

**An exploration of digital creativity used to engage and  
motivate 'hard-to-reach' learners in behavioural, emotional  
and social difficulties (BESD) schools**

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## Executive summary

The main aims of the project were:

To explore the experiences of ten schools with pupils with behavioural, emotional and social difficulties (BESD) as they trialled the digital creativity activities generated by the New Rush Hall Group<sup>1</sup> (NRHG).

To provide evidence of the impact of digital creativity interventions on pupils' behaviour, attitude, learning and attendance and on teachers' practices in using digital resources creatively.

To use the evidence to support teachers' development of further pedagogic strategies. This would be done by exploring innovative practices with ICT that might be used to meet a diverse range of pupil needs in both BESD and mainstream settings.

The research offers evidence that technology can have a positive effect on pupils with BESD, including those deemed hard to reach. This project demonstrated that digital creativity can be used to unlock learners' interests and creative energy in a powerful way.

### Impact on pupils

The learner gains were expressed in many ways.

#### **Pupils' motivation, engagement, persistence and links with personal interests**

- Almost universally, pupils wanted to be involved in digital creativity activities.
- Previously disengaged pupils were proud to present their work to peers, teachers and parents.
- Some otherwise disengaged learners were attracted back into achieving formal educational outcomes. This was the result of taking part in activities that tapped into their personal interests.
- Pupils with difficulties that affect concentration and attention span (for instance, Attention Deficit Hyperactivity Disorder - ADHD) showed increased persistence and concentration when engaged with digital creativity activities.
- Headteachers reported increased attendance in classes where pupils were involved in digital creativity activities.

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<sup>1</sup> John D'Abbro, leader of the New Rush Hall Group (NRHG) of special schools in Redbridge, which caters for pupils with emotional and behavioural difficulties, pioneered the digital creativity activities in the BESD sector that inspired the research reported here.

## **Personalisation**

- Pupils took control of their learning, suggesting activities and continuing their engagement into breaks, lunch hours and after-school.
- Pupils used their autonomy to create their own music or animation, rather than simply copying ideas given to them.
- They used video and images of themselves to personalise their work.
- There was a widespread sense of personal pride in achievement and raised aspirations. This was the result of using video cameras and picture-strip format software to present and record learning.

## **Social relationships and collaboration**

- Pupils with challenging behaviour displayed improved levels of engagement, interest and persistence.
- Pupils showed increased willingness to work together for extended periods to create animations to show to others.
- Making movies and animations encouraged pupils with interpersonal difficulties to work collaboratively with peers and staff.
- Creating movies required pupils to develop people management skills.

## **Literacy**

- Pupils with histories of having rejected literacy activities engaged with tasks using stop-frame animation, videos and podcasts. These activities drew on written and oral skills in an incidental way.
- The use of sound editing software was found to be a powerful incentive in developing pupils' creative story telling skills.
- Strategies that encouraged reading-averse learners to design animations about phonics were successful.
- Increased engagement and achievement of disruptive boys with low attainment in literacy was linked with digital creativity.

## **Personal reflection and developing insight**

- Stop-frame animation and music editing software gave pupils the opportunity to examine sensitive and dangerous situations that some youngsters face.
- Teachers reported observing the therapeutic value of using video cameras to encourage pupils' personal reflection. In particular, creating a 'Big Brother diary room' provided pupils with a supportive context for reflection on learning, behaviour and personal issues.

- A Year 11 youngster described as having emotional, behavioural and motivational difficulties created a weblog about her aspirations. She spoke of her improved confidence, motivation and focus as a result.

### **Continuing education and employment**

- The digital creativity activities raised aspirations and attracted some pupils to continue their studies with post-16 education.
- Using video to record work experience enabled pupils to create a record of challenges and successes. They were able to share this with prospective employers, parents, teachers and peers.

### **Embedding digital creativity across the curriculum**

- Pupils became involved in digital creativity activities across the curriculum. This offered new opportunities for pupils to use their imaginations and be inventive.
- Pupils also became engaged in curriculum areas that they had previously seen as difficult. This included subjects such as Modern Foreign Languages (MFL) and science.

### **Impact on teachers**

- The teachers found pupils' positive reactions to digital creativity highly motivating and satisfying. It was an exciting contribution to their professional development.
- While teachers used the more accessible aspects of the technology under their own steam, they recognised that a more focused deployment would be possible with the support of further training.
- Teachers recognised that on occasions, pupils' skills with the hardware and software rapidly outstripped their own. They found productive ways of sharing and celebrating these new talents.
- Teachers were keenly aware of the particular cognitive, behavioural and social needs of their pupils. They complemented this knowledge with the personalised learning offered by digital technology.

### **School impact and sustainability**

- Schools' implementation of digital creativity strategies developed through three stages:
  - 1 Initial arousal of interest and engagement with the most readily accessible functionality. Most project schools achieved at least this level of development.

- 2 Increased technical proficiency, instances of developing pupil expertise, with proactive rather than reactive deployment of the resource. The majority of schools reached this stage of operation.
  - 3 Refined, focused and bespoke targeted intervention. A minority of project schools achieved this stage in some areas, though in the researchers' view, given time and support, nationally widespread realisation is a realistic objective.
- Support of senior managers is essential to the sustainability of digital creativity.
  - Some BESD schools developed sustainability strategies including income generating digital creativity support to mainstream groups.

## Recommendations

The researchers recommend that all future educational policy documents make reference to technology as a key component in any future education policy. They also suggest the courses of action below.

### 1. Produce project material as a professional development package

The research presents strong evidence to suggest that digital creativity offers teachers some strikingly innovative means of extending teaching and learning strategies in ways likely to engage hard-to-reach pupils. These insights are invaluable and will justify the production of professional development materials for wider dissemination. The illustrative video material from the project should be at the heart of such INSET development, though interpretative support will also be required. The target audience for the proposed materials should be:

- senior managers and staff in BESD schools
- staff in mainstream schools with responsibility for pupils with additional needs

A strategic approach to any such programme of professional development will need to be done through the relevant agencies. This would include the Training Development Agency (TDA), the National College for School Leadership (NCSL) and the General Teaching Council (GTC). The programme should also encourage collaborative working between BESD and mainstream schools.

### 2. Provide hosting and support for a community of practice

Digital creativity tends to attract enthusiasts eager to explore the full functionality of the software. These pioneers open up possibilities for the profession and as such, merit support. The potential multiplier effect of teachers collaborating and sparking ideas from one another is an exciting prospect. The possibility of online collaboration

should be investigated, perhaps using a moderated forum. It might be that such an initiative will fit within an existing provision, given appropriate support.

### **3. Explore further applications of digital creativity and training needs**

There is more that needs to be learned from further research into applications of digital creativity in schools. This will inform more widespread, focused and effective teaching and learning.

- In order to use digital creativity opportunities more effectively, the training needs of teachers should be identified. The precedent of harnessing pupils' digital expertise should be systematically explored.
- While this research produced evidence for the efficacy of the digital creativity approach, the potential applications across the curriculum and with a wider range of additional educational needs warrants further research activity with teachers.
- Project teachers did not tend to use the communications functionality of the software such as blogging and podcasting. It is likely that this relative neglect was due to lack of time and expertise, rather than a lack of interest, as the more immediately accessible software was used almost instantly. This area has the scope for offering excellent productivity returns from supported research with teachers, following on from the provision of some initial training.
- The research demonstrated the power of extending educational goals to encompass learners' personal needs. The connections that were re-established with otherwise disengaged pupils was, in some cases, offered beyond the curriculum and outside conventional hours of schooling. The autonomy this offered pupils contributed to the success and productivity of their involvement. This area of ubiquitous 24/7 access by learners, and links with the home (for instance, systematic programmes with parents for pupils with ADHD) has the prospect of producing educational dividends on investment. Specific activity under Harnessing Technology Phase 2 is recommended, a course of action that would be entirely consistent with the Children's Plan (2007).

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## Introduction and background to the study

In June 2006, Becta commissioned a study to investigate ways in which the creative use of ICT might contribute to the education and interpersonal needs of children with BESD. Becta funded development and research (D&R) activities conducted by the Centre for Research in Primary Science and Technology (CRIPSAT) at the University of Liverpool.

### What is BESD and what is its significance?

Behavioural, emotional and social difficulties (BESD) is the term used to identify children having particular educational needs that are difficult to meet in mainstream schools. These children's difficulties may be associated with medical conditions, difficult social or home situations or combinations of these. Difficulties may be expressed in a range of ways, from extreme withdrawal to socially disruptive behaviours. The BESD spectrum also encompasses more specific patterns of behaviour, including autistic spectrum disorders (ASD) and attention deficit hyperactivity disorder (ADHD). These are likely to have a severe impact on development, learning and later social and employment adjustment. Given the difficulties such children face, specialised support and intervention is frequently required. This includes medication, special day school or residential placement and detailed management of pupils' learning by specially trained teachers. This study explores the potential contribution of the creative use of ICT to the management of the education and interpersonal needs of children and young people with BESD.

In 2007, the Audit Commission reported that:

'Over 11,000 pupils with a statement of special educational needs (SEN) are placed in out of authority special schools. These are most often children with severe behavioural, emotional and social difficulties (BESD) and autistic spectrum disorders (ASD).' (Audit Commission 2007, Summary p 2)

One of the Commission's conclusions was that the Department for Children, Schools and Families (DCSF) should:

'Build on current work to develop an evidence-based framework of national expectations across the five outcomes for pupils with the main types of complex SEN, in order to establish expectations of progress and a basis for monitoring.'

The evidence base across 'five outcomes' refers to the Government's Every Child Matters agenda (2004). These are:

- Be healthy
- Stay safe
- Enjoy and achieve

- Make a positive contribution
- Achieve economic well-being

The Audit Commission report draws attention to the complexity of the needs of those pupils stated as BESD and the associated complication of tracking their outcomes and progress in residential contexts. Of necessity, when children are in 'out of authority' placements, support must be provided for every aspect of development in an holistic manner. Assessing progress is not helped by the fact that the "targets in statements and pupils' IEPs are too variable and not focused enough on measurable outcomes to be helpful here. Beyond national curriculum attainment and 'P' levels for those operating below this, there are currently no wider national benchmarks for the progress of pupils with SEN across the five Every Child matters outcomes." (Para. 82, p.44, Audit Commission, op. cit.). This situation suggests that alternatives to conventionally assessed educational outcomes must have an important role in monitoring the progress of such learners.

### **What is digital creativity?**

The term digital creativity has been used throughout the project without formal definition. This is partly because its operational meaning has been obvious to participants and perhaps more importantly, because no preconceptions were imposed as to how the term might be interpreted in practice. Schools were provided with a set of digital hardware and software resources. There were some video-illustrated precedents to use in BESD schools that were captured during Phase one of the study. There was also support and encouragement to explore the possibilities for emulating and extending those practices. The 'digital' element was thus self-evidently associated with the hardware and software provided (though, of course, not exclusive to the Apple Macintosh platform, in the sense that other platforms and other software might offer similar functionality). To some extent the digital resource was attractive to pupils in its own right, connecting with their life needs in terms of digital photographs, video, music and connectivity. The creativity was also in the hands of the project participants. They were handed tools, rather than products, with an invitation to give their imagination free rein.

### **The wider context of ICT in education**

In a wider educational context, there is an accumulating body of research that documents the positive effects of ICT. This is the case for both the mainstream and special school sectors across the primary and secondary phases. Condie and Munro (2007) undertook a meta-review of over 350 literature sources and have summarised some of the positive impacts of ICT on teaching and learning. Positive benefits are reported on attainment in national tests by Becta (2006a); on motivation (Becta, 2006b), Passey *et al.* (2004); on self-esteem, interest, attendance and behaviour among hard-to-reach students (Passey *et al.*, 2004 and Ofsted 2004) and on writing

(Dunsmuir and Clifford, 2003). In 2006, Passey reported a range of impacts on learning as a result of digital video experiences offered to hard-to-reach learners. Loveless (2002) reported some of the ways ICT was being used to support creativity in art. Webb (2005) analysed the affordances for meaning-making provided in the ICT-rich classroom environment. Despite the accumulating reports of the effects of ICT and the demands for evidence-based practice, Fletcher-Campbell and Wilkin (2003) reported that of over 300 journal articles reporting innovations involving pupils with emotional and behavioural difficulties, only 25 were supported by evidence.

In contrast with some studies that focus on a single technological innovation or a single area of the curriculum, this study provided an opportunity for pupils and teachers to explore the potential of a range of media resources across the curriculum. This report analyses emerging digital creativity interventions and assesses their wider use. These interventions are grounded in stakeholder-validated evidence from practice in schools.

### **The research approach used**

'D&R' (Van den Akker, 1999 and Bruer, 1997) as an approach implies that the enquiry is not conducted at arm's length. It is characterised by immediate responsiveness to findings on the part of all participants. The relationship between researchers and teachers is collaborative. Positive outcomes are shared and fed back iteratively through cycles of classroom exploration. Empirical evidence is used to modify practice on the spot. The intention is to gather evidence about the efficacy and viability of the approach under practical classroom conditions, while rapidly accommodating lessons learned. The outcome is to understand the potential of the digital creativity approach and to make the lessons learned widely available to the BESD sector. The findings could also be used as the basis for a larger scale and more systematic enquiry, informed by a better appreciation of the main factors involved.

### **Project logistics**

The project ran between June 2006 and July 2007. The enquiry had been stimulated by innovative practices at the New Rush Hall Group (NRHG), an educational organisation that works within a range of settings with children who are experiencing BESD. NRHG comprises a day BESD school, a behavioural support outreach team, three pupil referral units and an adolescent psychiatric unit.

The group was featured as a case study in the Report of the Special Schools Working Group (DCSF, 2003, pp 86-89) and was one of a group of special schools designated as having trailblazer status by the DCSF. Enthusiasm for more research was fuelled by favourable educational outcomes reported by staff. These included increased motivation, engagement and application across the curriculum together with generally more settled behaviour.

The project was structured by two phases of activity.

**Phase one:** This comprised a period of orientation, fact-finding and observation of teacher-pupil interactions. This centred on digital resources at the NRHG day school. Detailed follow-up discussions of what was observed with staff and pupils provided insights into pupils' reactions. Video-recorded examples of digital creativity in classroom practice associated with productive outcomes were captured. The video clips were edited to tighten their focus. These exemplifications were constructed with the intention of conveying practices clearly and concisely to other practitioners. This was achieved by editing out the researchers' structuring of interviews in favour of foregrounding pupils' and teachers' activities and commentaries. This meant that stakeholders' viewpoints could be communicated as directly as possible to the intended audience.

**Phase two:** The headteachers of the ten project schools were identified as willing participants through the BESD network by John D'Abbro, Headteacher NRHG. Each school identified one contact person who would liaise between their school and the project researchers. As a condition of participation, the project schools agreed to collect baseline monitoring data, trial various suggested activities and share insights and outcomes. These emerging records and commentaries were analysed and classified by the researchers. The idea was to enable the most effective practices to be identified and publicised.

## Methodology

At least two staff members from each school were involved in the project, with one person identified as the main contact. In some schools, more staff members took part.

The project analysed qualitative and quantitative data captured. Collecting data from different sources enabled cross checking for consistency of emerging messages. The sources included multimedia recordings from classrooms, teachers' recordings of the activities, staff interviews and a selection of questionnaires.

Appendix 1 summarises the characteristics of project schools, all of which offered specialised BESD provision, half in a residential setting and half on a day basis. All the residential schools were located rurally, while only one of the day schools was in this type of location. Participating schools were not selected on the basis of any particular ICT capability. A summary in Appendix 2, 'Project Schools' ICT development, based on the Becta-Self Review Framework', confirms that none of the participating schools believed that they had reached the ICT Mark standard in all aspects of the framework concerned with Learning and Teaching (Element 3).

Each project school was provided with a set of hardware and software to support their digital creativity activities. For instance, each school received one laptop, one digital still camera, a music keyboard, a portable hard drive and mp3 player. There was also a variety of software to encourage digital creativity. This included software to help create comic books, animation, music and podcasts.

The methodological details, including specifics on hardware and software is included in the technical notes section at the end of this report.

## Summary of usage

### Schools' use of the digital creativity resources with students

Students' work provided direct evidence of use of the digital creativity resources. Teachers also recorded pupils' use of the resources on a simple recording form. They also completed a brief questionnaire at the end of the project. A wealth of evidence of pupils' work was received from all ten schools. Two schools completed the recording forms (returning 20 completed forms) and eight schools completed a brief questionnaire. Across the ten schools, at least 103 pupils (or about 20 per cent of the 530 pupils attending project schools) were estimated to have engaged in digital creativity activities as a result of the project.

Half of the project schools reported using the digital creativity resources between two and four times a week. These tended to be schools that had planned to use the resources within particular curriculum areas. They also encouraged pupils to use the resources at other times of the day. Several of these schools described pupils queuing up to use the resources at lunch and breaks, implying that frequency of use would have been greater had the level of resourcing been higher. Three schools estimated that the resources were used once a week. The latter tended not to have planned use within the curriculum, but instead opted for use in out-of-school clubs, school visits or during outdoor activities.

### Digital creativity software explored (at least minimally) in each project school

| Digital Creativity Software | Muntham House | Beormund | Coxlease | Lady Jane Franklin | William Henry Smith | Notton House | Avocet House | Clifford Holroyde | Cuckmere House | Wandle Valley |
|-----------------------------|---------------|----------|----------|--------------------|---------------------|--------------|--------------|-------------------|----------------|---------------|
| stop frame animation        | ✓             | ✓        | ✓        | ✓                  | X                   | ✓            | ✓            | X                 | X              | ✓             |
| editing and creating video  | ✓             | ✓        | ✓        | ✓                  | ✓                   | ✓            | ✓            | ✓                 | ✓              | ✓             |
| creating and publishing DVD | X             | ✓        | ✓        | ✓                  | ✓                   | X            | ✓            | ✓                 | ✓              | ✓             |

|   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|
| Internet communication using video, audio and text            | X | X | X | X | X | X | X | X | X | X |
| editing and publishing still images                           | ✓ | ✓ | ✓ | ✓ | ✓ | X | ✓ | ✓ | ✓ | X |
| presenting digital images and text in picture-strip format    | ✓ | X | ✓ | ✓ | ✓ | ✓ | ✓ | X | ✓ | ✓ |
| recording, editing and publishing sound                       | ✓ | X | ✓ | ✓ | ✓ | X | ✓ | ✓ | X | ✓ |
| capturing and adding effects to still images                  | ✓ | ✓ | ✓ | ✓ | X | ✓ | ✓ | ✓ | ✓ | ✓ |
| creating websites, blogs and photo galleries                  | X | X | X | X | X | X | X | X | X | X |
| publishing audio podcasts to the web                          | X | X | X | X | X | X | X | X | X | X |
| plug-in tool for removing and adding new backgrounds to video | X | X | X | X | X | X | X | X | X | X |

## Taxonomy

It was intended that interventions would be analysed to form a taxonomy that could be further elaborated as the project progressed. To this end, digital creativity activities were initially classified as mapping onto one of behavioural, social, emotional or cognitive interventions. However, the nature of the interactions between teachers and pupils proved to be more commonly holistic rather than therapeutically precisely targeted. This taxonomy therefore had to be modified. In practice, rather than targeting specific difficulties, teachers tended to develop interventions so that they could address several, often overlapping, concerns. Nonetheless, the taxonomy offers a useful means of classifying interventions that occurred across all of the ten schools. It will also provide a useful structure to inform the design of modules for professional development. The material collected was classified into nine groups. Six relate to pupil behaviours, while three are focused on institutional aspects. The six pupil-related behaviours are concerned with:

- 1 Motivation, engagement and persistence
- 2 Personalisation and links with pupils' personal interests
- 3 Social relationships and collaboration
- 4 Literacy
- 5 Personal reflection and developing insight

## 6 Continuing education and employment

The three institution-related activities were defined as:

- 1 Embedding digital creativity across the curriculum
- 2 Training for teachers
- 3 School impact and sustainability

Each of these categories of activity was observed and video-recorded. They are exemplified in Section 4 of this report, where there are specific illustrations of the project's impacts on pupils, staff and institutions.

### **Illustrations of impact**

#### **Impacts on pupils' motivation, engagement and persistence**

- Almost universally, pupils wanted to be involved in digital creativity activities.
- Previously disengaged pupils were proud to present their work to peers, teachers and parents.
- Some otherwise disengaged learners were attracted back into achieving formal educational outcomes. This was the result of taking part in activities that tapped into their personal interests.
- Pupils with difficulties that affect concentration and attention span (for instance, Attention Deficit Hyperactivity Disorder - ADHD) showed increased persistence and concentration when engaged with digital creativity activities.
- Headteachers reported increased attendance in classes where pupils were involved in digital creativity activities.

All schools noted that the software and hardware were immediately attractive and engaging to pupils. Part of the attraction of the digital creativity resource was the connection between the equipment and pupils' interests in music, video, digital photography, the Internet, personal websites, weblogs, podcasting and so on. Several students were enthused by the music software, which served to bridge their home and school interests and put them back in touch with formal educational goals.

A Year 11 student at NRHG, describes himself as a youngster who was naughty in mainstream, but suggests that getting involved in digital creativity and using sound editing software in particular, allowed him to express his interest in music. His 24/7 access to a laptop in Year 10 undoubtedly helped establish trust between him and his teachers. "I was working on the laptop 12 hours a day, literally. I wasn't moving. Even when I was called down for dinner, I didn't want to go," he says. His challenging behaviour and low levels of concentration were transformed into high levels of interest, persistence and engagement. His success seems to have increased his self-belief and ambition to use post-16 opportunities available to him productively.

The headteacher's comment confirms the impact of digital creativity on youngsters' motivation. "We just find they were incredibly motivated. Now I have a sense that, because they are so motivating and they really energise children in certain ways, that they change children's mindsets about how they see themselves and how they see the learning experience. This is because many of the children we work with are frightened of learning...if you're insecure, to learn is quite a frightening thing to do," said John D'Abbro, Headteacher, NRHG.

In a striking case of the immediate impact of access to digital creativity, a boy identified as having ADHD, with persistent long-term problems of concentration showed unprecedented attention. He was using software that enables pupils to present digital images and text in full colour picture-strip format. "For H to sit down and concentrate for an hour is a massive step forward for him," said Phil Houghton, a teacher at Clifford Holroyde School.

Schools generally reported improved attendance. The impact of digital creativity activities on the motivation of a school phobic pupil 'not in education' was reported by Doug Bone, Headteacher, Wandle Valley School. Doug found the provision of project activities encouraged one youngster to enter the school building and to gradually increase his attendance. "He was reluctant even to enter the school...He was very rude to his mum, very aggressive....We eventually got him to come into school to look at the equipment. We had it set up ready for him. He was highly animated by it and wanted to get involved – so much so that we increased his time from one session a week to two sessions a week. And when one of the sessions had to be cancelled, he phoned up to see if he could come for a session on a different day. This is a kid who was getting no schooling anywhere at all. The other services have found, as a spin off, that he's more likely to engage with them now so he's getting a lot more education and the prognosis is we'll eventually get him into school," said Doug.



## Personalisation and links with personal interests

- Pupils took control of their learning, suggesting activities and continuing their engagement into breaks, lunch hours and after-school.
- Pupils used their autonomy to create their own music or animation rather than simply copying ideas given to them.
- They used video and images of themselves to personalise their work.
- There was a widespread sense of personal pride in achievement and raised aspirations. This was the result of using video cameras and picture-strip format software to present and record learning.

Personalisation of learning implies teachers' consultation with pupils, allowing learners ownership and control of their own learning. Pupils' interactions with digital resources often shifted rapidly from interested engagement in a range of activities to assuming ownership. Their eagerness to suggest further activities and to continue working outside designated curriculum time indicated emerging confidence in their view of themselves as learners. This desire to take control of their own learning was, in some cases, unprecedented. It delighted and sometimes amazed teachers to witness a burgeoning autonomy, the first evidence of some pupils' desire to exert control over their own learning.

Teacher Tom Strover at Coxlease School noted how engaged pupils had become. "I've never seen such enthusiasm from some of the boys who come up to me everyday, asking when their time is to use the laptop. I haven't seen the boys being so focused on the work produced. Concentration time has gone up. They're coming up with ideas themselves and the ideas are fantastic! It's very much driven by them," he said.

A strategy that encouraged personalisation at NRHG was to give pupils digital audio tracks and invite them to modify them - to make them their own. Some of the pupils published their own track on an Internet music-sharing site.

"The object has been to work with pre-made loops, but to examine those loops with the students and get the students to understand that they can modify them; in fact, completely change them, personalise them, produce their own sounds and loops and eventually produce their own music track," said Julian Coultas, Digital Creativity consultant, NRHG.

Pupils' use of their own digital images was another direct way of adopting a personalised approach. For example, where practical activity was involved, pupils could photograph themselves engaged in learning and use those images in their reports.

A series of school visits to places linked to science, geography and history was organised for pupils at Lady Jane Franklin School. Pupils used digital cameras to record their impressions. Many of their images included themselves and their peers engaging with the artefacts or instructional materials provided. Using software, pupils presented captured images and their text in their own picture-strip format. Pupils' records, interpretations and reflections were made more real to them by this personalised format. They enjoyed drawing on personal material, rather than abstracts of content constructed by others. "Now I've got the hang of it, I can do it. And I know I can, because I've done it before. I'm proud. I'm proud of all the work I've been doing – every single piece!" M, male student, Lady Jane Franklin School.

It was satisfying for teachers to see young people showing such positive signs of re-engaging. These young people were taking whole-hearted personal responsibility for their own learning.

### **Social relationships and collaboration**

- Pupils with challenging behaviour displayed improved levels of engagement, interest and persistence.
- Pupils showed increased willingness to work together for extended periods to create animations to show to others.
- Making movies and animations encouraged pupils with interpersonal difficulties to work collaboratively with peers and staff.
- Creating movies required pupils to develop people management skills.

Claims that leading edge technology can support young people's capacity to develop social relationships might, at first hearing, sound paradoxical. The positive effects on pupils' relationships, behaviour and self-esteem occurred soon after the digital creativity resources were introduced. This was the result of the collaborative activities that they took part in.

Several teachers commented on an increase in pupils' interest in sharing successful outcomes with their peers, and a corresponding decrease in more negative volatile behaviour. "Particularly with a few of the pupils, it's helped them engage more in the lesson. They're no longer storming out or getting aggressive. They seem to be working together a lot more, particularly with photos. If you've taken a photo using software that enables you to capture images and add your own effects, that's really good. They're keen to show off what they have done to each other, so the hardware and the software are helping build on relationships in the classroom," said Tom Booth, a teacher at Lady Jane Franklin School.

Making even a small video film required pupils to collaborate by explaining their objectives to one another. They also shared tasks between themselves that would have been very difficult for one person to accomplish alone.

D and F, Year 6 male pupils at NRHG produced their animation together, 'Penguin'. They were aware that they had got to know one another better as a result of having worked together.

D: "I've made a lot more friendship with F, definitely since we made our film. We got to know each other a lot."

F: "Yes a lot better."

D: "We felt happy with ourselves. We felt we had achieved something."

They worked together to design the models of the characters and write the storyboards. In the film, a penguin takes tentative steps across cracking ice to meet a new friend. It is tempting to infer that the metaphor of the penguin moving gingerly across thin ice in a quest to make friends was a projection of their own apprehensions and needs as they worked together. Constructing an animation can be a lengthy procedure. Assuming the originators move quickly and efficiently – say one shot every four seconds – one minute of final product will take one hour 40 minutes to produce. The logistical and interpersonal challenge is significant.

In another school, pupils acknowledged the logistical demands of scheduling a film. They also reported that directing actors (who were often fellow pupils) required them to manage difficult behaviour. As well as fostering collaboration among members of the production team, those involved required previously untapped social skills.

J and M, male pupils at William Henry Smith School made a video together. It was particularly interesting to hear the insights that these boys revealed as the result of attempting to direct their peers as actors in their film.

"It was hard to find people who could do it and who listened: people who would be best for it. When we found people, it was just a matter of fact if they could do it or not. Some people could not and some people could. Most lads had trouble with doing simple things that you'd tell them to do. It's hard to find people who will do what they are told for a change," they said. It was tempting to infer a correspondence with the issues faced by teachers in managing those same pupils (J and M included) in a classroom context.

Pupils at Wandle Valley School developed a particularly complex animation, the Green Velvet Club. The activity was painstakingly detailed in terms of the set, lighting, number of characters and scene changes. All the contributors were thrilled with the outcome, which was applauded by parents and school governors.

Many of the young people involved in the Green Velvet Club project have ADHD or short attention spans. They spent hours making their models and then filming the models' movements – one tiny step at a time.

The production takes a humorous look at an evening at a nightclub. The scene opens with the club staff getting ready for the queue of people to arrive. The person on the door takes the money and doesn't let in undesirables: "No dogs allowed!" The dog replies: "Woof!" Later scenes show that the pupils have paid close attention to detail in creating the atmosphere of a real club.

"The amount of kids involved, they all feel they've got ownership in some shape or form, whether it's been designing the set, moving the camera or working behind the camera," explained their teacher, Spencer Guainiere.

"It's been great for co-operative learning. It's very difficult for young people to share because they get excited. For kids with emotional and behavioural difficulties, it's a massively difficult area. They have made progress by co-operating, because they know they have got to take turns to get the project finished. When they show it, they are proud - and so they should be," said Doug Bone, Headteacher.

The way in which the resources were used transformed students' relationships with each other. It was not the resources *per se* that produced the effect, but the meaningful activities skilfully managed by staff to engage children's interest. Students' high level of motivation also served to bring about changes in patterns of social interaction.

## Literacy

- Pupils with histories of having rejected literacy activities engaged with tasks using stop-frame animation, videos and podcasts. These activities drew on written and oral skills in an incidental way.
- The use of sound editing software was found to be a powerful incentive in developing pupils' creative story telling skills.
- Strategies that encouraged reading-averse learners to design animations about phonics were successful.
- Increased engagement and achievement of disruptive boys with low attainment in literacy was linked with digital creativity.

"Debates from at least the nineteenth century have contested the capacity of schooling as a prophylactic to prevent outbreaks of disorder among the young." (Stephenson, 2007, p 3) The relationship between exclusion from formal education and membership of those not engaged in employment, education or training (NEET) is well established. Developing literacy skills is regarded as being particularly

important in BESD schools. Digital creativity activities invoked several strategies to address literacy education of pupils. These included:

- ostensible avoidance of literacy demands, where these were implicit, but were instead masked by being embedded in other procedures that were more attractive
- an incidental requirement to use explicit literacy skills accepted by pupils, but only as subsidiary to the main attraction of using the digital creativity software
- direct addressing of literacy skills, but in a manner that made the focus palatable.

Staff at Avocet House recorded an example of the ostensible avoidance of literacy. They took English out of the timetable for one boy and repackaged it in digital creativity activities such as filmmaking, animation and creating talking books. The approach was successful in that staff were able to reintroduce English into the curriculum for this youngster.

“When he started with us, he seemed to have a real sticking point around literacy and anything to do with written formats. His behaviour would become increasingly challenging when asked to do literacy tasks. We took literacy out of the curriculum for a two-week period and replaced it with other subjects, some of which were ICT. We then got him doing English tasks, but from a totally different perspective...The idea behind the animation activity is a) to get him engaged in English activities and b) to get him enthusiastic. It has had a knock-on effect because he's now got English back on his curriculum and he does it every day, five days a week. His whole attitude and the way he conducts himself has moved on in leaps and bounds from where we were. I think it's been a number of different factors, the stop-frame animation software being one of those. It's also been about [the fact that] he's used his computer to make a podcast as well, a very small one, just to get him interested,” said Neil Dawson, Head of Education, Avocet House.

Spencer Guainiere at Wandle Valley is well aware of the resistance of many pupils to involvement with literacy. He linked oracy skills incidentally to pupils' exploration of software so that they could record and edit their own sound effects. "Literacy and language in our school is a very hard subject in which to motivate the students and get them to show an active interest. I think this is a medium which really catches their attention. If you ask them to write a story it takes a lot more perseverance to get them to be excited..."

As they explored the sound samples, Spencer realised the potential of the sounds for sequencing spoken narratives. The pupils were soon encouraged to move from spontaneous activity to planned storyboarding. The result was a strongly motivated story with sound samples interpolated. Pupils' interest in story telling seems to have been enhanced and their enthusiastic imaginings of further possibilities was heartening to their teacher.

Pupils also recognised the possibilities for adding emotional expression to their efforts. This might have set the scene for a more specifically therapeutic usage in which emotionally charged events could be explored. "I would do it again because it was different. We don't normally do things like that. I never knew you could do something like animation. When you are speaking, you use your expressions and your voice changes. In that, it didn't really change but if I did it again then I probably would.' A female student Wandle Valley School.

Several schools implemented the strategy of incorporating explicit literacy demands into other activities that pupils found more pleasurable.

A Year 6 pupil at NRHG had been struggling with recognising vowels. His teacher introduced him to animation software and he used the technology to help himself get to improve. He came up with the idea for Angry Ant, an animation that he produced himself. In the video, the angry ant wears boxing gloves and repeatedly hits a model of a letter 'a'. The letter forms and unfolds in response to the blows. As a result, the pupil has made progress in recognising letter sounds.

A further benefit was that such animations were recognised by his teacher to be re-usable resources to help and inspire other reluctant readers. "We've been using animation for those children who have got difficulty with vowels. This particular lad, who is a very creative boy, finds conventional learning very tedious. But, a lot of that is about covering up because his literacy skills are poor. He does not want to admit that. So he often kicks off to avoid having to say that he can't read something. To learn his vowel sounds he has come up with, 'The angry ant got squashed by an 'a'". He has actually produced an ant with boxing gloves having a fight with himself and then a letter 'a' forming and unforming itself. I think he can actually remember that sound now. So it's something to use with children. In a sense we are getting children to make some resources, not just for themselves but for those that are following," said Jan Kirkham, a teacher at NRHG.

The literacy skills deficit has a strong gender correlation. There was conjecture that harnessing digital creativity to support the development of literacy skills might offer a 'boy-friendly' strategy to teachers.

"Some of our children have very complex difficulties. They're not always dyslexic. They don't necessarily have specific literacy difficulties, but there is a delay in attainment due to all sorts of reasons. The children aren't particularly overjoyed about writing. They are very reluctant. So we're trying to get boy-friendly here. We're trying to get boy-friendly literature and boy-friendly books and boy-friendly topics to study. I do feel that this way of working and the fact that the children have access to all this electronic boy-friendly equipment, means that we can address the framework strategies. They are being offered a non-restrictive curriculum, but we're not dependent on writing and listening and book reading. We're going wider than that," said Helen Dunkley, a teacher at Lady Jane Franklin School.

### **Personal reflection and developing insight**

- Stop-frame animation and music editing software gave pupils the opportunity to examine sensitive and dangerous situations that some youngsters face.
- Teachers reported observing the therapeutic value of using video cameras to encourage pupils' personal reflection. In particular, creating a 'Big

Brother diary room' provided pupils with a supportive context for reflection on learning, behaviour and personal issues.

- A Year 11 youngster described as having emotional, behavioural and motivational difficulties created a weblog about her aspirations. She spoke of her improved confidence, motivation and focus as a result.

Goleman (2006) describes the success of interventions that have focused on self-awareness for emotional literacy, suggesting a need to move many of the outcomes of these initiatives from the laboratory into the classroom. Teachers and pupils in the project discovered ways in which digital creativity tools might be used to support children's emotional development. Interactions with the tools have resulted in procedures that can be replicated to encourage students to reflect on themselves, discuss their feelings, consider their achievements and set goals.

Almost universally, pupils who find themselves in need of the support of BESD environments are reported as not feeling good about themselves in some way.

A personal weblog provided one NHG student with an opportunity to reflect on her inner self - a process that involved consideration of the challenges and difficulties in her life as well as her likes and dislikes. Many of the issues she explained in the weblog were being aired for the first time.

She created her own website and dedicated a weblog to the diary of Anne Frank. "Her story fascinates me because it reminds me of me. She liked to get attention from people she likes and that sounded like me and made me smile. That's how I was when I was her age." She said it helped her with her history lessons, too.

"Since I have been in this English class I have caught up a lot and learnt a lot. I'm surprised I have done this much work - I never thought I could do this much," she smiled. "It's really shocking for me!"

Her behaviour report has shown a big improvement and she is continuing to prepare for her GCSEs.

A teacher of Year 6 pupils pointed out that digital animation and discussion provided some children with the first opportunity to think realistically about the serious issue of personal safety.



Pupils at the NRHG developed a series of animations on the subject of 'Keeping Safe'. The topics included drugs, knives, avoiding talking to strangers, playing near railway lines and playing with fire. The practical involvement in the animation and the graphic construction of unhappy endings (the arrival of police and ambulances and the plentiful simulation of blood and body parts) was instrumental in provoking more reasoned discussion than had been possible to stimulate previously.

"The children worked together in pairs. They storyboarded, they made models - everything. A lot of children in that class, say 50 per cent, are diagnosed with ADHD. They are easily distracted by anything that's going on. With digital filming, we find they can concentrate for quite long periods of time... They put forward this persona when you are discussing serious issues as if they are all powerful, 'Oh if someone came up to me I'd hit them, I'd kill them...'. It takes quite a lot of discussion to get around to asking, 'What realistically would you do if approached by a stranger in the park?' That was very important I thought because some of the boys would say, 'Well, I'd kill him.' I'd say,

'Well, have a think about it. We've made these models to scale. Here's the child and here's the adult. Think about the size of me compared to you. And think about, what could realistically happen and what could they realistically do?'

It was the first time some of them had really thought about those issues without the bravado, without putting on some front of being big and tough. You may be big and tough, but you're just 10 years old. You're still extremely vulnerable even if you've got behaviour problems," said Steve Barton, a teacher at NRHG.

The video camera proved to be a resource that could be employed to encourage children to talk about themselves.

Children generated a 'Big Brother' style diary room activity, which seemed to lend itself to supporting social and emotional development. Children were interviewed in the diary room and were sometimes called to account for their actions. The scope for the careful use of this scenario of recording and reflecting has potential for therapeutic intervention.

"Emotional responses to things, empathy, that's a great one, you know. Putting yourself into someone else's shoes is much easier to do when you're actually looking at yourself. If you've got the technology and the opportunity to sit there...When I've watched it being used for this Big Brother, it's there and they did it and they didn't need direction," said Helen Dunkley, a teacher at Lady Jane Franklin School.

The pupils were clearly attracted to the idea of emulating this aspect of the show and many were pleased to be interviewed 'live'. "What you do is you sit there while someone's asking you some questions. Then you just explain what you are doing in the diary room. It's a good laugh isn't it? Because then you get to talk about stuff but then you are being serious and like. Just like your hobbies and what you do in your spare time. What lessons you've done. Sometimes a bit more private stuff if you want to," said a student in the class.

## Continuing education and employment

- The digital creativity activities raised aspirations and attracted some pupils to continue their studies with post-16 education.
- Using video to record work experience enabled pupils to create a record of challenges and successes. They were able to share this with prospective employers, parents, teachers and peers.

There were instances of pupils becoming enthused by certain software to the extent that these influenced their choice to move into further education.

At Wandle Valley School, teachers used movie-editing software to re-engage a pupil from persistent anti-social graffiti painting, which had caused him trouble with the law. Instead, he moved to more constructive filming of urban culture. For the first time, the school saw the prospect of entering a student for GCSE media studies as the result of the availability of the digital creativity resources. The principal and a member of staff said that this has had a profound impact on the student. His school attendance, which had been poor, improved significantly. Where he had been in trouble with the police for spraying graffiti, his interest in urban culture, including graffiti, had been harnessed to a more constructive and productive end: filming and editing a documentary. The student described how the digital creativity resources contributed to the development of his portfolio to present to further education colleges in pursuit of his ambition to study graphic design.

The video recording of work experiences was an innovation associated with the introduction of the hardware and software. Pupils created video diaries, which recorded their achievements. They shared these with peers, staff, parents and prospective employers. The diaries also highlighted, for pupils, the progress they had made and the new skills acquired.

“The idea was to put those little clips of video together to make a big film. This was a composite record for each of them of their time at Cuckmere House and their work experience. We used a DVD publishing tool to create something that looked nice and it included a little snapshot of each boy in their out-of-school experience...Each of the boys is represented here with a small clip. They are all included...When we decided to do this project, the idea had been that they would have the chance to do narration, but we have struggled with that as a school. The finished product up here is something that was really impressive. It was shown at a parents' evening and they thought it was great,” said Phillippa Brookes, a teacher at Cuckmere House School.

Several schools mentioned their desire to explore the use of the resources with Year 11 students. This was understood by staff to be the cohort most likely to become disaffected with education. Some staff believed pupils would be attracted by the tools because they could be applied to real life. Other schools felt the resources offered students experiences of a different platform that could help them compete in the workplace. The fact that the evidence from the research highlights cases of pupils maintaining an interest in education as the direct result of their interest in digital creativity when they might have remained detached or even alienated is hugely important.

### **Embedding digital creativity across the curriculum**

- Pupils became involved in digital creativity activities across the curriculum. This offered new opportunities for pupils to use their imaginations and be inventive.
- Pupils also became engaged in curriculum areas that they had previously seen as difficult. This includes subjects such as Modern Foreign Languages (MFL) and science.

At Cuckmere House School, music teacher Robin Thomas recognised that the digital resources could extend the curriculum to include the types of music that interested the children. She also saw that it would encourage children to make and share their own music. “It's pushed me along to seek some extra funding. I've been lucky enough to receive a grant from the National Lottery for £10,000, which I'm now very excited about. Hopefully, I can start to get some use out of things like sound-editing software and engage the kids in some of the types of music that practically I haven't been able to do in the past. Most of the stuff we do is guitar-based, singing and performing. To be able to introduce the types of music that really interests them,

would be fantastic. I know, through this software, that we can, not only do that performance-based activity, but also do composition-based work. They can record their own stuff, which is something that I've already spoken to the kids about and they're very excited. I can't wait to get going on it.”

Staff in art departments recognised that the tools offered a safe environment in which students' ideas could be explored. It was not insignificant for this group to be able to edit out mistakes. The encouragement of editing as part of the process supported pupils' explorations. It was reputed to have brought about changes in students' reaction to their work across the curriculum. The ability to edit and the high quality of finished products was assumed to limit the tendency among this group to destroy their work rather than risk exposing weaknesses.

“Art is another area where the laptops and software have already come into their own. In the same way that writing can be a difficulty for them, sometimes if they draw and it's not perfect, it goes in the bin. So, we've been using the laptops to do some 'pop art' by taking images of people's faces and then changing the colour and matching them together. The art department caught on to doing that within about five minutes of the machines being here, so that's a success story, I think,” said Neil Chandler, a teacher at Lady Jane Franklin School.

The digital resources provided new ways of thinking about other areas of the curriculum that learners may find inaccessible or may be considered not to have scope for creativity. For instance, animation and movie making were used effectively to support a Year 6 pupil's developing understanding of Spanish.

Using several software packages offered within the resources, one student at NRHG used sound, pictures, writing and movement to support his learning of Spanish - a subject he found difficult. “I made a movie. It's called "Me gusta, No me gusta"... I like, I don't like... I like pizza. I like coca cola but I don't like sausage and I don't like witches. That's my movie. I made my movie using animation software and imported it into movie editing software to get sounds and everything. Firstly, I was a bit upset and Miss helped me, and I thought that was really nice of Miss to help me,” he said.

The different ways that the child chooses to represent the vocabulary in the movie are functional in terms of language learning. The student brought together images, writing, music and speech to help himself communicate meanings that would be unavailable to him if he relied on a single mode.

It had not been anticipated that the project would encourage the personalisation of collaborative science investigations. However, this is what happened in at least three of the project schools.

Increased engagement with science and increased collaborative working were dual outcomes of using picture-strip software to record science investigations. Students

used a camera to record their investigation of dissolving substances in water. Their pictorial record was edited and explanatory text added. The presentational format meant that the conclusions reached could be evaluated against the evidence collected. Also, the software helped pupils distinguish between their thinking processes and the learning outcomes, a process many children find difficult. "They actually introduced elements of humour, which showed they enjoyed it. They focused on science work as well, so they were working on both elements," said Steve Thomas, a teacher at Notton House School.

Embedding digital creativity into a particular curriculum area requires the subject teacher to think through the possibilities of exploiting the resources to achieve targeted objectives. It was apparent that many teachers had appreciated the potential for their subject area fairly readily. However, it would take time to develop their ideas into an effective form, going beyond the initial attraction, with integrated pedagogical subject knowledge.

Teachers and researchers did not treat these digital creativity resources as stand alone tools that would automatically increase the engagement of learners. There was no thought that these would replace more usual practices, such as the production of written accounts of science investigations. Rather, the resources were treated as possibilities, their use and impacts to be systematically explored across different curriculum areas with different learners.

Some fruitful uses of the resources across the curriculum began to emerge from teachers' and pupils' interactions with them. These early explorations require nurturing if they are to make a greater contribution to learning and teaching across the curriculum. The merits of different tools for different curriculum areas remain to be explored.

### **Training for teachers**

- The teachers found pupils' positive reactions to digital creativity highly motivating and satisfying. It was an exciting contribution to their professional development.
- While teachers used the more accessible aspects of the technology under their own steam, they recognised that a more focused deployment would be possible with the support of further training.
- Teachers recognised that on occasions, pupils' skills with the hardware and software rapidly outstripped their own. They found productive ways of sharing and celebrating these new talents.

As is often the case with software and hardware having extensive functionality, pupils engaged in self-motivated exploration and discovered new functions and routines. Almost inevitably, there was some evidence in the project of students' skills

outstripping those of teachers. Many of the teachers responded positively and encouraged the sharing of knowledge among the class and school. Some recognised the role that pupils might play in training their peers and possibly teachers, with the incidental outcome of a boost to pupils' self-esteem.

### **School impact and sustainability**

- Support of senior managers is essential to the sustainability of digital creativity.
- Some BESD schools developed sustainability strategies including income generating digital creativity support to mainstream groups.

As is the case in any school-based innovation, the support of senior managers is essential to successful integration, embedding and sustainability of practices. While resources were contributed by the project, a school contribution in the form of space and time for use and dissemination was essential to make those resources useful. Some schools allocated dedicated space; others incorporated the hardware into their ICT provision. Towards the end of the project, there was compelling evidence of a commitment to sustained digital creativity in the form of extending the schools' investment in hardware and software.

Doug Bone, Principal at Wandle Valley School offered his observations on this:

“The project has proved very successful. There are resource implications. It's expensive. You may look at the equipment. You may look at the time spent on it - and it is time intensive...It's not expensive when you are talking about the young people we are dealing with. If we don't include them in society, they become a lot more expensive for society in the long term.

“We've engaged young people and motivated them. The spin off has been that they have completed their examinations. Some young people this year are getting 8 GCSE examinations because they have been using the materials to support them. But it's also motivating. It also gives them self-esteem, improved performance all sorts of things like that. So, is it expensive? Not really.

“We need the funding to make sure we do these types of things. Special education is important for young people. Emotional and Behavioural Difficulties (EBD) tends to be the Cinderella of special education because it's not a very popular group. But we need to engage these young people. We talk about inclusion. The government talk about inclusion on many occasions. This is an inclusive practice that we need to extend, to develop for the future. Basically, keep putting the money in.”

## Conclusions and recommendations

The R&D activities with ten BESD schools produced evidence to confirm that teachers shared a unanimous sense that an important and innovative educational resource had been made available to them. Eight of the schools made the resource their own by adapting and extending the seeded activities. Two schools explicitly recognised the potential, reported positive outcomes, but were constrained by circumstances from exploiting the resource as they had intended.

Several conclusions reported in the Becta Impact Report (2007), were found to be directly relevant. The Becta conclusions can also be amplified by evidence from the outcomes of the digital creativity study. These are:

- the impact on intermediate outcomes – particularly motivation, perseverance, collaboration and reflection – are strongly confirmed within the approaches used. Impact on attainment appears positive, but would require confirmation by a larger-scale study
- pupils' creativity appears to have been enhanced and enabled by the range of tools offered by the project – an area in which Becta's study lacked evidence
- the role of multimedia affordances was an undoubted factor in the success with which innovative procedures were adopted.

R&D studies can be methodologically rigorous, can generate compelling qualitative evidence and offer unique insights that point the direction for larger-scale enquiries. In the case of the digital creativity study, the most important aspect of the reported outcomes is the identification of what the Becta study (*op. cit.*) identifies as 'tasks [that] have clear educational aims'. In this report, such 'tasks' are analysed in the form of powerful illustrative examples or 'nuggets' of classroom practices. These activities would not have taken place and may not even have been possible, without the introduction of the digital creativity project resources. These nuggets are compelling in the sense of being validated in teachers' and pupils' own words, actions and digital products. The educational validity of the exemplifications of practice is confirmed by the fact of having been tried out *in situ* and by being described in the stakeholders' own words. These characteristics lend authority to the suggestion that they could be replicated in other classrooms around the country, given appropriate resourcing.

### Identification of the critical factors underlying successes with digital creativity

Well-designed technology that works smoothly and attractively has intrinsic appeal. When this same kit includes items having the 'street credibility' associated with young people's popular cultural interests – music, digital imaging, Internet

communications and so on – we should be surprised if it failed to appeal to pupils in BESD environments. Judgement about the educational efficacy of the digital creativity approach demands acceptance that these initial attractions played a part in arousing interest. For specifically educational purposes, our understanding will be best served by scrutinising focused use for the targeted needs of teachers and pupils. Various theoretical orientations, both social and psychological, lend support to an interpretation of the success of the digital creativity activities. In this discussion, 'success' is defined as 'producing a positive impact on teaching and learning processes and outcomes.'

### **Social interpretations**

Wertsch's (1995) concept of cultural tools offers a useful social orientation:

"While the cultural tools or artefacts involved in mediation certainly play an essential role in shaping action, they do not determine or cause action in some kind of static, mechanistic way. Indeed of themselves cultural tools are powerless to do anything. They can have an impact only when individuals use them.... mediation is best thought of as a process involving the potential of cultural tools to shape action, on the one hand and the unique use of these tools on the other." (Wertsch, 1995 p 22)

The digital creativity resources were used by teachers in imaginative and innovative ways, informed by professional expertise and clear-sighted goals. Consistent with Wertsch's interpretation, the resources were more than facilitative of what might have been expected to occur anyway. They gave rise to novel behaviours and outcomes. Given appropriate levels of support from senior managers, teachers and pupils responded positively to the injection of hardware, software and ideas for their use. Schools' control of the resource can be seen to have shifted through three levels of mastery:

- 1 Immediately they were introduced, pupils' interest appeared to have been universally aroused by the digital resources. Pupils found them to be intuitively accessible, usable and attractive. Pupils and teachers were strongly motivated to use the software and hardware and persisted with their use. Most pilot schools achieved at least this level of interested engagement.
- 2 Gradually – rapidly in some cases – technical proficiency was gained, permitting a proactive rather than reactive use of the technology. For some pupils, software mastery served to enhance self-esteem and broaden their curricular or interpersonal engagement. There was evidence of this level of operation in the majority of pilot schools.
- 3 With teachers' and pupils' increasing technical competence came the possibility of refining the use of given applications for targeted



therapeutic interventions. For example, animation software was used to rehearse, analyse and reflect upon difficult or dangerous social situations. This potential was recognised by project schools, but as a target to work towards rather than a goal achieved within the duration of the project summarised here.

Novel forms of teacher-pupil interaction have the potential to be transformative, giving rise to new ways in which pupils might understand themselves and the world around them. New cultural tools offer empowerment and may result in an increase in the control handed over to learners. This novelty applies to teachers' changing perception of their own role, also, for if learners are to be empowered, the implication is that teachers must be prepared to revise traditional teacher-pupil role relationships. The most explicit acceptance of this issue was an expressed willingness on the part of some staff to countenance the possibility of pupils playing an active role in the training of not only their peers, but of adults too. "We act only by invoking mediational means that are available in the cultural toolkit provided by the socio-cultural setting in which we operate." (Wertsch, op. cit. p 24)

## Psychological interpretations

Sociologically orientated theoretical interpretations can be complemented by consideration of the impacts at the level of individual psychological processes. The two forms of explanation need not be seen as competing or mutually exclusive. One psychological perspective that is helpful is Gibson's ecological theory of perception, (Gibson 1986). What is particularly relevant about Gibson's theory is that it assumes that human beings perceive in order to operate on the environment. We perceive actively *in relation* to objects, rather than passively. This is consistent with an evolutionary, adaptive view in which we make sense of things around us in terms of what they offer us, according to our needs and desires. Gibson called the possibilities for action that humans perceive 'affordances'. We perceive objects around us in relation to the tacit (evolutionarily hard-wired) question, "What can this object do that is useful or relevant to me?" This theoretical orientation invites the question,

"What novel affordances were introduced to teachers and pupils with delivery of the digital creativity resources?" This question suggests that new possibilities for meaning-making and communication that the project introduced need to be identified. The affordances offered by the project are neither to be sought as intrinsic features of hardware or software, nor as intrinsic features of pupils and staff in BESD schools. What we have to look for is new possibilities for action in the relations between the equipment and its users.

Awareness of the range of ways in which humans are able to construct and convey meaning (Kress *et al.*, 2001) is increasing, not least as the result of the increased range ICT offers to instructional design. Multimedia functionality offers supreme

scope for learners to make their ideas known in whatever representational form they favour: using words, numbers, sound, video, audio, diagrams, animations and so on. Pupils are able to express their understanding using the cultural tools to which they have access increasingly in their everyday lives. These new tools offer unprecedented transparency (that is, possibilities for reduction of ambiguity in communications) to teachers and learners for sharing ideas. When a teacher makes the suggestion, "Let's look at this another way", the range of representational forms and the facility with which they can be manipulated is far greater than has been the case traditionally. For example, the digital creativity project produced imaginative examples of:

- spoken sounds being represented as three-dimensional animations
- science investigations shown as narratives using personalised images in picture strip form
- sound samples provoking narrative.

The educational value of such cross-modal opportunities was widely recognised by teachers.

There have been concerns expressed (Lemke, 2003) that the contribution these different modes make to learners' meaning construction have often been overlooked in favour of an emphasis on language. There have also been criticisms that cognitive learning theorists have tended to pay insufficient attention to the processes of social meaning-making and the role of culturally mediated symbols in that process (Bruner, 1996). The potential of this revolution in learners' multimedia experience must be understood by educators, both practically and theoretically, in order to exploit the opportunities offered. It is generally accepted that the recent interest in and attribution of 'learning styles' to pupils was misguided in the vigour of its application (Coffield *et al.*, 2004). However, it is undoubtedly the case that learners make use of different sense modalities, and instructional design exploits these modalities to varying degrees. Given the relational nature of affordances (that is, between human 'perceivers' and environmental 'objects'), the use of multimedia in educational resources clearly extends the set of possibilities by exploiting movement and sound – modes of information access not available traditionally.

Novel affordances associated with ICT/multimedia have been discussed by Moseley and Higgins (1999). Multimedia records offer exceptional opportunities for recording, playing back and analysing various types of performance. Sports and drama are obvious examples where a detailed review invites modification of future performances in the light of feedback. Dynamic representation of performance is not available through any other medium than film and video. Another affordance resides in the iterative opportunities for editing an artefact prior to the choice of the characteristics of the final product. In the context of BESD education, the whole gamut of social, emotional and behavioural needs were seen to be amenable to

formative feedback. For instance, life choices were examined, schoolwork was filmed and edited and behaviour was reviewed using video.

The digital creativity project has generated a practical, usable product in the form of the exemplary illustrations of practice. It has also provoked some serious questions about the nature and role of multimedia more generally to inform instructional design. These outcomes warrant further enquiry, certainly, but sufficient evidence has been revealed to justify a whole-hearted commitment to training and dissemination so that the teachers' practices described in this report become widespread and available to all young people.

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## **Technical notes: methodology detail**

### **Sample of teachers in project schools**

Headteachers of the ten BESD project schools invited teachers or Learning Support Assistants (LSAs) to signal their interest in participation. At least two staff members of staff from each school were involved in the project. One person was identified as the main contact. A second member of staff was identified as a co-worker and depended on the main contact person for information. In some of the ten schools additional members of staff took part. For example, in one school up to five members of staff were directly involved in further training activities. In three of the schools the whole school staff received INSET. In just one of the schools, one member of staff worked alone.

Twenty four members of staff who had been directly involved in digital creativity activities were interviewed. During their school visits, researchers video recorded some of the digital creativity activities. They invited headteachers, teachers, LSAs and pupils to offer their views on instances of digital creativity and their impact. Teachers and researchers analysed emerging insights from the project group and the results were fed back immediately in order to influence further cycles of classroom activity.

The video recordings were subjected to a grounded theory approach in which transcriptions were generated and analysed. Notes, interpretations and commentaries were added by the researchers. Different software, teaching approaches, curriculum areas and pupils' social, emotional and behavioural needs were summarised in matrix form. Each episode of typically 1-3 minutes edited recording was classified in terms of the behaviour addressed, the software used, the context and curriculum area. The intention of the matrix was to generate a classification system in which the range of therapeutic needs of the BESD population could be identified and linked to particular forms of intervention. Particular digital creativity activities might then be identified as suitable for the wider population of teachers to adopt when confronted by particular BESD issues. The outcome would be a taxonomy of therapeutic interventions based on the use of digital creativity. This taxonomy was constructed in draft form, reviewed and elaborated throughout the project. This was done as new areas of learning or problematic behaviour were examined and new practices evolved.

### **Hardware and software made available to the project schools**

Each project school was provided with a set of hardware and software to enable and support their digital creativity activities as summarised in Table 1.

**Table 1 Project hardware and software**

| <b>Generic nature of hardware and software provided to project schools</b>   | <b>Particular proprietary hardware and software provided to project schools</b> |
|--|---|
| One Laptop   | MacBook Z0D5, 2.0 GHz processor and 1GB RAM                                     |
| Portable hard drive and mp3 player   | 30GB iPod   |
| Music keyboard   | Music keyboard (M-Audio key station 49e)  |
| Video camera   | Canon video camera  |
| Digital still camera   | Canon video camera  |
| A tool that enables pupils to share, backup and publish content. Additionally, an email account is provided.   | 'dot-Mac' (or '.Mac') account   |
| Stop frame animation software. A single application that enables pupils to create movie animations.  | I Can Animate   |
| Video and still image editing software that enables pupils to create their own movies, add visual and audio effects and export video in different formats for DVD, Internet, iPod and email.   | iMovie  |
| Plug-in tool used within movie editing software to remove or add new backgrounds to video.   | Kudlian iMovie plug-in  |
| DVD creation software that enables pupils to publish their videos, music and still photos to DVD that can be played on any home DVD player.  | iDVD  |
| Software that enables communication by voice, speech and video over the Internet.  | iChat   |
| Software that enables pupils to capture still images from a webcam and add effects. Pupils can have images by email or send to photo library for use with other software.  | Photo Booth   |
| Software that enables pupils to record and edit music from real instruments onto different tracks. Musical loops, effects and vocals can be added. Soundtracks can be created for movies or animations. Audio podcasts can be created and published. | GarageBand  |



|   |            |
|---|------------|
| Software that provides a quick method of publishing audio and video files to a network or internet  | Podcaster  |
| Enables pupils to present digital images and text in full colour picture-strip format. Editing tools help pupil personalize the layout and content of picture-strips. | Comic Life |
| Software that enables pupils to edit, organize and publish their digital still images, thus making images easily available to other applications.                     | iPhoto     |
| Software for creating websites, blogs and photo galleries – using images, audio files and video created in other applications and publishing them to the Internet.    | iWeb       |

### **Group meetings**

Two group meetings were held during the project, to which all project schools' representatives were invited. Participants were introduced to the hardware and some of the software. Teachers responded positively to the first meeting, one teacher commenting that the day had provided the best INSET she had ever attended. A second, mid-project, meeting was held with the intention of sharing lessons learned to date and offering additional software training. Project teachers reflected on digital creativity activities developed in schools. The meeting helped to ensure that all schools had electronic access to one another to support dissemination. Training on the use of animation techniques was also provided.

### **Project communications**

The active participation of teachers and pupils during the project was essential to generating evidence and validating project outcomes. Effective communication between all schools was an essential feature. There were several means of encouraging practice sharing built into the research:

- project group meetings
- telephone and email contact between schools and researchers
- school visits by researchers for discussion and dissemination of observed practices
- sharing electronic files, including pupil outputs using the range of software made available
- distribution of DVD of intervention activities.

## Sources of data

The project recorded and analysed qualitative and quantitative data captured by a variety of means. The collection of evidence from different sources enabled triangulation of data and thus crosschecking for consistency of emerging messages. These sources included:

- multi-media recordings collected in the project groups' classrooms in Phase one and Phase two, transcribed, edited, analysed and supported with diagnostic commentaries
- project teachers' recordings of each digital creativity activity, including numbers of pupils involved, the frequency of use of the equipment and teachers' and pupils' views of the impacts (see Appendix 3)
- interviews with headteachers and teachers in project schools which probed ICT provision in school, staff experience of ICT personally and professionally, pupils' access to ICT and the extent to which ICT was embedded across the curriculum
- an 'ICT inventory' questionnaire which was used to collect details of teachers' personal and professional use of ICT
- the Teaching and Learning section of the self-review framework questionnaire which probed the schools' current approach to ICT in teaching and learning
- a brief questionnaire completed by teachers to summarise digital creativity activity (see Appendix 4)
- field notes from researcher visits, summarized and sent back to teachers for verification
- a tracking document which recorded and classified all communications via the project forum.

## Appendix 1 – Characteristics of project schools

|                           | <b>Pupil Roll</b>  | <b>Age range (years)</b> | <b>Residential or Day and location</b> | <b>Pre-existing Operating Platform</b> | <b>Staff involved in project</b> | <b>Mode of introducing to staff</b>                                     | <b>Mode of introducing to pupils</b>                                    |
|---------------------------|--------------------|--------------------------|--|--|----------------------------------|---|---|
| <b>Avocet</b>             | 6 male             | 8-16                     | Residential Rural                      | Mac                                    | 3                                | Already using resources   | Resources used in curriculum and 24/7 access outside school day         |
| <b>Beormund</b>           | 35 male and female | 4-11                     | Day Urban                              | PC                                     | 2                                | Informal discussion   | After-school club   |
| <b>Clifford Holroyde</b>  | 52 male            | 11-16                    | Day Urban                              | PC                                     | 1                                | Resources not introduced to other staff                                 | Resources used in optional curriculum and outdoors activity             |
| <b>Cuckmere House</b>     | 45 male and female | 5-16                     | Day Urban                              | PC                                     | 3                                | Informal discussion   | Resources used in curriculum and work placement                         |
| <b>Coxlease</b>           | 50 male            | 8-16                     | Residential and Day. Rural             | PC                                     | 5                                | Four inset sessions after school at Apple RTC for four members of staff | Resources used in curriculum and free time                              |
| <b>Lady Jane Franklyn</b> | 60 male            | 11-16                    | Day Rural                              | PC and Mac                             | 5                                | Staff one day INSET   | Resources used in curriculum and free time                              |
| <b>Muntham House</b>      | 52 male            | 10-18                    | Residential (43) and Day (9) Rural     | PC                                     | 3                                | Staff one day INSET   | Resources used in curriculum time and In-reach activity with mainstream |

|                            |                      |      |                   |    |   |                         |  |
|----------------------------|----------------------|------|-------------------|----|---|-------------------------|--|
| <b>Notton House</b>        | 55 male              | 9-16 | Residential Rural | PC | 2 | Informal discussion     | Resources used in curriculum               |
| <b>Wandle Valley</b>       | 80 male and 2 female | 5-16 | Day Urban         | PC | 2 | One day INSET bought in | Resources used in curriculum and free time |
| <b>William Henry Smith</b> | 62 male              | 8-16 | Residential Rural | PC | 2 | Informal discussion     | Resources used in after school club        |

## Appendix 2 – Project Schools' ICT development (based on Becta's self-review framework)

| School name         | Teachers' planning, use & evaluation | Learning with ICT | Leadership of learning & teaching | Overall Learning & Teaching level |
|---------------------|--------------------------------------|-------------------|-----------------------------------|-----------------------------------|
| Avocet House        | 2.00                                 | 2-3               | 2                                 | 2                                 |
| Beormund            | 2-3                                  | 2-3               | 3                                 | 2-3                               |
| Coxlease            | 4                                    | 3-4               | 3-4                               | 3-4                               |
| Lady Jane Franklin  | 2                                    | 1-2               | 1-2                               | 1-2                               |
| Muntham House       | 3                                    | 2                 | 3                                 | 2-3                               |
| Notton House        | 3-4                                  | 3-4               | 4                                 | 3-4                               |
| William Henry Smith | 2-3                                  | 3                 | 3                                 | 3                                 |
| Clifford Holroyde   | no response                          | no response       | no response                       | no response                       |
| Cuckmere House      | no response                          | no response       | no response                       | no response                       |
| Wandle Valley       | no response                          | no response       | no response                       | no response                       |

Project schools were invited to complete the Becta's self-review framework, Element 3: Learning and teaching. The self-review framework was used to provide the project with an impression of schools' use of ICT in the context of learning and teaching. (The self-review framework is intended to help schools to identify where their use of ICT is most effective and to plan the practical steps they can take to move forward. Using the self-review framework is a procedure that schools are expected to adopt anyway. At the time they were asked, no schools had done so as part of their internal management procedures.) No additional teacher classroom time was provided as part of the digital creativity project resourcing, so the researchers were mindful of keeping administrative demands to a minimum. The scale within the self-review framework is one to five with one being the optimum level of ICT development. Seven of the ten project schools completed the self-review framework. None of the project schools believed that they had reached the ICT Mark standard in all aspects of Element 3 of the framework. Two schools achieved the ICT Mark standard in the majority of areas within the Learning and Teaching strand of the self-review framework. The table summarises schools' self-evaluation of their ICT development.

## Appendix 3 – Laptop record sheet

### Usage and impact recording form – to be completed by teacher / LSA after each use

School: \_\_\_\_\_ Class \_\_\_\_\_

Session \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_

Pupils' names \_\_\_\_\_

Product archived to \_\_\_\_\_

| Learning objective(s) | Software / hardware used | Mode of use (group, individual, pair) (what they were doing) | Outcomes – pupil response & product |
|-----------------------|--------------------------|--|-------------------------------------|
|                       |                          |  |                                     |

## Appendix 4 – Digital creativity questionnaire

School: .....

Teacher's name: .....

Please tick (✓) as many boxes as you need. All responses are confidential.

**1. Can you access the Internet from school?** Yes  No

Nottingham Gateway Site Yes  No

Your Mac account Yes  No

Briefly summarise your difficulties:

.....

.....

.....

**2. What software have you used with your pupils?**

I Can Animate  iChat  GarageBand

iMovie  iPhoto  Photo Booth

iDVD  Comic Life  Other

**3. How many pupils are involved in digital creativity activities?**

1 – 2  5 – 10  Over 20

Less than 5  11 – 20

#### 4. How frequently do pupils access digital creativity activities?

- Everyday       Once a week       Once a term   
2–4 times a week       Once a month

#### 5. Can you describe how you have used digital creativity?

- Outside the school day       Art       Literacy   
In the school day but not curriculum related       ICT       Other curriculum areas   
Other

#### 6. Describe briefly the impact of digital creativity on pupils.

.....  
.....  
.....

#### 7. What do you think are the benefits of digital creativity for you / pupils / school?

| Myself | Pupils | School |
|--------|--------|--------|
| 1..... | 1..... | 1..... |
| 2..... | 2..... | 2..... |
| 3..... | 3..... | 3..... |



**8. What are the challenges of digital creativity for you / pupils / school?**

| <b>Myself</b> | <b>Pupils</b> | <b>School</b> |
|---------------|---------------|---------------|
| 1.....        | 1.....        | 1.....        |
| 2.....        | 2.....        | 2.....        |
| 3.....        | 3.....        | 3.....        |

**9. How do you see digital creativity developing in your school after the project?**

- 1.....
- 2.....
- 3.....

**10. Describe a digital creativity activity that worked well.**

.....

.....

.....

Thank you for completing this questionnaire. It will be used to summarise the work of teachers in the project.