials here and to arrive at the school with a user-friendly design which could be easily understood and operated by pupils. Happily, by September of 2014 I felt I had achieved this. I was confident in calibrating the machine and had arrived at a conclusion about the basic configuration of prototypes from

that point. What I hadn't expected to achieve was any measure of confidence or proof about the device's accessibility to all students.

As I said, my initial test subjects were my neighbours and my family on a fairly casual basis for perhaps fifteen to thirty minutes intermittently.

Whilst it would have been hasty to read the experiences of six individuals as indicative of anything, in that summer what I witnessed instilled me with a sense that many people who profess no interest in art at all were in fact once deeply connected to it and could be so again.

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Although initially *I* had found it quite difficult to trust the visual information as I saw it in the mirror, to build spots and dabs of tone according to something outside the trained inclinations of my own head, my volunteers, who, with the exception of one, professed to having no artistic skill at all, were ducks to water by comparison.

My invitation to test the device began with a few minutes of explanation over a cup of tea and an encouragement to bring along black-and-white images no bigger than 8 inches which held personal significance to each volunteer. When my mother tested the device she opted for a small (approximately 6 inch by 5 inch) photograph of her father, much like the image used by Tim Jenison in his early comparator mirror experiments.

After explaining some basic principles concerning brush handling and pallet etiquette I went inside to make a cup of tea. I returned 5 minutes later to the sight of my mother weeping, head in hands and what looked like a constellation of brush marks under the mirror.

My first reaction was to console her with my father's epigram, 'Failure is never to have tried' and to offer some gentle advice on starting again if she felt like it. This was not necessary.

On closer inspection those daubs and steaks of paint I had dismissed were in fact a pretty accurate description of my late grandfather's upper lip, cheek and bowline and what had transpired whilst I was boiling water was something close to a reconnection with her father and with a serious, albeit adolescent, desire to pursue painting which had been extinguished at school following a run of bad still lifes.

Though almost all expressed a degree of hesitancy before beginning work, the moment of true comprehension, in which an operative looked into the mirror for the first time and understood the absolute simplicity of the device, seemed to present enough possibility to warrant a temporary suspension of doubt, or at least a persistence in spite of it.

Within 5 minutes each volunteer had, like my mother, mastered the knack of observing and doing in the same moment and the bare bones of recognizable images began to emerge. Although there were often no more than ten or twenty brush marks at this point, what these first moments of satisfaction did for the confidence of each volunteer cannot be overlooked or overstated. In short, it often amounted to an inward

recognition of competency which some volunteers had yearned to find for a very long time.

Beyond this stage each volunteer's momentum began to become self-perpetuating. As ever more recognizable images grew under the mirror and the various complexities of realism revealed themselves to each individual, new questions about quality and about ability became possible.

Having said all of this it must be pointed out that there were difficulties and the process of achieving a likeness did pose challenges for each volunteer at different points. For some, especially Morgan (14) and Gareth (16) the simple business of paint handling, of brush washing and of keeping a clean palette, had left both boys struggling with one homogenized tone of grey. After remixing fresh paint and explaining how and why to keep good working habits the two boys were back on track, confidence undented.

Another problem was a general lack of familiarity with the actual mechanics of paint and of brushes. For instance, the 4mm synthetic filbert brushes I had chosen can provide a very diverse range of marks and effects. Thin precise lines can be achieved by shaping the tip and using the brush sideways whilst holding the handle at the tip. A fatter, fingerprint like mark can be achieved by turning the brush at 90 degrees and applying enough pressure to flatten and fan out its bristles. A clean dry filbert brush is ideal for blending two areas of wet paint and of course all of these habits are used differently by different artists who may have developed as many as several thousand such habits and knacks.

These simple techniques are just the beginning of what, for each painter, eventually amounts to something like a vocabulary. As with the written word, the more extensive and practiced this vocabulary, the more articulate a painter becomes.

The comparator mirror had, in three weeks, allowed individuals with low confidence to arrive at half-finished realistic paintings with no vocabulary whatsoever and whilst the boost in confidence this provided was revelatory for some it began to dawn on me that there was a downside.

The closer my volunteers' paintings came to photographic detail, the more this absence of knowledge hampered their endeavours. Whereas the techniques I have mentioned above allow a painter to describe the thin strip of folded skin above an eye or the effect of sunlight shining through the branches of a tree, without them all of my volunteers headed toward a second stumbling block to do with the perceived difficulty of painting certain elements, a nose, a flick of hair, ripples in water. The mirror had bought them deep into an unfamiliar country unable to speak the language.

At this point Kate (50) and Trevor (58) both seemed resigned to the fact that they really could not paint after all and that the mirror had, in the end, only served as a reminder of their glaring ineptitude.

The boys, who normally visited my studio together or in a pair, began to distract one another and to spend less and less time fully engaged in the task at hand. Nevertheless they remained keen to please me and it was also apparent that, unlike their parents, they did not seem to read these setbacks as an indication of general creative inadequacy.

My approach here was to aim for specifics with the following questions. I also provide some observations about the answers I received.

‘What exactly are you finding difficult?’

Answers to this question universally referred back to the business of applying paint with sufficient delicacy to bring each painting closer to the source photograph.

‘Which areas are you struggling with?’

Though each volunteer’s source image was different (four being of human figures, including two conventional portraits, the others were a landscape and a cartoon image), the answers were all quite similar. There seemed to be a consensus that some things were just harder to paint than others, hands being one, eyes another.

It seemed to me that these preconceptions were distracting my volunteers from the simplification offered by the comparator mirror.

The confidence of experience was, in a sense, the only way to trust the objectivity of the mirror. Whilst its simplicity and the immediate satisfaction of assembling a kind of painted scaffold had got them all to a midway point, perhaps now was the time to begin to teach exactly what some volunteers had failed to learn—to be specific, the knack of objective looking.

I wanted to demonstrate that most painters build images by observing tone and form and perspective as opposed to painting eyes and hands and trees. Logically the best thing to do was to demonstrate this principle using the comparator mirror but as the five I had built were being used, it seemed best to help each student along by including myself in their process.

What Trevor, Kate, Huw, Gareth and Morgan needed was detailed explanation of the nuances of paint. This, of course, has been the aim of lessons in realistic painting and drawing since it began to be practiced and taught a thousand years ago but what the comparator mirror seemed to provide was a more intimate way for a teacher and student to become involved in a painting together.

Working alongside the student on the device allowed detailed conversations about technique to be held inside the students work. By taking turns at rigid three minute intervals the progress I had made with the mirror could be seen, comprehended and built upon by the student

directly. If their attempts faltered again in another three minutes my involvement would pull things back on track and so on and so forth.

Then, when confidence had built, I began to encourage each member of the Jones family to share the painting process with each other by including each other in the painting process. The most interesting thing about this was that although no one member of the family was any more advanced than the others, a shared process of working seemed to make painting easier, or at least less daunting. When problems were encountered a change of turns would often see a fresh approach solve the problem.

In this way the first inklings of a teaching strategy began to formulate themselves and with this approach I was able to unravel both the challenges of painting and my volunteers' misconceptions about it.

Gradually each of my five struggling volunteers regained confidence and it was possible to allow them to paint for longer and longer periods until each was working with measured, inquisitive objectivity toward a finished painting, whilst helping each another.

The general patterns I have observed here were common to the five of my six volunteers with low creative confidence. It should be said that each arrived at these stages at different times but generally speaking volunteers progress involved four stages as follows:

- (1) Initial caution before beginning to paint based on prior negative experiences.
- (2) A surge of enthusiasm as paintings began to be made.
- (3) A sticking point in which each volunteers' preconceptions about painting blocked further progress. (rectified by one-to-one teaching as described earlier)
- (4) A more measured enthusiasm as volunteers began to understand *how* to paint and paintings reached a conclusion.

As I have said it would be foolish to interpret these first observations as indicative of anything more general. Nevertheless it is fair to say that they gave me cause to hope.

Certainly the Jones family were casual volunteers and it is true that, as a family, their beliefs, misconceptions and value judgments may be a shared exception to the rule, but the fact remained that they had all managed to begin working with the mirror within a few minutes. Its accessibility had given them confidence and it had put me in a unique position from which to explain painting in depth.

There was a sixth volunteer in these early months of testing, my partner Georgina. I have chosen to leave my observations of her progress until last because they were quite different to that of the Joneses and my mother.

Georgina, or Georgie for short, is a professional classical pianist. She has developed, I would say, exceptional hand eye coordination and is able to apply at least some of the extreme manual dexterity required to play Chopin to drawing and painting. On the other hand, to my annoyance, I have the makings of an entirely ordinary pianist.

Essentially Georgie is creatively confident. At school she negotiated the requirements of the curriculum with relative ease without losing confidence or feeling that her personal artistic discoveries were inhibited by academic hoop jumping.

Then, at sixteen, her commitments to music overtook her commitments to painting and so it has been ever since.

Georgie was interested in my involvement with the comparator mirror from the outset. As I began to build my first prototype she became very involved in the refinement of its design and we began to use it in tandem from the outset. Her existing creative confidence, or at least the ability to draw and paint realistically, also made Georgie a good sounding board in this early stage as our painting quickly took shape.

In the end a fairly accurate rendition of Vermeer's *Girl with a Pearl Earring* (based on a black-and-white reproduction measuring about 6 inches by 4 inches) was completed in around 2 hours (based on three sessions of around 40 minutes in which we alternated at intervals of perhaps 10 minutes). It was also at this point, before recruiting any other volunteers, that I began to see that the device could be used by two or more people working in tandem and that this approach had certain benefits, which did become useful when members of the Jones family started to struggle as I have said.

In a practical sense, although Georgie's contribution to our painting remained progressive, consistent and confident throughout, during the process Georgie began to express a degree of disaffection for what we were doing, or more accurately why we were doing it.

In discussions she explained that her feelings had shifted during the process from an initial technical interest to concerns about the wisdom of encouraging children to copy images mechanically. Although our finished painting was fairly faithful to the Vermeer original she was concerned at its lack of soul and she suggested that perhaps the device would prove that there is something to be said for paintings made slowly and for skills acquired over decades rather than hours.

Of course I could not disagree with any of this. If painting has a particular strength in 2015 it is that it has soul. It is organic and holds meaning differently to almost any other artistic medium as a result. To go further I suspected that the soulfulness in painting would be absent from any image made with the comparator mirror and that this fact would have to be openly acknowledged as part of any teaching process involving the comparator mirror.

On the other hand, by that September I had witnessed the positive impact the device could have. I had seen how quickly and how simply it had

rekindled creativity in my mother, and in my neighbours, particularly Trevor and Kate. Most importantly I had seen that it offered a way into detailed conversations about the mechanics of realistic painting and drawing by putting student and teacher in an altogether new position.

Now came the challenge of applying this research in the classroom. I wondered if the discoveries made with my neighbours would be supported in a school environment. Would larger groups affect my ability to work closely with each student when they needed guidance? How useful would the device be to individuals at either end of the spectrum of ability, and how easily could the skills learned with the device be retained and applied to conventional painting and drawing?

Work Begins at West Buckland

I began testing the comparator mirror at West Buckland following an announcement to school *en masse* in the weekly assembly. I introduced my project by showing the students a clip from Tim Jenison's film *Tim's Vermeer* in which he reproduces a photograph of his father-in-law in oil paint having never previously used oil paint.

I went on to explain my belief that the basic skills of drawing and painting which would allow a person to understand how Rembrandt painted could be learned in just a few hours, the only catch being that they take a lifetime to perfect.

I then explained that the device was now at the school, that I was looking for volunteers for the first weekly art club to be held that evening and that I was particularly interested in volunteers who felt they had no ability in this area.

That evening I was pleasantly surprised to find around a quarter of the permanent (boarding) student body waiting outside my studio door at 8 p.m. In this group of thirty students, ages ranged from eleven to eighteen with around a 70/30 gender split in favour of girls.

Although there are some very confident and able students at the school I thought it best to assume that these students would benefit from a ground up explanation of the device and of drawing and painting with some basic practical exercises designed to train objective looking and confidence.

I began, as I began in my earlier tests, by showing the class the moment in Tim Jenison's film in which he explains the comparator mirror's simplicity with a practical demonstration. What he manages to paint is a faithful reproduction of the photograph from which he is working whilst emphasizing all the time that he has very limited prior experience as a painter.

The unanimous reaction from the class during this brief screening was spellbound silence. In my experience during the past six months one of the most rewarding things about using the comparator mirror to teach is the ease with which it explains itself and this moment was no exception.

My experience has also shown me that the next question for the student is often one concerning their own personal aptitude despite what the film has shown. In some students this will be posed as a question of personal ability, in others it will be an outright declaration of ineptitude in spite of this new prospect. What I have taken to understand as important in all of this is that their attendance at the class counts for infinitely more than anything they might say about their ability.

That said, as I ushered the students into the next room, in which six finished prototypes (each with one 4mm filbert brush, a jar of white spirit and a palette consisting of five premixed tones of grey) were waiting I could sense that the potential offered by Mr Jenison's discovery had won me the attention of the class but I was cautious.

At that point, having raised the hopes of thirty young people, could I have been mistaken in my belief that the simplicity of the mirror equated to accessibility for all? Had my previous volunteers been too kind and too loyal to lose interest? Was the quality of their painting a fluke and if so, how could I offer any consolation to these poor children? Would I be doing more harm than good? With ten minutes of our one hour session gone it was too late to turn back.

With a watertight lesson plan in hand I began to explain a short warm up exercise which would involve copying small abstracted fragments of an image onto a much larger sheet of paper by observing negative space and the interactions between one line and another. Then, section by section, the larger image would be pieced together to form the basis for a painting. From here students would begin to build tone and colour systematically using premixed paints. I had taught these simple and rewarding games to many classes before and so I approached them with all the flair and enthusiasm of past success but I had not understood quite how impressed by class had been by Tim Jenison's discovery.

My aim was to make sure that everybody had at least a basic understanding of proportion and tonal observation. When this was in place, I thought, I would begin teaching with the comparator mirror, dividing the class into six groups of five to begin rotational working, just as I had done with the Jones family toward the end of their time with me.

Of course I also had a certain amount of acclimatizing to do. I had already observed the boosting effect of one strong member in a working group and I was keen to pick out stronger students with a view to including at least one in each group of five. In short I was following an inclination, untested at that point, toward the notion that the better a teacher knows their class, the more helpful the comparator mirror might be.

In the end these warm-up exercises did not hold the interest of the class. On enquiry and in conversation in the days following the class it was clear that the prospect of an altogether new way to draw and paint was what the students had turned up for and, despite my reservations, holding them back any longer would be counterproductive.

With just over half an hour remaining I decided to take my hands off the wheel and hold my breath. In the end I did not divide the class into formal working groups but instead let students gravitate toward paintings which held their interest with an encouragement to change the person painting at three minute intervals.

I wanted to see if certain working trends would present themselves. Would younger students be drawn toward cartoon imagery? Would more able students want to work for longer than five minutes at a time and would they necessarily gravitate toward more complex imagery?

I should say that in the interests of variety I had prepared each comparator mirror with a different image. These included reproductions from the popular cartoon, *Pokemon*, an image of the actress Jennifer Lawrence, the head of Velazquez's *Immaculate Conception* and Vermeer's *Girl with a Pearl Earring*.

At this point the class's enthusiasm returned instantly, the room was filled with chatter and I realized it may have been impossible to hold any class back from using the device once it has been explained. In future I supposed it may be better to explain colour theory and proportion before introducing the mirror at all.

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I cannot understate what happened during the next thirty minutes. Although in the months since that evening my experiments with the mirror have led to discoveries, breakthroughs and setbacks, within ten minutes these thirty young people had bypassed usual hurdles of realistic painting and were building up tonally accurate, tightly detailed paintings even to the extent of replicating Vermeer's brushwork stroke for stroke.



My email to Tim Jenison the next morning contained a grainy JPEG image of twelve-year-old Henry Burke working on his *Girl with a Pearl Earring* and a single sentence, 'Children get it!'

Though the group clearly contained a range of abilities it was clear that the progress made by more confident students and working intervals of three minutes had an holistic effect upon each member of the group.

During the class, the sense of collective excitement had been palpable. Perhaps this was partly due to the sheer novelty of what was being done but the fact remained that as each image began to take shape, students

began to encourage one another and, as each took their turn, they became personally invested in the process and could take pride in what was happening no matter how tentative their contribution.

It can be said that the comparator mirror mechanizes and objectifies painting and that this strips it of its soul, but what this night proved to me was that it can also democratize painting. Specifically, for those thirty minutes, it turned painting from a personal private endeavour into a shared experience.

This, of course, has no relevance to art or to artists, whose work succeeds if its clarity defies the various personal risks involved in making it, but what I observed in this first class was that learning the skills necessary to paint and draw inquisitively in a communal way had kept every child engaged whilst giving each a sense of ownership.

To an artist, this way of working may well be irrelevant. To a teacher committed to keeping as many children in the creative loop as possible, it would seem to be very significant indeed.

At this point it would have been very easy to take these results as proof and to begin to publicise my research. In fact Mr Teller, Tim's collaborator on Tim's Vermeer, very kindly tweeted the image of Henry Burke's painting the next day without mentioning any specifics about where or by whom it was painted.

Certainly that night had felt like a breakthrough. My goal was now in sight but I had a responsibility to the pupils and to myself to dig a little deeper, to test the details, to teach more classes and to refine a methodology before beginning to think that anything was proven.

At this point I could at least be sure that the comparator mirror had put certain painterly skills within the reach of students as young as twelve. But those skills would need to be retained and transferred if the mirror were to live up to its potential. To put it another way, could it do more than catch the attention of disaffected students and fill them with optimism? Could it equip them with the skills necessary to confidently paint and draw without the device?

It should also be said that the paintings produced in this first class were impressive but by no means virtuosic. They were small, half-finished and monochrome but they displayed, amongst other things, comprehension of technique which is the beginning of a conversation with painting.

Work in earnest

A few children stood out from my first class, not because they were precociously talented, or indeed because they were precocious, but because each had quickly mastered the knack of using the comparator mirror and had expressed particular enthusiasm for lending a hand from that point.

I had observed the positive, holistic influence of one strong member in a working group since my earliest tests, and now as I began the process of

refining a methodology it occurred that perhaps I should invite these five pupils to act as my core research team with the aim of implanting them into groups of perhaps four or five children once they became fully confident.

In much the same way as a botanist might use pollen to propagate new breeds of flower, I could begin cycles in which children become ambassadors for the comparator mirror as they grow in confidence, but this all depended. Would the mirror always produce the same results for everyone as suggested in Tim Jenison's film? Certainly my initial tests had substantiated this claim to an extent but one of the points I needed to strengthen was consistency and this would take time.

My team initially consisted of Scarlet (16), Henry (12), Nele (15), Candice (17) and Louis (13). Within a few days it was decided that they should visit my studio from 4 until the evening meal at 5:30 p.m. and within a week we had found our rhythm.

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We began with a discussion. Initially I wanted feedback. I wanted to understand, from the students perspective, what had taken place at our first art class and more subtly I wanted to get to grips with each student's personality and sense of creative confidence by allowing time to mull things over.

It seemed that all five of my team were roundly pleased with how things had progressed and when I asked each group member to quantify the ease with which they used the device by using a scale from one to five, with five being very easy, each independently answered easy or very easy. Happily I felt a little more secure.

In the discussion which followed it was suggested that the mirror could be used to teach very young children of 10 or even younger. Henry, the youngest in the group, put forward the idea of using the device in combination with his mobile phone which presented some very interesting ideas about developing new prototypes. Nele asked if we might experiment by limiting the time taken to make paintings and I suggested that this might be an excellent way to loosen up more tentative students by forcing them to ignore superfluous detail and go straight for the bare bones of an image.

Next came the question of how to begin our work together. It transpired that each of the five students felt very committed to the paintings they had started in the first class and so it was decided that each of the six paintings already underway should be finished individually with my assistance.

It was important to establish a sense of team spirit and of coherence, in which each individual had their own very important part to play.

Although they were begun as part of a group exercise, our initial paintings presented an opportunity to give each student a research project and for the time being I decided it would be best to focus exclusively on

these five individuals with the aim of establishing a bedrock from which to make comparisons further down the line.

Before beginning work I had premixed three tones of grey which, alongside titanium white and ivory black, would give each student a good basis from which to begin to analyse tone. It had proved important in my preliminary tests to reduce the variables involved in painting wherever possible to enable volunteers with low confidence to focus on the process of painting itself. With this in mind I had instructed my five researchers to resist using black and white until their paintings were reaching a conclusion with a demonstration of just how too much dark or light too quickly could throw a painting off balance.

It crossed my mind that perhaps the enthusiasm shown by these five students was evidence of their being exactly the kind of minority who pass through the eye of the needle. Whether or not it was the confidence of success or the fascination of finally making good which brought them to my studio every day I could not yet say. Perhaps in time I would need to find other volunteers displaying definite signs of low creative confidence but for now I had a committed group of children who were using the device as naturally as any adult which in itself seemed like proof of something, namely that children *do* get it.

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Over the coming month I would come to know these five young people through their painting and discover their various strengths and weaknesses. It would transpire that none were conspicuously confident and that none had been picked up as *gifted*. In the interests of specifics, what follows is an account of each student's progress during this initial period lasting one month.

Scarlet (17 years)

Scarlet had opted to complete her rendition of *The Mona Lisa* which, after only an hour was beginning to take shape.

Her working method is meticulous and consisted of sitting by the mirror so that her head was only a few centimeters away from it and, with one hand covering her left eye, moving her head back and forth.

From the outset it was clear that she had confidence in what she was doing, that she understood the principles involved in using the mirror and that she had some experience of paint handling. In fact it was only as her painting neared completion that she began to falter and I began to lend a hand.

Essentially Scarlet felt that she had painted herself into a corner. After two hours she had reached a point where questions of proportion and tone had been answered and all that remained was to build up the very darkest darks and the very lightest lights. Of course to an experienced painter this is one of the most satisfying stages involved in realistic painting in which the various attempts one has been making to create a three dimensional

world on a two dimensional surface come together and all previous hard work pays off.

To a relatively inexperienced painter such as Scarlet on the other hand, it is understandable that a painting's *coup de grâce* may seem daunting. She explained that her painting became more and more precious to her as the image she was painting began to appear until, with only the most subtle intonations of black and white needed, she ran aground with the thought that she might ruin hours of work.

In short, her success early on was inhibiting her progress later down the line as a symptom of her inexperience. What was needed was not a demonstration not of technique but of confidence.

At this point it was very gratifying to be able to work on the painting with her. With a fine pointed brush and a very small amount of black I began to imply each strand and wisp of hair by describing the shadows between them. As I did this, the subtly observed tone around the nose and mouth began to make three dimensional sense in relation to this new dark area and Scarlet, who saw without any prompting from me that the painting was coming to life, begged to be allowed to take her turn with doubled enthusiasm.

It was evident that my involvement in her painting had made the difference at this final stage. I considered that art teachers have always offered instruction to struggling students and on many occasions have taken it upon themselves to demonstrate good technique by correcting the students' efforts.

The objectivity of the comparator mirror however, the fact that anyone using it will eventually achieve the same result, means that demonstrations such as this are no longer didactic. After some practice students seemed to begin to understand that a good outcome is quite possible. In this situation, in which the challenge of painting never seems insurmountable, it was becoming possible to teach without intimidating students, it was also possible to make clear to many students that what they lack is not dexterity but confidence.

Although she knew that her painting was nearing completion and I knew that she had the sensitivity to put in a few carefully placed areas of dark and light but without the confidence of experience she failed to trust herself.



As I began to build those final areas of shadow I was able to demonstrate an unsentimental attitude toward realism and a sense of assurance that this stage in the painting was no more difficult than any other. The marks I was making were simple, precise and comprehensible and Scarlet only needed to observe this once to understand that the task in hand was easy enough. She had learned a lesson about painting through praxis and I was able to guide and direct this by being in the process myself superior in knowledge perhaps, but her equal in technical terms because of the comparator mirror.

This was not a perfect copy by any means, the level of care in da Vinci's original is quite exquisite but Scarlet's attempt had enabling her to arrive at a deeper understanding of da Vinci and that seemed more important.

I now consider Scarlet to be the most sophisticated comparator mirror operator in my team. She came to the device with an existing fascination for detailed, labour intensive picture making and with a little experience and encouragement she has begun to help new students to use the device. Together we are currently working on a full sized, full colour copy of Rembrandt's *Woman Bathing in a Stream*.

Henry (12 years)

Henry's enthusiasm from the outset was admirable. Despite difficulty in my first lesson because he was not tall enough to reach the table he pre-empted any further invitation on my part and the announcement that his painting had already been tweeted around the world, by asking to visit my studio to try the mirror again.

I learned very quickly that this was a young man driven by a desire to find challenges and tackle them head on, whether as a gymnast at national level or in the creation of meticulously complex origami sculptures which concertinaed and reticulated as if they had been machine made. Here, I thought, was a child already in love with learning.

His technique with the mirror involved keeping both eyes open and relying upon the curious double effect of seeing one's picture plane with

one eye and the mirror with the other. In this way the image to be copied appears transposed onto the picture plane and because this transposition happens inside the operator's head, colour and tone can still be built accurately.

Henry's chosen image was a black-and-white reproduction of Vermeer's *Girl with a Pearl Earring* approximately 22cm by 18cm and, as with Scarlet, I had premixed five tones of grey to speed the process up. He also insisted upon beginning a new painting from scratch, which I thought was consistent with what I had been told about his flair for a challenge.

I began with a false caveat. I explained that I was extremely busy with my own work and had to finish a particular detail in a large canvas leaning on the far wall which was partly true. I explained that I had been struggling with this detail for several weeks with the mantra that the only way to deal with a problem in painting is to go straight through it and with this in mind Henry said that he didn't mind working alone on the device during this first lesson.

Of course this was my attempt at fostering an awareness that painters face difficulties on a daily basis and that this is what makes painting endlessly fascinating. I also wanted to see how ably a child of twelve could begin to apprehend an image as it appeared in the comparator mirror and this could only be done without outside influence.

After twenty minutes the lower right hand section of the tree I had been painting looked worse than before and I decided it was time for a break. During this time Henry had been so quiet that I had almost forgotten he was in the room at all and as I walked over he was still engrossed in what he was doing.

Beneath the mirror were the skeletal beginnings of a head placed convincingly on its shoulders. The scarf worn by Vermeer's model was Henry's next challenge although he had managed to draw in the silhouette which gave him parameters in which to work.

He clearly understood the basics; he was using the mirror to build up accurate outlines and some level of detail, and after a little encouragement I returned to my painting. With one eye on his progress I saw a marked difference between his approach and the others. Where Scarlet had shown fluidity and an awareness of how a brush could be used to achieve different marks, Henry sat hunched over the device with his paintbrush gripped like a pencil as close to the bristles as possible.

Until this point I had suggested using a 4mm filbert brush but had made it clear that students could choose a different brush if they wished. I wanted the children to teach me how to teach with the device and to arrive at their own ways of working however odd it might seem.

Henry had opted for the smallest option available, a fine 1mm round point rather like the kind used to paint model aeroplanes. Ordinarily I would use this brush for very fine highlights or perhaps the details of an eye, and to me the idea of trying to tackle an entire image from scratch

with it seemed rather like trying knit a sweater with a darning needle. But I wanted Henry to make his own discoveries and so I left him to it.

After a further twenty minutes or so I returned to Henry whose canvas was now thick with paint. With every attempt to correct a mistake by applying another layer of paint, Henry had disturbed the layers deeper down. He had attempted to counteract this muddying effect by correcting with enough fresh paint to counterbalance the existing layers. This now meant that pea-sized blobs of paint had been applied and flattened out in much the same way as a plasterer might handle a first coat of render.

His image, although still vaguely comprehensible, was disappearing into a bog of thick impasto. Being the tough young lad that he is, he had not asked for help or shown any sign of dissatisfaction, but I could see that he was struggling and that I had been remiss in expecting a twelve year old to understand how oil paint behaves.

I could understand the logic of what he was doing perfectly, ‘mistakes must be corrected therefore more paint must be applied’, and the size of his brush made this a more cumbersome task still. Having said this I could not fault his use of the mirror. Certainly tones were unbalanced and in places his paint was a few millimeters thick but I could see that he had picked out the proportions of the young woman’s facial features, the shape of her head and was beginning to apply himself to the folds and drapes of her scarf.

These accurate observations were encouraging. He had clearly understood how to use the comparator mirror to transfer an image, to comprehend forms within a form. But what he was struggling with were the basic skills of paint handling. Paint itself was posing a greater challenge than the comparator mirror.

From this point I decided to work in tandem with Henry. I recalled working with Morgan (14), my youngest neighbour, on my first prototypes and remembered that I was always close enough to observe the details of his working habits. This may or may not have improved Morgan’s confidence but it certainly gave me an opportunity to catch him at critical moments with advice, a guiding hand or hands-on involvement in the process.

Together, working at five, fifteen and then thirty minute intervals as the image began to reveal itself and Henry’s confidence grew. My turns were considerably shorter and allowed me a chance to guide the painting and demonstrate various techniques. Our finished painting became more and more accurate. We began to discuss Vermeer’s life, the politics of 17th century Delft and the notion of thinking with the tip of one’s brush.



Within five hours, spread over three weeks, Henry's version of *Girl with a Pearl Earring* was complete. It was small, monochromatic and the brush marks were tentative in places but its details were compelling.

In hindsight, his progress was markedly improved when I explained that any mistake could be adapted or corrected by removing paint with a moist, clean brush, in much the same way that I had shown the Jones boys.

With this ability to undo any mistake Henry enjoyed the confidence of knowing that he had an infinite number of chances to succeed and with a little time he managed to render the facial features single handedly.

In all of this my involvement was the single critical factor. Without it Henry began to flounder. He had made bad choices through lack of experience and compounded them by not realizing it. In this way I believe younger children would require closer observation and involvement from the outset to prevent errors of judgment which can compound and lead to dissatisfaction, disappointment and disengagement.

As momentum and confidence build this involvement may become less and less important and perhaps it may be possible to establish a system in which the length of an individual's turn reflects their ability. The lower the ability, the shorter the turn, with the teachers turn being equal in length.

Lastly I should point out that Henry continued to use his tiny brush despite my suggestion that he might like to block in larger areas with something a little more appropriate.

His polite insistence made me smile, not because it was so unusual in someone so young but because as I began to explain the basics of paint handling it actually began to work in his favour. He had understood better than I had that different folks do indeed have different strokes and no one should stand in the way of that.

Nele (15)

Nele joined West Buckland in September as part of the school's admission of German students who visit until Christmas. Of all my young researchers she was the quietest but I soon learned that she was diligent and not without confidence, an eye for colour, detail and proportion.

To paraphrase her words, art lessons before visiting England had been altogether more sterile, conservative and less demanding. Despite this, her attitude to realism was quite measured and she seemed to have understood for herself that the boundaries of artistic quality extend far beyond anything the mirror might offer. Nevertheless, she was interested in the device and gave it her full commitment from the outset.

Her chosen image was not a classical painting but a black-and-white image of Bette Davis which contained many of the elements of chiaroscuro common to the old masters and to early Hollywood headshots.

Before beginning work I had fallen into conversation with each of my students. With Nele I discussed what she felt were her strengths and weaknesses and I established that David Tress and Caspar David Friedrich were among the painters she most admired. These struck me as unusually sophisticated choices for someone of fifteen and her relaxed attitude in conversation about them convinced me that she knew more than a few hurried Google searches might disclose.

Until this point I had wanted to control the variables around the process of painting such as paint mixing, pallet management and preparing a surface on which to paint. My initial intention had been to establish whether or not the comparator mirror was universally accessible by removing all other variables which might inhibit progress. But at this point, with all previous tests confirming that this was correct, it was time to extend the boundaries a little.

Based on Henry's achievements with his tiny brush it also occurred that perhaps some students would benefit from more responsibility from the outset. Nele's quiet self-assurance reassured me that she could put up with a little experimentation on my part and that her ego could withstand exposure to a teacher who tries and fails and so we began with a crash course in paint mixing.

Very quickly Nele mixed three descending tones of grey in equal quantity and applied them to a smaller more portable palette with no difficulty. We then coated a sheet of white card with PVA glue to provide a smooth impervious surface on which to paint, with an explanation that this layer of primer would prevent oil paint from seeping into the paper

and becoming unworkable as a result. This is also the trick which allows a painter to work by adding and subtracting with a moist clean brush. Without it realistic painting can become a one way street in which mistakes are more time consuming and more difficult to adjust.

As Nele's painting began I opted to allow her longer working stints than with Henry, her confidence was full and her painterly vocabulary was large enough that she could push forward constructively with minimal practical involvement from me.

Within a couple of hours, a convincing, if a little ghostly facsimile of her source photograph was appearing underneath the mirror. Although Nele's source photograph contained no areas of tight detail, as Scarlet's had done, it still contained quite extreme areas of light and shadow and as we moved toward the stage where these problems would have to be tackled, I noticed Nele's hesitancy.

This was exactly the stumbling block which Scarlet, who initially showed some previous knowledge and skill as a painter, had faced. With this in mind I methodically intensified my involvement and adhered to short, rigidly maintained turns taken regularly at three minute intervals which had the desired effect.

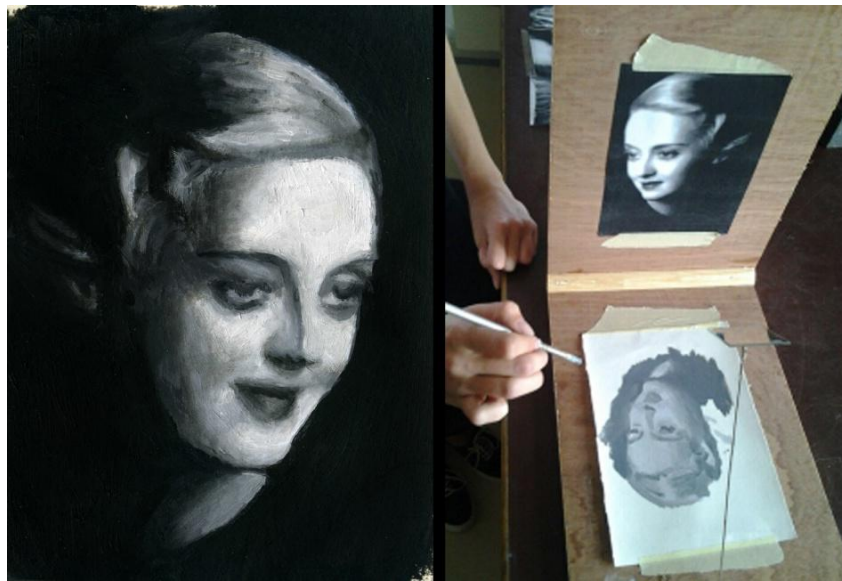
From this point it did not take long for Nele to understand how the final application of dark tone consolidated her previous work rather than ruining it and before long we were on the home straight.

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Nele's difficulty, or sudden lack of confidence occurred at exactly the same point as Scarlet's. In hindsight it occurs that students who come to the mirror with an existing knowledge of painting would be more likely to shy away from finishing a work which has gone well until that point. This anxiousness requires some prior experience that black is a very volatile element to throw into the mix but with the mirror its placement and its management poses no threat with a little awareness on the part of the teacher.

Using the mirror, teachers are at liberty to manage and maintain a kind of safe zone within which the student can work happily. If the student is working well and is growing in confidence, this safe zone can be extended to purely conversational involvement from the teacher. If they begin to struggle again, the students' susceptibility to disappointment increases and this can be managed with more practical involvement.

Nele's painting was, in the end, quite convincing in its discovery of three dimensional form and she was pleased enough to begin work on a new painting in colour almost straight away.



As a last caveat it did occur to me that Nele and I had learned a good deal less by not copying an existing artwork. Whereas the conversations with Henry and Scarlet had ranged from discussions of da Vinci's invention of the helicopter to the use of lapis lazuli in the making of pigment in 17th century Holland, Nele's image offered only the opportunity to discuss the technical issues concerning realism.

It was, I thought, worth considering that the gains which could be made by using the device to understand an artist by walking in their footsteps far outweighed the benefits of reproducing a blurred black-and-white photograph with the aim of fostering a purely technical understanding.

Candice (17)

Candice, or Candy for short, is a precocious talent whose drawings contain areas of quite scintillating detail.

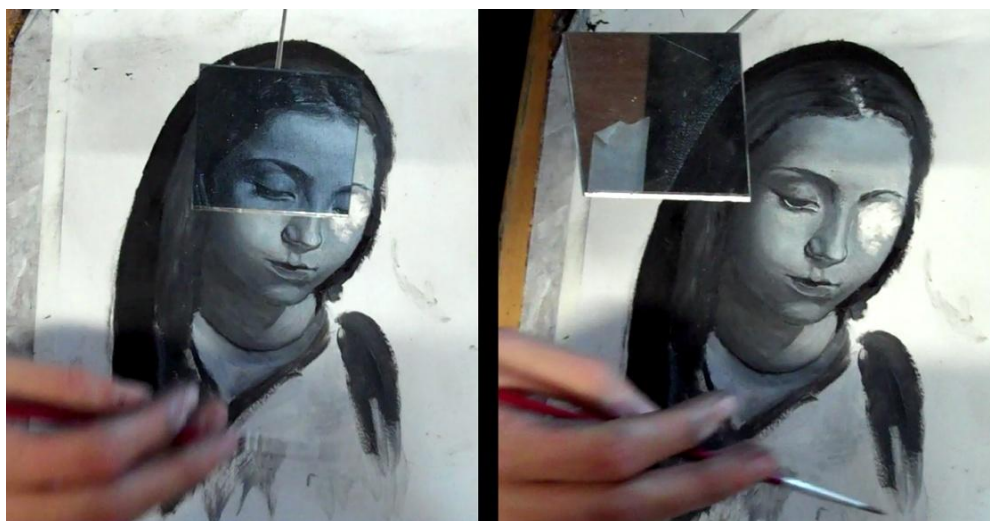
This flair for realistic drawing, which was first recognized at fourteen, has deepened Candy's personal fascinations across the curriculum, in much the same way as I suggested in my introduction, but it should be said that Candy is only beginning to understand drawing's place within culture and its ancient association with diligent, dogged, artistic enquiry.

Her interest in the device was as immediate as my other students but after discussing the whys and wherefores it struck me as a little strange that such a technically accomplished young draftswoman might want to bother with it, she certainly had no misconception about the technicalities of drawing. Nevertheless it would be wrong to dissuade anyone from using the device and so I began the task of finding a challenge equal to her ability.

Based on my experiences with Scarlet, whose confidence was only slightly less, I knew that this would present an opportunity to teach something of the history of painting rather than a lesson in technique and so we began with the grandfather of virtuoso brushwork, Velázquez.

Our version of the facial detail from his *Immaculate Conception* was black and white, as were the other students' paintings. This suited Candy well, given her familiarity with tonal drawing in graphite (another medium with which images can be built with a similar push-pull process of adding tone and subtracting it with a rubber where necessary).

Progress throughout was straightforward and where I had previously blurred images very slightly to avoid less able pupils prioritizing detail at the expense of the whole image, Candy seemed to relish the challenge of the high-definition reproduction I had chosen to use for this painting (measuring 22x18cm).



The quality of modern reproductions found on websites like that of The National Gallery in London present a level of detail which, in Candy's case, did two things in conjunction with the comparator mirror. Firstly they presented a significant enough challenge to keep this technically able young student engaged in the process, secondly they proved to be the catalyst for a truly authentic rendition of Velazquez's brushwork and equally complex conversations regarding his technique, his subject matter and his biography.

That said, these conversations were quite informal. The fact that we were both engaged in an intricate task which required a level of focus meant that I could impart what wisdom I had more accessibly, in much the same way as two people might chat whilst washing a car or building a house. Our painting was completed in around four hours, spread over three weeks, and as we went on Candy began to ask more specific questions and I got the sense that her knowledge, or at least here thirst for it, was deepening.

Louis (13)

Louis is a force of nature, totally uninhibited, prone to spontaneous outbursts of song at full volume and brimming with confidence. He was also, at that point, quite unable to speak more than a few words of English.

His presence in the class was regular from the outset and his commitment to tackling tasks, with French translation from his friend Arianne, was

admirable. I should say that Arianne was extremely shy about undertaking her own painting with the mirror although I hoped that the enthusiasm of the other students would rub off if I could only be patient.

My initial impression of Louis's creative abilities was that he very much enjoyed painting, drawing and everything else on offer in the school's art department and did not mind falling short of others' expectations one iota if the process was enjoyable to him. For Louis the joy of doing was its own reward.

I began by suggesting several images, a detail from a Vermeer, a van Dyke head and another contemporary image from the popular *Hunger Games* films. Louis was nonplussed.

He suggested that he wanted to draw rather than paint and presented me with an image of a young French pop star with good tonal variation. This led me to conclude that Louis had a firm understanding of the mirror despite our difficulties with language and more importantly, he had been sufficiently inspired to prepare more thoroughly than any of my other students. He was, I supposed, as single-minded as he was uninhibited.

The language barrier also presented another interesting challenge. I considered that this would be a lesson taught by example first and foremost and as we began I adhered strictly to three minute alternating turns in order to maintain a level of consistency.

Louis had opted for a well-sharpened 9B pencil and although I had experimented with drawn imagery in the early stages of testing and had found it to be less suited to the comparator mirror than oil paint, Louis began without hesitation.

His marks were fast and broad and reasonably well controlled and within ten minutes he had achieved the same kind of skeletal framework of tone and form that I would have expected from the others painting in oil. At this juncture Louis turned to me and declared the drawing finished.

I did not share this opinion. We had made a very good start and were ready to begin discovering the hows and whys of realism and so I insisted that we continue by tackling the next layer of detail.

In another ten minutes I had begun to increase the level of contrast around our subject's left eye by feathering in layers of tone almost imperceptibly. I began to pad conversationally around the enduring truths of realistic painting. The fact that the look in a person's eye, if rendered well, is as resonant today as it would have been in the sixteenth century. Louis yawned and asked if he could start another drawing.

At this point, by persisting with what I thought were the beginnings of a good drawing, by not treating this student's natural creative inclinations as credible enough to set the agenda, I was in danger of losing Louis and so I thought fast and set him the new challenge of using a large graphite stick (20mm in diameter) for his second drawing.

It seemed that Louis's aim had nothing to do with attaining skills, with learning the craft of realism, and everything to do with apprehending an image in just a few seconds, in much the same way that Toulouse-Lautrec might have done. A graphite stick is ideal for this kind of drawing and would suit Louis's agenda perfectly because what is lost in precision is made up for in fluidity of line.

Again he worked fast. The next drawing, from the same image, was complete in only five minutes of continuous working without direct intervention from me. With Arianne's translation it was possible to discern that he now wanted to try a bigger image painted in colour without the mirror.

This painting, on canvas, of huntsmen dressed in pink coats with their traditional French horns, would occupy Louis for three months. With it he would learn the process of colour mixing, canvas preparation and the use of scaling grids with which to easily transfer his small photograph onto canvas.

Gradually it became evident that he had no difficulty in maintaining concentration once he had identified a task which appealed to him. As I have said before a great many young people leave their own creativity behind at his age due to a lack of confidence and a sense of disappointment, I do not suspect that Louis will ever suffer in this front. And it also occurred to me that he may also have simply not found the comparator mirror of interest.

In a situation where he could not speak the language, Louis may well have been relying on visual cues and his own inclination.

In the school assembly several weeks before, I had introduced the comparator mirror by talking excitedly about Vermeer, about Tim Jenison's breakthrough and about the fact that anyone who came to my studio would be amongst the first children in the world to try the device.

It was true that any success with the mirror would stand as proof that it could be used by children and beyond that they would be playing an essential part in researching the possibilities presented by the device.

This put the comparator mirror into context, it made clear that there was something important at stake and all of this depended upon being able to understand what I was saying.

Louis's apparent indifference alludes to an interesting point. A student's interest in anything can only be maintained if they feel a sense of personal authenticity about it. Yes, we were in the business of making copies and certainly Louis may have been a particularly dismissive young lad but it seems fair to say that the way the comparator mirror is introduced by a teacher will radically change how it is perceived and consequently how it is used. In this, language barriers present a problem because it is language which may make the difference.

Put one way, the device can be understood as an ancient technology which will allow teacher and student to tread in the footsteps of the great

artists of the past together as equals. It presents the opportunity to discuss and discover a deep sense of understanding, of painting, of drawing and of art history by creating a sense of personal authenticity and ownership for each student.

On the other hand it could be perceived as a mirror on a stick for the purposes of copying and perhaps Louis's difficulty with English had led him to understand the device by way of this definition.

A second cycle of working

As I said before, my initial feeling about the comparator mirror was that it might do for art what the calculator did for mathematics and at this point I began to get a sense that it carries with it many of the same political implications which reside at the balance point between notions of cheating and universal accessibility.

It must be said that copying as a positive route to understanding is a notion which has seemed almost extinct for many years. After modernism, the prevailing consensus became that great artists *were* great only insofar as they were radical and this has subtly altered concepts of creative quality and ability in the broadest sense.

Nowadays artists are expected to fly in the face of convention and provide us with ground breaking ways in which to look at the world and in this climate the act of copying can tend to seem synonymous with falsification and the copyist can seem to lack authenticity. Replication has become the antithesis of authenticity.

Before modernism, when each successive generation made art based upon previous understanding, copying occupied an entirely opposite position.

For van Dyke, copying would have been an essential means through which to apprehend and digest the work of Rubens (his teacher) or any of the other artists who formed an unbroken chain of art historical antecedence reaching back to Giotto.

In this way successive generations of artists built upon the discoveries and inventions of their predecessors and this began with copying. If an artist had applied himself to understanding what had gone before with sufficient dedication, his art had the potential to be a conduit for a kind of meaning that was centuries deep.

Despite a culture in which newness and quality are one and the same, some artists working in 2015 still adhere to this old notion. For many this position constitutes a richer standpoint and copying, as a means of apprehension and understanding is as useful now as it ever was.

To look at a Rembrandt, to spend hours interrogating it without assistance or apparatus, is to set one's own intellect against his, to enter into a deeply personal conversation which consoles and fascinates and means something substantial. This kind of understanding cannot be achieved by any other means but it requires creative confidence and

enough preexisting fascination to walk through the doors of a gallery in the first place.

It is ridiculous to think that the rewards of analytical copying or even attending a gallery are clear to people whose creative confidence was lost at the age of fourteen. It is a world away from people who associate painting with memories of deep personal disappointment and by November 2014 it was here, in the moments when creative confidence germinates or withers, that the comparator mirror was beginning to show results. But could it really offer a way to keep the most cautious and inhibited of children in the creative loop?

Certainly each of my five students had produced impressive copies, with varying levels of finish, but I thought it wise to remember that a few swallows do not make a summer and that an accurate copy does not necessarily constitute evidence of personal fascination. Perhaps the conversations which the mirror allowed students to have were as important as the paintings made with it. Perhaps the paintings were only a by-product of a larger, richer process of learning.

By this point all of my volunteers had unlocked the problems of realistic drawing and painting using the comparator mirror. I had also discovered that, because anyone who uses the mirror gets basically the same result, the comparator mirror enables a teacher to explain the various tricks and techniques of realism from within the painting process, with a student, as their equal in technical terms.

Within six weeks my initial group had all completed a small tonal study and were beginning, with the exception of Louis whose commitment was still wholehearted and frequent, to attempt more ambitious colour imagery. Most noticeably almost all of these volunteers now talked with enthusiasm about painting and about the possibilities which lay ahead with the comparator mirror.

There was no doubt that the mirror had given each student a surge of enthusiasm and that despite a difference in age each had managed to achieve results of compelling quality but it should be said that none of these students came to the process without some small measure of confidence. A bigger challenge was needed.

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By this stage my young researchers were visiting the studio on a daily basis between 4 p.m. and 5:30 and this workshop atmosphere had started to attract the attention of other students who wandered in with questions and an eagerness to become involved.

My researchers continued to work on new projects which they had devised themselves, some working on larger images, some working in colour and even including computer technology in the process as I will discuss later.

Although this fresh interest attracted by our research made me anxious to allow all comers a chance to try the mirror I had to be selective at this

point as two significant issues were yet to be tackled. They were as follows.

- (1) Could the comparator mirror be used by a child with perceived low ability and levels of confidence, or more concisely, could a person with low confidence who is about to abandon creativity be turned around?
- (2) Could the comparator mirror be used effectively in a classroom situation and how much teacher training would this require? (This would begin to prove the general usefulness of the device as a teaching aid.)

To prove the first of these points I would have to select a student whose confidence I could be sure was very low and although several students had told me that their own abilities were woefully lacking it would take time to know a student well enough to be sure of this.

Fortunately Louis's friend Arianne was now a regular visitor to the class despite her reluctance to begin a painting herself. She was certainly interested enough in what was happening to attend the class for several weeks but she consistently presented defensive, self-deprecating responses to her own creativity.

Arianne (13)

So far my research had brought me into contact with a few individuals with low creative confidence and their results had been very encouraging.

My neighbours Trevor and Kate had both managed to achieve results which pleased them enough to begin to reconsider themselves as 'Artistic'. They had at least enough confidence to volunteer and to begin a painting and although their children had not performed well enough in school art lessons to establish themselves as 'Creative' they too had no difficulty in getting started with the comparator mirror.

Arianne presented a deeper challenge in this respect. Her presence in the class made her interest clear but her confidence was lower than any of my previous volunteers. Where others had seen the comparator mirror as a golden opportunity to tackle the problems which frustrated them at last, Arianne's first reaction was to remove herself from the equation by saying that for her painting was simply impossible.

Then, gradually I had seen Arianne relax. I had noticed her engage with what others were doing and it occurred to me that if I could help this young girl rebuild her artistic confidence, if I could at least talk her down from the resignation that art was not for her, I might also begin to sure up my inclinations about the comparator mirror.

In fact, I thought, volunteers such as her might be the way to test the comparator mirror's importance most convincingly. It also allowed me the chance to test earlier conclusions and to put teaching strategies into practice.

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By December Arianne, who had been visiting my classes with increasing frequency, would sit and chat happily to other pupils about their paintings, her English being much better than her friend Louis for whom she still offered occasional translation.

It occurred to me that, until this point, I had not really had the time to engage with Arianne on a one-to-one basis for any longer than a few minutes. Now, as I was looking for a student with all the characteristics which she displayed, I took the time to make clear that I was very interested in everything she had to say precisely *because* she struggled with drawing and painting. With this in mind I set aside one session in which Arianne and I would begin a painting alone, together, without any outside distractions.

She was still very reluctant but finally agreed on the condition that I would work with her on a painting. Arianne had spent long enough in the class to understand the principles involved and had begun to understand that logic and objectivity were more necessary to this process and that creativity could come later.

Perhaps, as before, the mirror and my communal approach to teaching with it, had presented enough possibility to warrant persistence in spite of her doubts but only after six weeks of cautious observation on her part. Most importantly she had seen that working with the mirror could be a shared experience and that setbacks could no longer be taken as signs of personal failure.

Nevertheless I wanted to take time from the outset. I began by explaining the basic stages of realistic painting and drawing as I had with my other volunteers. After watching Tim Jenison painting his father-in-law and after my step-by-step description of what we would be doing, Arianne responded enthusiastically and for the first time I began to see a glimmer of possibility in her questions.

It was crucial, I thought, to keep this glimmer alight and to let it grow. To this end I was conscious of taking very short alternating turns in order to avoid a sort of avalanche of disappointment. By this I mean the compounding effect of mistakes made without on the spot guidance which very quickly gathers momentum and makes painting harder and harder as I had observed when Henry, Morgan and Gareth began their paintings.

With three tones of grey mixed and initially without black and white, we began with working intervals of three minutes. These intervals worked as they had before, with Arianne's tentative brush marks being advanced and stabilized by my input.

In these early stages I began to understand that what Arianne had said about her confidence as a painter was fairly accurate. Of course this had nothing to do with her actual ability to paint realistic images but her faith in her own creativity and in the brush marks she was making was very frail and her reluctance to make even the smallest mistake made for slow progress during this first session.

It was also apparent to me that where I had previously jumped in with rapid adjustments of proportion and tone with students such as Henry or Trevor, with Arianne things were more complicated.

With somebody whose confidence is at rock bottom it occurred to me that no explanation of the comparator mirror and no degree of rationalizing before beginning work will cure feelings of inadequacy. The only thing which can begin to win over a student such as this is a personal experience of positive progress. Conversely, if a student's own contribution to the process seems entirely opposite to the confidence and speed of their teacher, the comparator mirror may only exacerbate feelings of inadequacy. To me it seemed prudent to assume that, in situations such as this, a teacher's main aim should be to tease out confidence by matching a student's pace, however slow it may be, and to resist bold demonstrations of technique until the student has some momentum.

This approach required a complete deceleration in my working habits. I found I had time to talk, to discuss the results of the school hockey team and to explain exactly what I was thinking of doing with each brush mark before evaluating after the event by speaking my mind about my own progress.

I wanted Arianne to understand that my thoughts were not entirely confident and never are, where painting is concerned. It is a fascination which deepens and gains complexity with every moment of progress and by tailoring my approach to suit Arianne, by setting a pace she could manage, within thirty minutes we were in it together. We were making slow, steady progress and some degree of confidence was beginning to show.

From here it became easier and easier to take Arianne through the nuances of brushwork, to ask her to attempt the shading under a lip or the shape of an eyebrow with a single brush mark because, in this process, she could only think about painting objectively. She had seen me try and fail and persevere and was beginning to understand that painting is a push-pull process which begins at a creep and builds speed toward its conclusion.

The image she had chosen, a portrait of the actor Louis de Funès dressed as a French policeman, was monochrome and similar in size to my other students' first paintings. Its contrast presented some good technical challenges and some areas of detail which would present a challenge even for more confident students. At this point however, perhaps an hour into our painting, I kept the emphasis on broad brushstrokes and was mindful of the fact that Arianne's enthusiasm was still fragile and it would not take much to damage it.

Of course, unlike Arianne, I knew that with a methodical approach we could be fairly sure of making a realistic painting and as we began to slowly pick up speed and increase the length of our turns to five minutes our brush marks began to describe eyebrows, forehead and the distinctive French policeman's hat. At this point her excitement was palpable, perhaps because she had not expected to see results and perhaps because

nothing she had encountered so far had caused her to consider pulling out of our arrangement. What she had described as an impossible task was, so far, entirely comprehensible.

Our second session began where our first had left off with regular turns being taken at five minutes. This time other students were present in the class and their encouragement and surprise at seeing Arianne paint was disarming. This also helped Arianne to recover momentum from our previous session and before long we were making good progress again.

The brim of the policeman's hat was our next challenge which included two curved semi-circular brushstrokes in a tone approaching black and a lighter grey ellipsis above to describe the hat's flat top.

To a more advanced painter these three shapes could have been described with three swift brushstrokes (we were using a 4mm filbert brush as with previous paintings) but for Arianne this presented our most difficult challenge yet. In fact it presented a good opportunity to demonstrate that a brush mark can be refined after it is made by removing paint with a clean moist brush and cutting over dry paint at a later date with other tones. In this way it is not hard to refine even the most complex shapes and Arianne began to tackle the problem with enthusiasm.

Having taken a few turns myself (at the 2 hour stage we were working in 10 minute intervals) and seeing that Arianne was making confident progress I made a point of walking around the class to chat to other students. Henry was beginning an experiment which involved dragging his school ruler across his paintings surface to remove paint before repeating the process in a manner reminiscent of Gerhard Richter. Nele was making a good attempt to copy Stubbs's *Whistlejacket* without the mirror by using a 'copying' or 'scaling' grid to build up an accurate underdrawing.

When I returned to Arianne I saw that, whilst she understood the principles involved in refining brush marks she was silently struggling with the mechanics of oil paint. As with other students this was easy to rectify although it struck me as exactly the kind of problem which would cause serious confidence problems if not spotted early enough by a teacher.

From this point Arianne's momentum appeared to be self-perpetuating and by the end of her second class (3 hours in total) she was content to work on her painting alone. Naturally I was mindful of the fact that she did not yet have the experience to recognize moments of difficulty, to pause and re-evaluate before continuing, nor did she have the confidence to take setbacks in her stride, but this ability came with time.

This is not to say that difficulties did not occur during the next three weeks. The detail of the badge pinned to the policeman's hat became a talking point in the class as Arianne persisted in painting and repainting it a total of eight times before finally announcing to the class that it was acceptable.

On a separate occasion an area of tightly packed detail including the actor's hand and a pair of binoculars seemed too complex to unpick despite my encouragement.

My solution was to cut a 15mm square into a white sheet of card to be placed over her source image. This isolated a smaller, more manageable area of detail and Arianne continued to paint with renewed confidence and by Christmas Arianne had completed her painting. Whilst it was tonally and proportionally accurate it was not refined or eloquent but that was not the point.

For Arianne the process had provided enough positive creative experience to reboot a sense of self-sustaining creative confidence and interest. An objective understanding of realistic painting had equipped her with the drive to stick at difficult creative tasks, to understand that struggle is part of the creative process and to see that a methodical approach makes recognizable images more or less inevitable.



What surprised me more than anything was the speed with which Arianne came to these understandings. Getting her to commit to a painting had been a long and tentative process and building fresh positive memories had required one-to-one tuition but within an hour the positive effects of the comparator mirror were undeniable and most importantly, within just a few hours Arianne's enthusiasm was largely self-perpetuating.

In the first week of the spring term I noticed Arianne in the hallway of the Art department with two small boxes and a pad under her arm. When I stopped to ask what she was carrying she replied 'Christmas Presents!'. She had been given a watercolour pad, drawing pencils and a box of paints.

Katie (11) and Nadia (17)

My next opportunity to test the Comparator mirror presented itself in late January when two students approached me simultaneously with an interest in making a painting.

At first glance these two girls could not have been more opposite in terms of maturity but where creative confidence was concerned, however, both were a perfect match and showed all the typical signs of self-deprecating wit and a willingness to concede uselessness. Here, I thought, might be a chance to understand just how democratic the comparator mirror process really can be.

We began with all the usual working habits which had become familiar to me by this point. We worked in three minute intervals with a monochrome image of a small white dog which had been selected by Katie on a whim but which also presented the chance to explore tonal observation, detail and blending.

As they began to work, the interaction between the two students was quite charming with Katie shouting encouragement as if standing on the edge of a football field and Nadia keeping her in check.

Whereas Nadia's demeanor displayed the measured coolness of maturity Katie, was incandescent with childish enthusiasm. This was very endearing but I did wonder if she was capable of the kind of focus necessary to use the mirror. It was also apparent that her attitude changed dramatically when it was time for her to take her turn.

By this point I had settled upon a fairly structured approach to teaching and I had seen good results often enough to guide Nadia and Katie through the various stages of painting without difficulty, or with at least a measure of certainty.

I was beginning to realize that, although I am quite familiar with the process of painting and of teaching it, the more I saw the mirror in use, the more effectively I could use it to reach beyond what was previously comprehensible. With some existing sense of the questions which could crop up, as Katie and Nadia began to reconsider the meaning of 'difficulty' and the legitimacy of copying, I was better able to extend the conversation.

My approach to using the mirror had begun with improvisation based around a hypothesis, but now I was beginning to see structure in my own approach. Despite the difficulty of proving the mirror's usefulness I began to feel a sense of certainty about what I was doing and within this structure I was able to add detail.

The image we were working from was fairly simple but what areas of tight detail there were had an extremely dark and extremely narrow tonal range and this made for an interesting challenge.

Within four sessions the girls had blocked in all areas of their painting. It was tonally accurate if a little coarse but, after a little blending, they triumphantly declared their painting finished but I wondered if I could persuade them to look a little deeper.

Inside the dogs mouth were four or five very similar dark tones which were close to the single shade of black the girls had used but certainly not the same. I invited the girls to consider that what they had already done

was a very useful underpainting. I explained that some of the most fascinating realistic paintings are so precisely because an artist has bothered to observe minute differences. That a painter often fascinates when they go beyond what most consider to be visually adequate.

As the girls built their painting they had developed a rapport. They began to trust that placing one well observed tone in relation to three or four other tones would describe the shadow under the dog's muzzle, or the shape of its ears and these technical discoveries amounted to a reawakening of creative confidence.

What happened in these final stages however, in which we built final layers of detail and subtlety together, moved the girls beyond the exhilaration of renewed confidence into a sense of authority about what they were doing.



By mixing four tones of very dark grey and taking time to describe the various shapes within the general shape of the mouth the girls had understood the difference between an adequately convincing painting and a painting which fascinates because it exceeds expectation.

Much to the girls' amusement, as their work neared completion, other students would wander into the studio saying that *they* wished they could paint in a similar way.

Of course this was exactly the conversation I had had with Katie and Nadia only a few weeks before and I was pleased to hear the girls explaining the process of painting to their struggling peers with confidence and reassurance.

In concluding this account I return to the growing sense that I was beginning to teach with a coherent strategy upon which I could rely. There was certainly no room to be complacent and although I did continue to teach many other pupils after this point they are absent from this text because, give or take a few idiosyncrasies, their experiences all mirrored the events I have described so far.

To be specific, in the case of reluctant students with low confidence slow progress early on gave way to growing confidence and a pleasingly realistic painting. This was achieved through attentive teaching with regularly maintained working intervals which created a sense of shared discovery. This democratic approach could, I felt sure at this point, be shared between students of any age or background so long as their levels of creative confidence were complimentary.

The Comparator mirror in the classroom

After working with my five initial volunteers and then with three pupils of very low creative confidence, thoughts about the mirror as a widely accessible way to teach on a one-to-one basis were almost irresistible. But as this work developed, the realization began to dawn that if anyone could use the mirror and if children stood to benefit from this *en masse*, it would also have to perform well in classroom situations.

My introductory class at the beginning of the year had given me a taste of the possibilities here. It had allowed me to identify potentially useful points of interest. Rotational working in groups had seemed to prevent individual stumbling blocks from denting confidence and a democratic painting process had seemed to remove the notion of personal failure from the equation.

In time, I considered, these points would have to be tested, as would other issues concerning the device's accessibility to teachers and the extent to which a class including four groups of struggling students could be effectively managed by a teacher.

In fact my first opportunity to begin researching this area cropped up far sooner than expected when it was suggested, by the head of department (Cameron Main), that I might like to use the mirror to teach an induction class of students looking to join the main school in the next academic year.

In total thirteen pupils aged ten to eleven would take part in this two hour 'taster' lesson as part of their visit to the school in which they would take part in several such lessons across the curriculum.

Although I felt a little under prepared at this point, I was eager to test my ideas for group working on a class of much younger children because, quite apart from anything else, this approach seemed to present a bigger challenge.

In preparing for this class it seemed logical to find ways to appeal to younger children and this affected my choice of imagery. With older children I already believed it might be possible to teach an understanding of technique alongside the various art historical details which make a Rembrandt or a Caravaggio more than the sum of its parts, here though I wanted the children to enjoy the sheer pleasure of painting with a realistic goal in mind.

On the day of the class Cameron, who had volunteered to lead the lesson, was running late and as we waited I chatted to the students. All were very

eager and professed to having a particular interest in art which I thought was encouraging.

Of all the students, one pupil, who I will call John, quickly stood out as being confident to the point of being disruptive. My first impression was that John was highly intelligent; his quips and interjections showed sophistication beyond his years and were enough to throw me off balance initially. I realized that unless I began as I meant to go on this could be a baptism of fire from the outset.

I introduced the comparator mirror with a short demonstration after which I asked the pupils to split into working groups of three. This provided the perfect opportunity to ask John to be my working partner, partly to prevent his behavior from distracting other students and partly to see if the initial moment of realization I had observed with others earlier, which had hooked every previous volunteer at least long enough to begin painting, would draw and hold his attention.

With twenty minutes of our ninety minute session gone the class settled down to work at three minute intervals. As John began to wander from group to group, hands behind back, imitating the owl-like approval of a teacher, I began our painting of a character from *Horrible Histories* by blocking in the contours at the left hand side of the actor's face with enough detail to enable John to comprehend how the mirror is used to build a painting.

Within a minute or two I had to ask John to return to our painting. My approach with him was firm but I insisted that I needed *his* help to make the painting, which was partly true.

At three minutes all members of the class switched and John took over from me. It took a little time for him to decide for himself that what was being done was worth paying attention to, but within a minute or so he had become absorbed in the novelty of the machine and by the end of his turn he had carefully placed two or three brush marks with a sense of conviction and concentration.

To my mind the most difficult objective with John had been achieved in those three minutes. I had to be firm and I had to insist on John helping me but I deliberately resisted making demands about how he should paint. Specifically, I wanted John to find a sense of authenticity in the process for himself.

I knew that he had to see that *I* was fascinated by the process. I knew that I would have to keep him engaged but I did not want to dictate the terms of our painting. Doing that would have removed the potential for engagement and I knew within the first moments of meeting John, that a potential lack of engagement, as a symptom of a lack of authenticity was the biggest danger.

During my second turn John was initially attentive but gradually began wandering to other groups, initially with questions which became more competitive and ended with him mocking other students' efforts.

I should say that I am not qualified to speak about anything other than the process of painting and the various ways in which that process can be taught but, in a general sense, this behaviour seemed deeply troubling to me.

John had taken his new found excitement as licence to judge quality in others but thanks to the objectivity of the mirror I was able to defuse the situation. I reminded the class that only the person looking into the mirror as they paint can judge the accuracy of the marks they are making and in this way each user retains a certain level of authority, even in the face of harsh criticism. I then thanked John for bringing up the problem and challenged him to show me what he could do now that he understood exactly how the mirror worked and what a good painting should look like.

Of course it would have been easy to turn a blind eye at the outset, to have allowed John's presence and notions of quality to affect and become dominant within the class. Perhaps a professional teacher is better qualified to talk about and judge these issues of class dynamics but I must say that once John had seen what the mirror could do, once he had experienced the moment of comprehension and 'bought into it' anything he could say had the potential to end in a constructive conversation about painting and about the mirror.

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We were now just over thirty minutes into our class. Whereas John and I had each taken three turns, the other working groups were beginning their third rotation. As John began his fourth, with the challenge of working alone as the glaring face of a caveman began to stare back at him from the page, I took the opportunity to work amongst the others.

I was pleasantly surprised to see that three of the other four groups were making progress fast. Each had chosen a colour image from Disney's *Frozen* and had begun to unpick the details of platted hair or the graduation of tone across a cheek with good results.

Between these three groups it was not difficult to maintain the enthusiasm of a class of reasonably able students. By checking in with each working group at five to ten minute intervals it was possible to be in the process with multiple students at once, to suggest a particular trick with the brush, to demonstrate ways of blending paint or to draw out students own uninhibited opinions of art in conversations which seem entirely casual and secondary to the painting being made.

That said, the fourth working group were struggling. It seemed that they had failed to grasp the basic knack of the comparator mirror from the outset and, as each group reached their fifth rotation, they were becoming increasingly frustrated. As with Henry or Arianne or any of the other struggling students I had encountered until this point, what was needed was a demonstration from within the painting which would draw these young students back into the process by shedding light on the simplicity of realism.

My experience with other faltering students had given me confidence here. I knew I wanted to be concise. I wanted to make clear that pure realism is an exercise in logic rather than virtuosity.

As I spoke I worked the brush at the mirror's edge, moving my head back and forth. In the end no more than ten brush marks were needed to imply the expression on a face, the shape of a neck, the angle of a head. I had given the girls the bare bones of an image as seen in the mirror and they had seen that what I had said about painting was manifest in what I had done with the mirror, that it *was* simple.

What I am describing here took place over perhaps five minutes. It was not an in-depth analysis of realism but a brief explanation of practicalities which took root because the mirror had allowed me to provide concrete proof. Whilst the girls were now full of enthusiasm I was also mindful of the fact that they would need to get to grips with what I had explained for themselves if my explanation was to have ongoing significance and so I was mindful of their progress from that point onwards.

John had now been working away quite diligently for perhaps ten minutes. Whilst I would not say that his application to the mirror was single minded, he had found enough enjoyment in the process to continue painting in my absence. By allowing him to see my enthusiasm, by setting rigid boundaries in the classroom which contrasted his sense of freedom when using the mirror, the painting had become the central focus of John's attention.

In my time away from him I had made a point of firing question across the room with a certain air of expectancy. I was specific about his painting and could keep him engaged without needing to stand next to him. I asked if he had managed to tackle his subject's eyebrows. He said that he was 'right on top of it' and, as I took my turn again, I saw that although his brush marks were thick and fast he was getting to grips with his painting.



We were now an hour into our class and in that time all five working groups had managed to arrive at paintings which were relatively faithful to their source images and the mood was buoyant. Of course of these observations the latter was the more important and at this juncture I decided it would be most constructive to stop and take stock of what we had achieved with a group discussion.

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Broadly speaking it became clear that many pupils felt excited about what they had done. That it had been a significant enough boost to their confidence to make them excited, rather than daunted by the prospect of drawing and painting realistically from that point onwards.

My choice of imagery had appealed to the class and was sufficient to hold their enthusiasm and although the 'knack' of using the mirror did present a sticking point for some focused periods of detailed working with struggling students, it was enough to keep them from losing heart and ultimately solved the problem.

By the end of the session it became clear that some students in this group of ten-year-olds were probably confident enough to begin copying more complex imagery which stood to teach more than the basics of tonal observation and brush control.

What mattered most was an immediate exposure to the process of painting realistically in which students made discoveries for themselves with help on hand if needed. With this in mind the decision to remove the variables of paint mixing, priming and mirror calibration from the equation was sound. Although this could be taught a later date, attempts to teach these processes too early could frustrate attempts to use the mirror with negative consequences.

Overall the mirror had worked as planned. I had learned that a class of students of mixed abilities could be taught effectively through rotational working in small groups. I had also seen that, providing good momentum was established early on, it would be possible for a teacher to engage with all students by sharing the creative process with just a few minutes of contact time per group.

With confidence high I was keen to point out that transferring a new found understanding of realism to 'non-assisted' painting and drawing would have to involve other simple tricks and techniques which we would not have time to discuss in the thirty minutes which remained. In hindsight, although the students enjoyed the class, this was an error of judgment on my part.

However visually impressive results with the comparator mirror may be, however accessible it may make realistic painting and drawing, realism for realism's sake would be an awful thing. Without time to teach around the mirror, to build upon an understanding of technique, to expand and realign students' ideas of creative quality, the comparator mirror could be an antidote to creative thinking and could reinforce the belief that realism *is* quality.

In asking a class of ten year olds to copy images verbatim and by praising them as they began to use the mirror effectively I had sought to teach the mechanics of brushwork and paint handling and to dispel the myth that realism is unobtainable to all but the gifted.

Certainly there was reason to believe that I had succeeded in this aim but without more time it was impossible to open up debate about artistic quality, about the value of realism or to teach non-assisted drawing and painting as a language for understanding rather than for display.

This model, in which the comparator mirror is included in a larger holistic approach would seem to make the difference between facsimile copies which reinforce misguided notions of quality and groups of children who begin to think as artists think because they have overcome the hurdle of technique.

As with Louis, this train of thought leads back to the notion that conversations made possible with the comparator mirror are as important as the paintings it allows individuals to make and that in the end, quality takes time.

Henry (detaching from the comparator mirror process)

Henry began to experiment as I began to work with Arianne. This meant that my direct contact with him was less than had previously been the case but I was pleased to see that he quietly went about his work with determination nonetheless.

I had learned that there is a certain streak of mischief in his humour. On one occasion he had knocked up a grotesque copy of the Mona Lisa with a spare mirror before attempting to pass it off as his attempt to helpfully adjust Scarlet's first painting. Of course my attempts to conceal outrage and to stress the importance of allowing others to finish solo paintings alone were ridiculous and when I finally understood what had happened the group burst into laughter and I vowed mock revenge.

Something of this playfulness filtered into his own experiments which involved a process of building a painting up before partly obliterating it by dragging his school ruler across the surface.

Some weeks before I had shown Henry the process used by German painter Gerhard Richter to create abstract paintings which form a kind of counterpoint to his other, rigorously photographic paintings.

To me the authority of painters such as Richter, who so clearly understand photographic realism without being seduced by it, seemed to present an exemplar which would allow me to lead students away from the idea that realistic painting is somehow more precious than other modes of expression.

With this in mind it came as quite a coincidence to see Henry brandishing his school ruler before using it to scrape away his carefully placed brushwork.

In all Henry repeated his process seven times and although each application of his ruler radically changed the appearance of his painting (a portrait from the recent *Hunger Games* film), it did not completely obliterate it.

On close inspection small pockets of paint had been left untouched and where paint had almost completely been removed a ghostly image remained which was at least interesting enough for him to continue repeating the process.

As I have said, some volunteers struggled to complete paintings precisely because they had become so personally valuable. For Scarlet, Nele,

Trevor and Kate a half-finished realistic image was proof that they could paint realistically and this made them more and more cautious.

You will remember that the solution in all cases was to slow the process down, to emphasize the security in objectivity and to demonstrate confidence in applying finishing touches during my turns.

What Henry had stumbled upon, it occurred to me, was a way to change a realist painting into something altogether different but no less interesting. If this technique was used with students who seem a little too seduced by their own realism it could, I thought, offer a way into conversations which broaden their horizons.



Whilst Henry was doing this of his own accord I suspected that asking a student to scrape back and remake a painting to which they have become attached could be a risky business. On the other hand as Henry worked and reworked the same image on the same canvas again and again he began to find his way around the image more quickly and his brushwork became more assured, even eloquent.

By the sixth cycle of painting and scraping he knew exactly how to describe his sitter's nose, or the angle of her shoulders with so few brush marks that he was managing to repaint his source photograph in just ten minutes.

By the end of his Vermeer copy Henry was sufficiently confident with a brush to plot areas of tone and line accurately and this led to a fairly competent rendition.

Through this new process, of building a painting up before breaking it down, Henry had begun to go further. He was showing the first signs of real painterly eloquence as a result of a process rather than anything I was teaching him.

Repetition had lead to fluency, as it often does, but the fact that it had all happened on the same canvas was important. It had enabled Henry to work quickly, without needing to remount fresh canvas or to consider the quality of what he was doing in comparison to his last attempt.

With no time for sentimentality and within a few cycles of painting and scraping, both parts of the process had become equally intriguing.

Realism had been devalued because it was clear that the image could be repainted at will an infinite number of times and the application of a cheap plastic ruler had been elevated because each time it led to unexpected and totally unrepeatable results.

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For an inexperienced student with a long held desire to paint realistically, the prospect unfolding before their eyes may become as daunting as it is revelatory.

Perhaps it is unwise to demand that anyone in these first throes of understanding be asked to scrape away and repaint what they have done. If, on the other hand, this approach was presented as a game, as something supplementary which could be implemented in a one-off lesson as part of a larger scheme of work I believe it could be very useful.

Nele (working at speed)

Nele began to experiment within days of completing her painting of Bette Davis by challenging herself to draw in pencil at timed intervals.

She explained that she wanted to understand the difference between drawings made at varying speeds and to this end she had selected several black-and-white images taken from popular films. These all included at least one three-quarter-length figure, fairly challenging levels of detail, and tonal contrast.

Within a week Nele had produced handfuls of drawings. The briefest of these, made in just thirty seconds, made clear that she was beginning to relax and reconsider the mirror as a guide rather than a hard and fast method for producing pristine photographic copies.

Unwittingly Nele had actually stumbled upon one of the oldest art school exercises which is often used to loosen a student's approach to drawing. The simple fact is that with just thirty seconds to apprehend a scene a student has no choice but to be expressive. Realism is just not an option in such a short space of time.

Nele's process was a little different however. No matter how much time she allowed herself, the mirror still made clear where each mark should be and because of this the freedom traditionally offered to a student making timed drawings was forfeit.

Fairly quickly Nele had produced around twenty drawings made at timed intervals of between thirty seconds and ten minutes and was very pleased with her progress.

Taken as a group these drawings made the possibilities of timed working clear. The quickest were broad and lyric and barely held onto a likeness. The slowest showed evidence of tonal observation and detail but of all Nele's timed experiments it was the four small monochrome oil paintings she had made last which were most successful.

These were made at intervals between one and five minutes and in some cases the rapidity of Nele's brushwork led to results which were every bit as interesting as the more considered brush marks she had been making in her painting of Bette Davis.

There were also similarities between Nele's timed drawings and Henry's process of painting and scraping back. In both instances the process removed the possibility of making a realistic image and replaced it with the possibility of achieving something altogether more unique.

Perhaps the most valuable thing to be taken from our experiments in class is that playing, in and of itself, is useful. If nothing else it permits a freedom from formality which might begin to bring students back to non-assisted drawing and painting, or to the awareness that they are capable of making unique and unrepeatable works of art which must be at least as valuable and interesting as photographic realism.

Non-assisted working

By February of 2015 it seemed as if the comparator mirror was capable of working as I had hoped but one question remained unanswered. Could students who have been filled with confidence, who no longer feel inhibited by realistic painting transfer their skills with the mirror to conventional non-assisted painting and drawing?

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From the outset it seemed unlikely that the skills learned with the mirror would be directly transferable. For a self-diagnosed no-hoper like Arianne to leave the studio after two months as a radiant example of technical virtuosity there would surely have to be a gradual weaning process.

This was just an assumption of course. It was possible that I was entirely misguided but in any case, I felt a sense of duty to my young researchers. My own experience told me that an art student is never more vulnerable to crushing disappointment than when they are on a high and so I decided to err on the side of caution.

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Before Tim Jenison's comparator mirror discovery there were other means by which inexperienced individuals could achieve lifelike paintings. These techniques ranged from scaling grids, a way of drawing a dissected subject by reassembling it square by square, to the methods formalized and promoted by Mark Carder in 'The Carder Method', which are essentially the same skills of systematic observation and colour measurement formerly used by painters such as Euan Uglow.

In each case these techniques reduce looking to an act of pure analysis. To a lesser extent than the mirror they offer the painter the security of objectivity and it was exactly these techniques which I considered as I began to plot an accessible route back to non-assisted painting.

The growing confidence of the students had created a fertile atmosphere in the studio. From one day to the next ideas would be shared, new

projects would crop up and students would lend a hand when one of the team struggled with a particular problem. This momentum reassured me that although the techniques mentioned above are more time consuming and less intuitive than the comparator mirror, this enthusiastic group of students would at least give them a fair hearing

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The conventional approach to realistic drawing and painting, which has been standardised by Mark Carder, basically involves isolating and solving the problems of shape, tone and colour systematically. In essence this is no different to the process of using the comparator mirror, except that it depends upon raw observation.

What I mean is that the various elements required to construct a realistic image are all observed without a safety net. A painter must look, think and act with confidence and this can only come with experience as I have observed. For this reason scaling grids presented a more structured next step.

A scaling grid is a simple tool used by artists since the invention of linear perspective required preliminary drawings to be precisely redrawn in situ before being painted. By placing a grid over one's scene, which might also be a photograph, each detail is itemized or placed within its own square. The details of this grid can then be transferred to a corresponding grid on the surface of a canvas one square at a time.

This technique caught the imagination of Nele, Henry and Katie more quickly than I could have predicted. Within a week Henry had completed a minutely detailed pencil drawing of a funicular railway weaving its way through the French Alps. It was a complex, tonally rich image but Henry saw that by applying himself to the logic of it an accurate copy was more or less inevitable.

At the same time Nele began to attempt a copy of Stubbs's *Whistlejacket* in full colour (measuring approximately 30x30cm).



Without any prompting from me she set about mixing a palette of various colours and tones and applying herself to an accurate pencil underdrawing

before finally applying colour. Of course the comparator mirror had already introduced each student to the three elements of form, tone and colour and as a result Nele, as with Henry, already knew that systematic working was the key to success.

Lastly, although Katie is only a year younger than Henry, her trust in me was far more implicit and when she proposed to paint an image larger than the comparator mirror would allow she showed no hesitation at my suggestion of a conventional approach.

Of all my students, I had assumed that it would be most difficult to transfer Katie's skills to conventional methods of working but this assumption was altogether wrong. Whereas initially I had been daunted by her absolute faith in anything I asked her to do, in this instance it was exactly what was needed.

With a scaling grid, or with paintings made from raw observation, the only stumbling block is the tendency to deviate from the prescribed method. With experience painters can, of course, push this method; they can break rules intelligently, but at this point maintaining levels of confidence was key and to lose a painting unintentionally would have spelled disaster.

Maintaining this focus perhaps sounds easier than it is. Painting has always offered the potential for expression and for many inexperienced painters the temptation to indulge in easy expression quickly outweighs a desire to remain faithful to one's subject. Most will fail to observe their source, to measure accurate proportion, to mix colour accurately or to apply that colour methodically, and without sufficient experience and no means of direct, instant comparison, paintings can easily fall apart.

In this instance however the comparator mirror had equipped each student with a range of skills and with their own understanding that a methodical approach will yield results which are generally more sophisticated, compelling and certainly more realistic.

In Katie's case her adherence to my advice was allowing her to make progress fast. In one lesson, working together we had transferred a small photocopy of her pet cow onto a primed piece of paper measuring 70x90cm. By the end of the week she had solved the problems of tone by building up an underpainting in burnt umber and by the next week Katie was applying accurately mixed colours. She was painting articulately with the confidence of someone with prior experience of realist painting technique.

In these three cases the skills learned with the comparator mirror did transfer to this more conventional method of realistic painting.

To extend this range until each student had the ability to interrogate the world around them through direct observation would take a little more time. Essentially though all that was needed was a little more practice, not for the sake of technique. The mirror teaches that, but for the sake of confidence.

Whilst analytical drawing and painting do require technical competency, the most important element in the process is a sense of personal authority and this can only come from experience.

Drawing and painting have always offered a child this sense of personal authority, a means of expression rather than display and the comparator mirror's place in this process comes early on, where technical skill is acquired and a

vocabulary is built. It accelerates this process and makes the language of realism more accessible and that is quite a breakthrough.

But making authoritative analytical drawings is rather more like writing poetry with that language. It requires just a little more time to cement one's sense of self and to trust that pursuing one's own fascination is infinitely more useful than the pursuit of acceptance.

Scarlet's Rembrandt

Copying a Rembrandt is a difficult challenge, perhaps the most difficult of all, but for anyone wanting to understand paint's potential to hold meaning through time no teacher is more erudite or complex or more capable of pathos.

I was twelve when I first saw Manga, the Japanese style of highly stylized cartooning. The meticulous detail and dynamism of production drawings by Katsuhiro Otomo or Hayao Miyazaki fascinated me and every spare moment of my time was devoted to poring over my collection of comics in an attempt to emulate their skill with the tip of a pencil.

Through this fascination I became fluent in the processes of drawing figures in movement, of composition and of building carefully observed facets of tone into three dimensional images.

Then at the age of fifteen, my father took me to Kenwood house in north London where I saw a late Rembrandt self portrait and I understood for the first time that what is made on the surface of a canvas can be more than descriptive, more than dynamic, more than detailed. It can be deeply meaningful.

This was the beginning of my relationship with Rembrandt and with painting proper. In the nineteen years since I have made seven painted Rembrandt copies. Each have deepened my fascination, have added complexity to my thinking and strengthened my resolve that painting is as important now as it was then.

Scarlet's first painting, a copy of *The Mona Lisa*, had shown me that she had technical ability, an eye for detail and the diligence to stick at difficult tasks. It had also transpired that she was as fascinated by Manga as I had been and it was not long before she was showing me her pile of dog-eared sketchbooks crammed with copied detail. Big eyes, long legs, giant robots.

After her *Mona Lisa*, Scarlet did not immediately consider making a second painting with the mirror but as I began to consider using it to copy Rembrandt's *Woman Bathing in a Stream* to satisfy my own curiosity, I wondered what this technically able young girl might gain from working with me.

Happily Scarlet agreed to my suggestion and as I set up a larger version of the comparator mirror, which would allow us to produce a full sized copy, she arrived promptly as discussed. She was eager to help and was

quite conscientious in her approach to mixing paint, priming a piece of board and in asking pertinent questions before running into difficulty.

In conversation it transpired that, coming from Hong Kong, Scarlet knew as little about Rembrandt as a child from London might know about Tang dynasty vases, and to me this seemed quite useful.

With no pre-existing notions of quality in Scarlet's mind and an existing fascination for detailed draftsmanship it might be possible to discern exactly what a Rembrandt copy, made with the mirror, offers over and above images of Disney princesses or Hollywood film stars. To be precise, could a student with good draftsmanship skills learn something else by copying with the mirror?

Our first challenge was to produce a thin underpainting in burnt umber. This is widely believed to be the approach favoured by a great many artists from da Vinci to John Singer Sargent as it allows a painter to solve the problems of proportion and tone before applying final layers of colour.

From here, I explained, we would take time to carefully mix our paint so that the final stage of painting, which many people believe to be an unfathomable mystery, would in fact amount to a kind of glorified colouring-in.

Of course this description of painting is over simplistic and does not account for nuance, a painter's ability to think through the tip of their brush in the moment in which they are painting, but I was looking to draw Scarlet into the process and the best way to do this seemed to be to deconstruct the process of painting, to break it down into practicalities.

Initially we took turns at ten minute intervals. As before, our choice of brush was important. Although we were only beginning to compose our underpainting, it quickly became clear that, with a high definition reference image, Scarlet could compare her brush marks, made with a soft 3mm brush, to the original as she painted. When her brush marks seemed unsympathetic to Rembrandt's description of shadow across the woman's thigh she saw it for herself without any prompting from me.

As with Henry, Scarlet's paint handling with a small synthetic brush was too polite to be Rembrandtian and at this point my experience came into play. I encouraged her to consider that, based on the evidence in our source image Rembrandt appears to have used brushes made of stiff hog's hair which apply paint in rough imperfect marks and remove it when dragged.

When we began to paint again, with three of my oldest stump-like brushes, our results were pleasingly similar. Of course this was only a suggestion based on an informed guess but it had worked and our involvement in the process together meant that we had both learned something.

This was the first of many such discoveries for Scarlet who began to ask question and make her own suppositions about how Rembrandt was

painting. At times the objective scrutiny made possible by the mirror felt more scientific or even archaeological than any of the other copies I have made. Although I do not mean to imply that the process was in any way clinical.

To anyone not involved in painting, this kind of activity may seem entirely trivial. To pick at and ponder over tiny spatters, flicks and swoops of paint made so long ago seems to hold no meaning at all in a world of immediate necessity, but just as archaeologists dig and forensic scientists scrutinize microscopic details, so the painter who copies is able to comprehend the intimacy of a person's touch. As we began to complete our underpainting, the comparator mirror was enabling us to understand these moments of touch on an almost forensic level.

To my mind, marks made in a fraction of a second, which have endured for centuries by virtue of their ability to hold meaning, present the most vivid way to make that which is beyond living memory deeply personal. Ordinarily this requires a certain level of technical mastery but now, in just one hour, the comparator mirror was allowing Scarlet to begin a conversation with Rembrandt with me as her guide.

Certainly her abilities as a copyist would have allowed Scarlet to make a freehand reproduction at this point, but without the communal aspect the mirror offers, without a teacher at her side as her equal, would she have wanted too? Without exposure to western painting as a child, without parents whose own interest makes the poetry in Rembrandt comprehensible, why would she? The fact was that we were in conversation with the painting and with each other and this added something to the process. It made it comprehensible to someone with no prior knowledge.

It had not taken long to build a recognizable framework of basic forms beneath our mirror. Although this was just an under painting, which in the end would only inform the finished layers of paint, and although we knew that a good deal of work lay ahead, within an hour we had a shared sense of direction.

From time to time I would run into difficulties of my own and I made no attempts to hide this from Scarlet. I wanted her to understand that, for many artists, inaccuracy is a part of the process of making deeper and more sophisticated paintings but this proved to be Scarlet's biggest challenge overall.

To be blunt, her notion of quality was singular and derived from a singular idea of perfection which included no room for mistakes.

Despite this her interest in what we were doing was clear. She was always prompt and even early for our 4 p.m. sessions. Within a week I would return to the studio after my lunch to find her hunched over the mirror with questions about the painting and about Rembrandt despite her description of him as a scruffy painter.

Her particular difficulty lay in making brush marks which were not precisely where Rembrandt had made them because I was asking her to

imitate the speed and eloquence of his brushwork. Despite a limited painterly vocabulary, her touch was compelling, her brush marks were becoming more descriptive and lyric but it was only when a vividly recognizable image began to appear that Scarlett saw exactly how there was sense in Rembrandt's scruffy brushwork.

As an example, slowly rolling a large, worn-out round hog's hair brush whilst dragging it across the surface of a painting will produce a very fine, albeit imperfect line. By dragging a brush loaded with white spirit through wet paint, areas of transparency can be achieved and built one on top of another. At first, techniques like this seem imprecise, messy, even careless but incrementally they add to a painting's complexity and in the case of Rembrandt they build a sense of soul, of pathos.

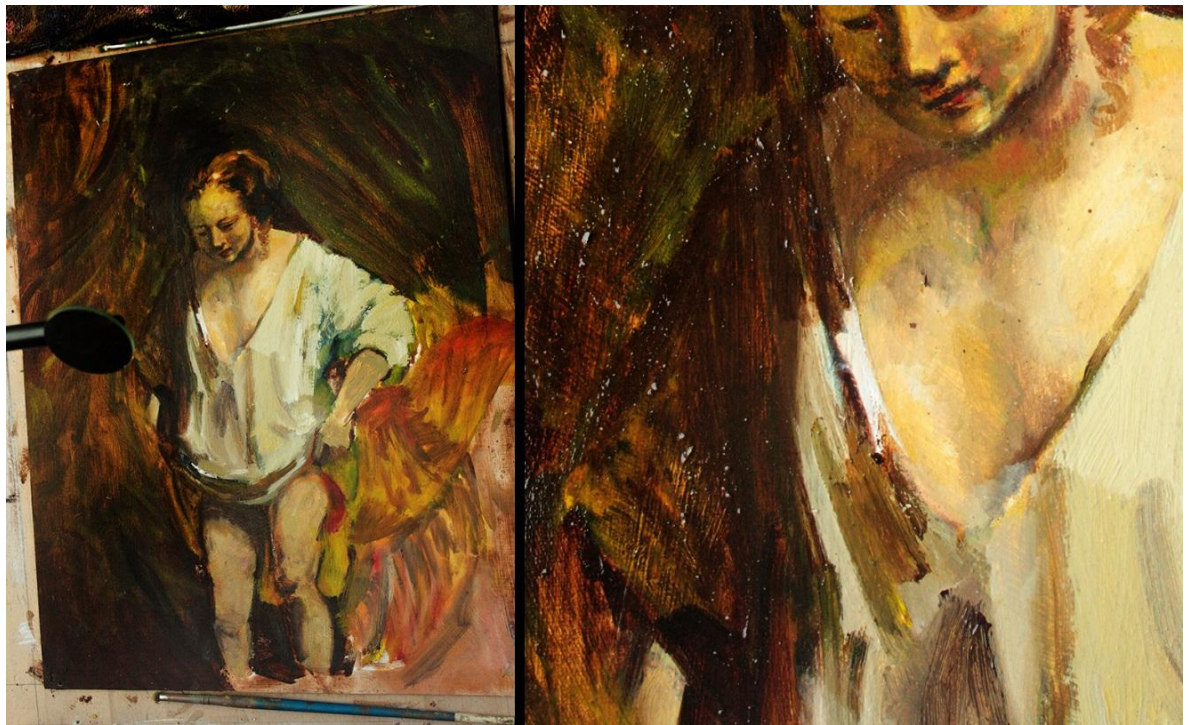
To begin to make marks in this way was difficult for Scarlet; it went against her feeling that a good painting is made slowly and with care. Of course this much is often true but what was needed here was care to observe that Rembrandt used spontaneous gestures and imperfection, built in layers, to create resonance.

With colours mixed we began to apply what we thought would be our final layers of paint. In actual fact it turned out that the original had a level of luminosity which could only be achieved by a second layer of vivid lemon yellow, French ultramarine and violet. We stopped, re-thought, re-worked and with these additions in place our premixed colours began to glow. Another technique was added to our individual vocabularies.

Once Scarlet had seen that paintings of life can be made more substantial by painting in stages, by laying foundations and returning days later to build in complexity she began to stop me and make her own suggestions. Perhaps more paint here? Would dry brushing be used there?

As with other students, conversation about Rembrandt unfolded quite naturally. Who was the woman in the picture? Why couldn't Rembrandt marry her? How did Rembrandt lose his money?

In all, our painting took around fifteen hours to complete. It could have been made more efficiently, with less back tracking, more addition and less subtraction, but that would be defeating the point.



If I had only wanted to encourage considerations of eloquence through technique I could have chosen to copy a Velazquez or a Caravaggio. Rembrandt, on the other hand seemed to offer the potential to explore a far wider vocabulary of marks and a deeper sense of what is possible with painting.

My project with Scarlet has reassured me of several things. The first is that the process of painting naturally leads to curiosity about what is being painted. As with Scarlet this curiosity has the potential to grow and become self-sustaining if a teacher's knowledge is sufficient to maintain momentum.

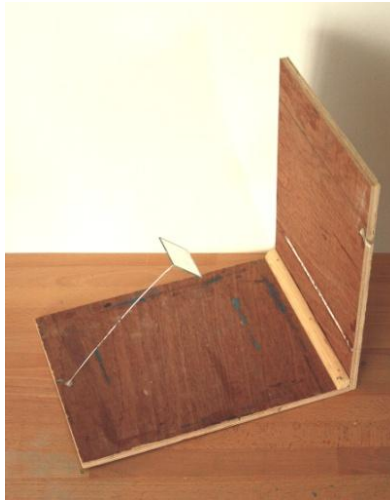
This does not mean that a teacher should be a master painter. The more technical discoveries made with the mirror together, the greater the sense ownership students may feel, but teachers should be prepared to do their homework.

By identifying an artist with depth of character and breadth of style, teachers should aim to develop enough art historical knowledge to augment the process of using the mirror, to build an experience which inspires and encourages pupils to take painting to heart. To coin a phrase, the mirror makes painting possible; the teacher makes it personal.

Lastly our progress and conversations throughout would not have been possible without a reproduction of sufficient quality to show individual brush marks. Whilst it may be wise to limit the level of detail for less able students by selecting simpler monochromatic imagery, or by blurring images, with an able student source image fidelity is the key that will allow an informed teacher to bring a student as close to great paintings as they themselves are.

Finalizing a prototype design

The prototype design I had used until December was adequate but not finished in any sense. It allowed students to paint images no larger than ten inches by eight and comprised two pieces of 250 x 200mm plywood fixed at right angles with a 40mm mirror on a 2mm steel rod projecting from a pre-drilled hole at the rear of the painting plane.



Although I now had eight devices, these had not developed beyond this design. As I became convinced of the mirror's significance I began to think about how the device could find its way into the world and I began to see that useful research into the comparator mirror from this point would necessarily involve further prototyping and the formulation of designs suitable for manufacture. In short, I wanted day-to-day discoveries made in the studio to help inform and refine a version of the device which could be easily used in classrooms anywhere.

Fundamentally my existing prototypes had not developed during the first few months because they had not needed too. They successfully answered the problems at the heart of the device concerning the angle of the mirror and its relative distance from both planes. Now though, these essential elements and my conclusion that the device should be a single portable unit were met by other requirements to do with its ideal context and its suitability when teaching large groups of inexperienced people.

Certainly it could be useful to anyone wanting to paint realistically but its applications in a school environment necessitated a design simple enough to be set up and used by the youngest children likely to benefit from it.

Secondly, as it existed in December of 2014, the mirror was not best suited to easy storage, which poses problems in most classroom environments.

These concerns informed designs from this point onwards. Essentially my existing prototypes would quickly evolve into a flat, compact unit which occupied no more space than a reasonably sized text book. This device could then be opened rather like a laptop computer with a discreet 90 degree locking hinge ensuring that source plane and painting plane were at right angles without any adjustment needed from the user.

The boom arm which supports the mirror and is attached to the painting plane at the end opposite the source plane can then be moved from its flat storage position inside the base until it locks at 45 degrees. Lastly the comparator mirror, which folds flat during storage, can be turned to its position perpendicular to the boom arm.

When in use the current prototype differs very little from its earlier incarnations except that the painting plane, which was formerly solid is now extruded. This alteration means that the entire device now sits upon the surface being painted and all that is left of what was the source plane is a 12mm rim.



In practical terms this does not change the functionality of the device when painting images one application at a time. However, when images are larger than the device's maximum working size this design allows artwork to be built section by section, in much the same way as painters use conventional scaling grids.

This modification does away with the previous assumption that the maximum viewing angle possible in the comparator mirror dictates the maximum size of any painting made with it. Previously the comparator mirror could produce artwork up to approximately 42 x 59cm (A2 UK paper size). With this modification there are no restrictions where size is concerned.

It occurred to me in hindsight that this breakthrough was only possible because the other variables of readjustment and calibration had also been built into the prototype. Without a self-contained design in which components clicked into their proper place again and again painting in multiple sections was infuriatingly vulnerable to human error.

With a self contained design a user needed only to change their image before setting it down on the next area of canvas and lining it up with what had already been painted.

Certainly all of this is a world away from the pleasure of spontaneous alla prima painting but it seems to open up a world of possibility for any individual, from age eight to eighty, with a desire to explore the technique of Holbein, Caravaggio or Canaletto at full scale.

Conclusion

Writing this essay and conducting the research which it describes, has been a strange undertaking for me.

As I re-read my own account I see that its most condensed moments all pertain the actual business of painting and I am reminded that this, of all the issues at stake, is the area about which I am qualified to speak.

I am an artist, not a teacher. My central concern is painting, the various ways in which painting is understood and the methods by which this understanding can be taught. I am not qualified to enter into definitive statements about educational policy and if I have strayed into this territory it is because the comparator mirror has seemed so significant in that context.

In fact the reasons why many children shy away from their right to be creative, or why adults might subtly endorse the notion that realism *is* quality have more in common with the problems faced by an artist at the easel than by a teacher at the blackboard (or more latterly the whiteboard).

In the end schools are an important environmental factor but the buck stops with the actual mechanics of painting. Though a child may be working from an already inhibited idea of creative quality, though they may see realism as a route to good grades, the difference between success and failure depends upon issues I face every day in my studio. It is for this reason that I feel I have some authority to speak about art, art tuition (as opposed to formal classroom teaching) and creative quality.

Although this account has borrowed the conventional structure of academic case-making I am also *not* an academic and do not intend to mount a full scale cross analysis of my various experiences here.

What I present instead by way of a conclusion begins by confessing that I have been motivated by a private fascination for the comparator mirror, a need to understand for myself, as deeply as possible, if it could resolve difficulties I observe as a painter, on a daily basis.

That said, I am aware that often the most thorough and convincing conclusions are reached collectively over decades. Great paintings are great only because they have stood the test of time and perhaps it is right that the comparator mirror's use as a teaching aid is decided similarly.

In my introduction I talked about reactions to photorealist painting in exhibitions like the BP Portrait Award. This was not an attempt to dismiss photorealist painting but to point out that sheer painterly skill can be very seductive. Of course this seduction can be extremely enjoyable but without some comprehension of what a painting is and how it is made, this seduction comes at the expense of deeper meaning.

I have been using realism for twenty years as a way to bring people as close as possible to my subject matter and in this time it has become difficult to ignore the frequency with which people coming to my work express deep personal regret.

They talk to me about my work in relation to their own experiences. They offer praise and tell me that they wish they could draw and paint as realistically as I do but that they were never any good at art at school, that their drawings were terrible and that creativity has never really been their strong point.

This conversation always touches me because it makes me aware of yet another individual whose creative ability was judged according to their ability to draw and paint realistically.

Perhaps, you may say, the adults I speak to were educated before the syllabus reforms of the early nineties, that they were subject to old, outdated attitudes and that now children and teachers benefit from far broader marking schemes.

This may be true. Although I have no right to pronounce judgment upon the details of educational policy-making, I have seen several recent marking schemes which do seem to dovetail with an artist's understanding of quality.

All promote good grades for students who show evidence of broadmindedness, inquisition and personal understanding, but renewed, expanded directives, which seek to bring art education in line with what artists are actually doing in the twenty first century, do little to change deep-rooted cultural sensibilities.

Children of twelve are still likely to encounter art teachers who do not paint, who struggle with realistic drawing and who are seduced by realism, not because it is seductive but because they revere it as a skill above all others.

Even those twelve year olds whose teacher has some purchase on the complexities of artistic quality may return home to parents whose own resignations in adolescence make them predisposed to praise what I have heard called 'real art' far too many times.

I cannot quantify the number of people who feel no sense of permission about art because of bad experiences at school. I cannot say precisely how many of these individuals are infuriated by reports of contemporary art which shows no regard for technique. I cannot chart the disconnect which grows as artists expand the definition of art day by day and it seems less and less like the definition of quality many of us learn to trust in adolescence. Nevertheless, these attitudes exist, they are certainly not uncommon and that, in itself, is a tragedy.

Speaking as a painter who uses realism I have always known that the techniques which seem to mean so much to some people could be broken down and taught to anyone if time were not an issue.

The misconceptions around realism are widespread, intergenerational and distance art from its potential audience and for a long while I believed that the only intelligent choice was to promote broader definitions of quality, that it was best to redirect the ambitions of imaginative students who struggle with technique because current definitions of art leave room for visionaries who cannot draw. In the end though, this only sidesteps the issue and builds insecurity into the equation.

More recently I have understood that the only way around this problem might be to go straight through it, because no amount of educational policy making will change the suite of circumstances at home, in the classroom and in the playground, which lead children away from creativity as if it were the privilege of good draftsmen and the very young.

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By producing a Vermeer copy worthy of comparison to the original, Tim Jenison has opened fresh debate about Golden Age painting but, as I see it, he has also unwittingly created an antidote.

It can no longer be said that realistic painting has anything to do with talent because, whatever Tim's talents may be, his near-identical freehand comparator mirror copy required no subjective input from him whatsoever.

From here it is not difficult to see how the comparator mirror might be used by children to create realistic paintings of their own in the time curriculums allow and how this might have profoundly positive effects.

By equipping each child with the skills of realism there would be no room for misunderstanding any longer. If realism became accessible to all, general notions of creative quality would have to evolve and the implications of this reverberate all the way back to the fundamental issues surrounding public engagement with cutting edge artistic discourse.

To my mind this is where the comparator mirror's full potential lies. Perhaps as a painter, I was better placed to see this at the outset. In twenty years I have met hundreds of individuals who cannot see what art stands to offer because they cannot see beyond technique and personal disappointment. In each case I have always known that an understanding of the mechanics of paint would be the solution but until this point, it has just taken too much time to teach to all but the fastest learners in the class.

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Recognizing the potential in the comparator mirror is one thing but putting it to the test is quite another. Here I should say that from August 2014 everything I have done has been driven by a private sense of fascination, a need to be sure and to quantify this potential in the most direct way possible, for my own peace of mind if nothing else.

If it had been the case that children could not operate the mirror, or if they gained nothing from the process, I was quite prepared to abandon work with it, to save myself time and return to my painting.

However, my experiences suggest that the comparator mirror can be used to teach students no matter what their abilities and existing levels of confidence. Furthermore, what it teaches is invaluable.

Observations and Solutions overall

(1) One to one teaching

For students with very low confidence, including those who had almost dismissed their own creativity altogether, the comparator mirror has allowed me the opportunity to unpick insecurities and to objectify that which had seemed unfathomable.

With school-aged children, it allowed me to catch the first thread of renewed hope and to maintain a kind of safe zone around a student which would allow them to teach themselves and to become as personally invested in the process of painting as they were at the age of five.

Of course, this feeling of security, or even inevitability about the process depends upon the teacher by establishing good working habits and by allowing a student's pace to dictate the pace of progress overall. By alternating turns at rigid intervals I was able to demonstrate the nuances of painting as part of the process without seeming to interfere or overshadow a student's own efforts.

If a struggling student looked likely to lose heart, shorter turns, of perhaps three or four minutes, meant that my input would always keep paintings on track. As a guide I began to consider that turns should be long enough to allow a student to progress but short enough to catch mistakes before they are compounded.

In Arianne's case what started as a very tentative and frail process blossomed into wholehearted confidence and she was eventually able to tackle the highs and lows of painting alone. It is appropriate to point out here though that working alone and working in solitude are two very different things.

As I said, the mirror democratizes the process of painting, it makes painting a communal experience which eventually dispels the myths surrounding realism. In this way the conversations which go on around the painting and the interaction of a teacher with individuals, who may or may not be working autonomously, seem as valuable as the painting being made.

Though it may be beneficial for a student to take full control of the process as their confidence rises, their lack of experience should be considered at all times. Managing this, being in the room, spotting problems before a student becomes disenchanted by them is, in my

experience, critical to successful working with the comparator mirror.

(To be specific I define success as any lasting increase in an individual's creative confidence which may very well come about as the result of a highly detailed painting but which is by no means dependent upon it.)

Overall my aim was to dispel the myths of realism by making it accessible but I could see that if it was used without appropriate, intelligent guidance it could do precisely the opposite and augment the idea of realism as quality.

Used intelligently, as part of a broader conversation I saw that it allows student and teacher to gain access to the broader and more relevant notions of quality which lie beyond technique for techniques sake.

Although tight, realistic paintings may be possible in one hour, to the delight of most pupils, prolonged periods of working are necessary to achieve an understanding and to transfer this understanding to non-assisted painting and drawing and that, I think, should be the aim of the game.

(2) Larger groups

In classroom situations a group of thirty pupils was managed effectively by dividing into smaller teams, of three or four individuals, before building paintings up with rotational working, as with my one-to-one sessions.

In these groups short turn lengths were essential to the overall quality of work produced and this had an effect on enthusiasm at large.

As an example, five young minds working on the same image, in short three minute intervals, had a self-righting effect in which the problems confounding one student would be quickly solved by another mind with a fresh outlook. Although this phenomenon was not infallible it did allow me enough freedom to act as an overseer and I was keen to remind students that, because of the mirror, the positive effect of a fresh mind on the same problem had nothing to do with ability and everything to do with perspective.

Though a one-to-one teaching environment always yielded a more swift understanding and left room for more detailed analysis, struggling groups in classroom situations usually contained several members who lacked the experience to trust their own judgments, or who had failed to master the knack of using the mirror initially.

All issues of difficulty were purely technical in nature and in these situations the mirror's ability to explain itself was hugely helpful. My intervention where necessary, with four or five brush marks and some advice about progress from that point onward was usually enough to point out how groups had gone astray. To be more succinct a methodical stroke-by-stroke explanation from me was enough to bring students back to the simple objective task at hand.

It does occur to me that knowing the mix of confidence levels in a class would put a teacher at a distinct advantage here. With this knowledge it would be beneficial, in my opinion, to pre-arrange working groups as part of any lesson plan so that each group could include at least one strong member.

These individuals should be confident enough to take setbacks in their stride and possess good manual dexterity; they do not need to be capable of exquisite feats of draftsmanship.

(3) Working beyond technique (more advanced pupils)

Initially I had not considered that the comparator mirror might do anything more than to allow freedom of access to a purely technical understanding of painting.

Then, as I began to consider my own experiences of copying and its significance within a tradition of artists learning from their predecessors, I began to see that the comparator mirror might offer something unexpected to more able students.

For Scarlet and for Candice it offered a way into this lineage, a means by which to step into the ring with Rembrandt or Velazquez with me as their guide.

In each case students benefited from high quality, high resolution reproductions, not just because they presented a more rigorous technical challenge but because through them, through the process of seeing and remaking individual brushstrokes they would become intimately acquainted with these artists.

Of course copying for scholarly purposes in the traditional way is still something done by artists today. As I said, my own Rembrandt copies, made since my time at school, have intensified my attachment to Rembrandt and strengthened my belief in painting.

The overall effect of working communally on paintings like Rembrandt's *Woman Bathing in a Stream* was quite remarkable. Certainly, Candy and Scarlet had the confidence and experience to produce accurate copies of any image but the mirror offered another dimension.

With working intervals of ten minutes I found myself able to explain paintings in detail, to make Scarlet aware of the vast array of techniques in Rembrandt's vocabulary or to discuss with Candice exactly why Velazquez's brushwork could be described as eloquent. Most importantly it allowed me to draw students into a conversation on equal terms, as two painters discussing another painter.

Quickly conversations cropped up about the details of Rembrandt's life, about Velazquez's sense of humour and about art history in general. I saw that because technique had been opened up we were able to move beyond it, to an understanding of nuances and of how a brush mark made in just a few seconds might last for four hundred years.

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By the age of seventeen, thanks to my father and a wonderful art teacher at school, my relationship with Rembrandt was already deeply personal. I wonder now though, how much faster I might have learned if my teacher had been able to be in the process with me, drawing me into the complexity, answering my questions all the time and making her own discoveries alongside mine.

In the case of these students, who had already begun to conquer technique, the comparator mirror offered a way to explain what lies beyond it in intimate detail. It presented me with a way to extend and strengthen my own understanding whilst sharing it.

Final Remarks (a sense of direction)

I understand that it would be impossible to prove very much with what I have presented here. In fact proof of the comparator mirror's universal accessibility would be almost as elusive with a thousand case studies conducted over many years.

Instead, what I have presented here began as an attempt to understand the comparator mirror for myself. To substantiate my findings because they seemed to speak so directly to issues I encounter every day as an artist using realistic painting technique.

In response to the first stage of my hypothesis I would say that the ease with which Tim Jenison was able to grasp the principals of realism *is* indicative of a general accessibility to children. It makes the technique of realism comprehensible and accessible by removing subjectivity and the disabling fear of personal failure.

Though my younger volunteers were generally not as dexterous as their older counterparts an attentive approach to teaching was enough to bolster this weakness. By involving myself in the process of painting, when necessary, I was even able to train inexperienced students in this area by entering into detailed conversations about brushwork which would not ordinarily be out of place with students at postgraduate level.

In response to the second part of my hypothesis the mirror appears to offer different things, of equal value, to students of different abilities. To the beginner it can open up the world of realism, boost confidence and allow access to the notions of quality which lie beyond pure technique.

For a teacher with knowledge to impart and their own private fascinations underway, it also presents the possibility to draw more advanced students into the nuances of painting, to explain how technique can be used to create meaning, or even the kind of pathos to be found in a Rembrandt or a Velasquez.

In response to the third part of my hypothesis, alternating rotational working in groups of three or four pupils has allowed me to teach class sized groups effectively. This group structure proved useful in sharing the workload and depersonalizing any sense of failure.

Because each individual using the mirror would approach a problem slightly differently it also allowed students to teach one another and to tackle most problems without intervention from me.

This led to the conclusion that the length of turns taken should be determined by the least confident member of a group. If a group contains a members of very low confidence turns as short as three minutes should be rigidly adhered to, with turn lengths as long as ten minutes increasing as confidence grows.

This ensures that no one painter is able to dwell on a problem long enough to stagnate and lose confidence. Nevertheless a conscientious, watchful approach to teaching was always important.

In the case of struggling groups my intervention was sometimes necessary but demonstrations of technique were never didactic. The objectivity offered by the mirror and my adherence to the same turn length as the students implied that I was their equal and that what was needed was not complex, virtuosic brushwork but confidence.

The comparator mirror's objectivity also made it possible to work alongside a pupil as an equal and to unravel the techniques of great painters by sharing the process of copying.

Despite all of this and to conclude, I am mindful of the following four points.

(1) A basic technical and philosophical understanding of painting should be a fundamental requirement for anyone wishing to teach with the mirror. The more personal and thorough this understanding, the better results will be.

(2) Initial enthusiasm in the student is essential to compelling results and useful understanding. Although the process itself can be quite fascinating in and of itself, one way or another students must be personally interested in the process.

(3) It would be wise to consider that, before a certain age, the ability to manufacture a realistic image on a two dimensional surface has no place in notions of quality. For this reason teaching very young children with the comparator mirror may be detrimental because it may actually implant the same superficial notions of quality it might otherwise dispel.

(4) Whilst pristine, tightly detailed paintings and drawings are possible with the comparator mirror and although this universal accessibility could change attitudes toward realism, the understanding gained from looser, more broadly painted images was often far more valuable to individuals.

Only two of my students completed images with areas of intense detail. What seems to matter more is that each student is compelled by their own sense of discovery.

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For the time being this concludes ‘The Comparator Mirror as a Teaching Aid at The West Buckland School’. It has been a voyage of discovery in which the discovery rather than the search for proof has been the driving force. As such I hope that my account provides a few compelling examples of the comparator mirror’s potential as a means with which to make painting more accessible.

My time at West Buckland has been very useful. This is due in no small part to the support of Cameron Main (the head of Art) and John Vick (the school’s headmaster) whose progressive broadmindedness provided an ideal circumstance in which to test the device across a range of abilities and situations.

That said, this is a work in progress and over the coming year I will add to it with several accounts of students making full colour paintings up to several meters in size using my latest prototype as described earlier.

I also plan to work alongside teachers at a range of other schools to further develop the comparator mirror as a classroom teaching aid.

By extending tests to a broader range of schools and by putting the device in the hands of teachers from various backgrounds, I hope to strengthen the case for the comparator mirror’s universal accessibility. I also hope to formalize a strategy with which to train teachers in its use and in time an account of this research may be included as an addition to this text.

It remains for me to thank Tim Jenison whose transparency and encouragement from the outset was very gracious. His input has allowed me to begin with confidence from a position of understanding without which I would have struggled to begin meaningful work at West Buckland.

Lastly, my many thanks for your interest in this project. If you have any queries or if you feel you could offer assistance of any kind during my next year of research I would be delighted to hear from you.

All enquiries can be sent directly to me at Tomasgeorgeson@aol.com. I will of course do my best to answer any reasonable questions not covered in this account.

