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**Independent evaluation of the *Little Big Planet 2*  
project in Wolverhampton's Local Education  
Partnership schools:  
Outcomes and impacts**

**Final Report**

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Individuals and schools in this report have not been named, to ensure anonymity and confidentiality for those willing to provide evidence for research of this nature - this should in no way be seen as devaluing the commitment and contribution played by all involved.



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## 1. SUMMARY OUTCOMES AND FINDINGS

### The project in outline

- This project aimed to encourage teachers in schools to bring together teams of young people to use a well-known video game, Little Big Planet 2, to create new levels that would be published and used by other players.
- The project started with 15 schools and over 100 students.
- Teams of students were often selected by teachers, and most were run as after-school clubs.
- Many teachers recognised that students involved were not always involved in other school activities. Teachers did not create the ideas or do the programming for the project; they supported teams, facilitated work, provided a working environment, and offered advice.
- After some 5 months of activity, 25 teams in 7 schools had created a completed level.
- Those students not completing levels also gained a great deal of experience and interest along the way.

### Addressing industry needs of the future

- This project and its outcomes relate in important ways to current issues raised about the future of key industries in the United Kingdom (UK).
- The Livingstone and Hope report (2011) highlighted a major set of issues facing the video games and video effects industries in the UK. As they said: “difficulties filling vacancies are having a real impact on video games and visual effects companies’ growth prospects. They are forcing some companies to recruit from abroad, turn down lucrative work and in some cases move their operations overseas”.
- Ray Maguire, former head of Sony Computer Entertainment UK, and now the Chair of BAFTA’s Video Games Committee, said (in The Guardian, 2011) that he would like to see a computer club in every school to encourage young people to join these industries.
- In this project, 15 schools were involved, and evidence from students at the end of the project indicated that 6 more students had become interested in the video games industries, 5 more in the games software industries, and 4 more in the visual effects industries.
- The project helps students to think ahead. As one student said: “I think that it really helps you, as up until this, I hadn’t really thought about being in the gaming industry and that it’s something that you could do and a new experience of something that I have never done before”.
- If the level of outcomes from this project could be replicated across all 5,000 secondary schools in the UK, then 5,000 more young people would be likely to become interested in the video games and video effects industries each year. This could clearly have a marked effect on the current industry shortages.

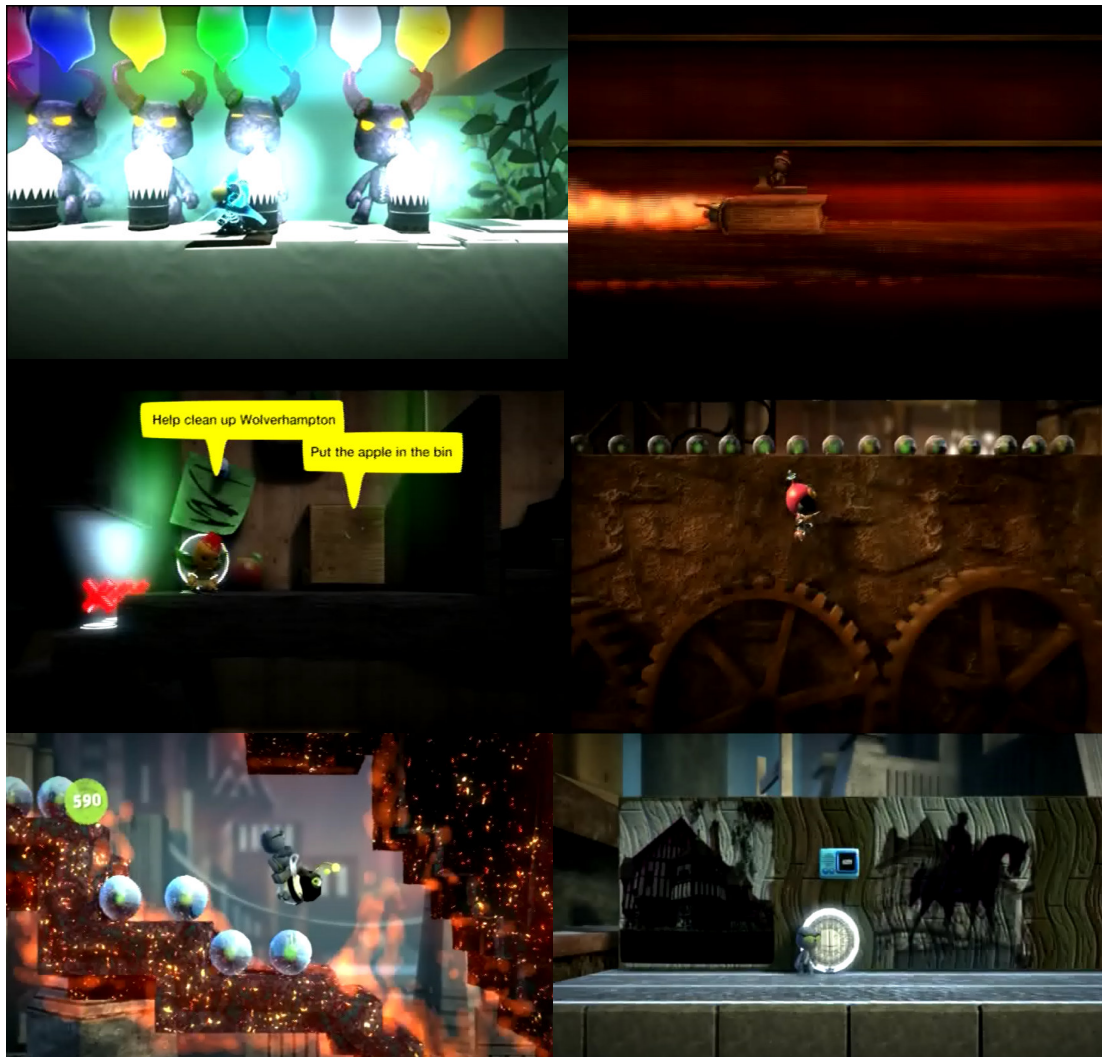
### The context of young people not in employment, education and training (NEET)

- This project relates importantly also to the future of employment and training for young people. A recent report by Sissons and Jones (2012) states that: “Almost a million young people in England are NEET. ... More young people are struggling to make the initial transition from education into sustained work”.
- The report goes on to say that: “Skills needs have changed in a way that makes it harder for some young people to access the labour market. ... In particular, soft skills are increasingly important for young people to access and maintain employment ...”
- This project has achieved three important outcomes: some young people who were disengaged from learning and likely to become NEET have become re-engaged through the focus of this project; the project has highlighted areas of potential longer-term employment that were unknown or little known to the young people previously; and the project required the young people to use and develop soft skills in parallel with the use of technical skills.

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### Types of creativity

- This project has engaged a range of students in creative endeavour. That creative endeavour has covered a range of different elements – artistic and planning, as well as technical.
- Members of teams tended to take different roles; artists created many different images and scenarios; designers produced a great many ideas for routes and challenges; programmers found ways to build the levels.
- Digital creativity has been at the heart of student endeavours. Figure 1 shows a range of the creative outcomes (although these 2D images cannot do justice to the real, moving forms).



**Figure 1: Montage of captured images from 6 different levels created by different student teams, demonstrating artistic, creative and technical abilities involved in building these scenarios**

### Development of soft skills

- Throughout the project, technical skills alone have not been sufficient for teams to achieve success. Teams have needed to use and develop a wide variety of soft skills.
- Communicating was vitally important. Teams spent many hours working together, planning and discussing details. They used their own social networking often to communicate. As one student said: “yes we often use instant messaging on our phones, sending each other ideas”.
- Gaining technical details enabled teams to overcome obstacles and create features within their scenarios. Students needed to seek specific help often to do this. As one student said: “I



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went online and communicated with a man in Germany who told me how to do this; he gave me the circuit board for that and I went on his YouTube too”.

- Working in teams was vital. Students often found they could work with others they had not worked with before, and enjoyed working towards a shared goal. As one student said: “[what I] most enjoyed? Our imagination to build stuff; in the game we communicated and worked as a team, pretty good actually”.
- Sharing and generating ideas was common. Some students were recognised as developing their abilities to share. As one student said: “We tested out ideas, got other people’s ideas, put them into use in this level”.
- Problem solving was important. As one student said: “[The] traffic lights bit - took me about an hour to make a car and ... took me ages...had to look through tutorials ... there are like Little Big Planet websites that show you the more advanced things”.
- Students sought to create a professional finish; they were not satisfied with less than the best. As one student said: “most of the time we was arguing and saying that we didn’t like this or that, but we sorted it all out and it’s come better than we thought that it would”.
- Student commitment was high throughout, and achievement was clear, as judged by the students themselves, the teachers, the supporters, and the research findings. As one student said: “I’ve put more work into this than my history work and other stuff. I put about 50 minutes a week into my history project and have put in an hour on the blog for this and another hour on the game. It’s actually taught me how to get stuff done”.

### Measuring soft skills

- The research methods used in this study involved the trial of a new instrument to measure soft skills. Based in part on the Qualification and Curriculum Authority framework of personal, learning and thinking skills (n.d.), the instrument gathered data from students about 16 different soft skills: thinking; problem solving; researching; generating ideas; identifying solutions; making; evaluating; communicating; scripting; story boarding; sequencing; logical thinking; artistic; team working; planning; and leadership skills.
- In this study, the instrument was used to chart self-reported levels of skills before, during and after completion of the project. A matched student group self-reporting their individual skill elements at the beginning and at the end of the project indicated that a range of individual skill elements in each skill set had moved further towards the ideal across the period of the project: thinking skills (5 out of 5); problem solving skills (3 out of 5); researching skills (4 out of 5); generating ideas (4 out of 5); identifying solutions (3 out of 5); making skills (3 out of 5); evaluating skills (5 out of 5); communicating skills (4 out of 5); scripting skills (4 out of 5); story boarding skills (2 out of 5); sequencing skills (3 out of 5); logical thinking skills (3 out of 5); artistic skills (4 out of 5); team working (5 out of 5); planning skills (3 out of 5); and leadership skills (4 out of 5).
- The project provided opportunities for students to review their skills. Based on teacher reports at the interim stage and comments at the final stage, the later survey scores are likely to offer a more realistic picture of student skills, since their earlier experiences would have been much more limited. On this basis, more reliability should be placed on final scores. Skill elements strongly self-reported at the end of the project (67% or more of the ideal scores, and all clearly important for application in longer-term employment and training) were: I usually think about things from different viewpoints; I usually take other people’s ideas into consideration; I can think of ways to handle problems; I can usually find details and information I need; I usually try out my idea to make sure it works; I modify what I’m doing if things need to change; I think carefully about what I’ve done and whether it’s as good as it could be; I think about information and ideas and whether they are useful or not; I check with other people whether they can understand easily what I’ve written; and I check how things are going regularly.
- The skills framework has enabled monitoring of soft skill developments. It should be verified further, for use in contexts where students can self-review, and compare their reports with other peers and teachers.

## 2. RECOMMENDATIONS FOR POLICY MAKERS

### **This project supports creative endeavour and outcomes**

- The outcomes of the project clearly encourage creative endeavour, across artistic, planning and technical arenas.
- The outcomes are real and authentic. Video games levels are created, that are published for others to use and report on.
- Few children of secondary school age have published a book. Yet 25 teams of students in 7 schools have had a video game level published as a result of this project.

### **Wider adoption could support future employment needs**

- This form of activity should be encouraged. Results from this pilot suggest that future industry needs and future employment challenges of young people could be supported positively.

### **The place in the curriculum needs to be considered carefully**

- Although some schools ran this project in lesson times (largely special and short-stay schools), most mainstream schools ran it in after-school clubs.
- It is clear that after-school clubs provide time and opportunities for creative work, developing artistic, planning and technical skills, and the development of wider soft skills in context.

## 3. RECOMMENDATIONS FOR CURRICULUM DEVELOPERS AND MANAGERS IN SCHOOLS

### **Implementation structure and planning is an important first step**

- This project was initiated by a sponsor (in this case the local education partnership), and an advisor (who provided contacts with key industry people, provided an important and valuable structure and framework, ran three workshops, monitored progress, and checked the final work).
- Both of these elements are important, and need to be accommodated in setting up a similar project.

### **One or more key teachers need to facilitate rather than teach**

- Key teachers need to make the project known to students. They do not need to be computing teachers, but support from computing teachers can certainly help. Key teachers may need to select teams, but selecting on the basis of potential team working and leadership rather than existing friendship groups may be more useful in the long-term.
- Key teachers need to facilitate – attending key workshops; discussing ideas with teams; advising on initial planning; providing a working environment; supporting meetings; and encouraging generally.

### **Communication channels should not be restricted**

- Student teams are likely to need to communicate a great deal. They need time to discuss details as well as to discuss overview needs such as plans and scripts.
- Students are likely to use their own communication channels, and may spend additional time outside school. Setting up bespoke digital communication channels is not likely to be needed.

### **Technical details are likely to be sourced by the students**

- Although teachers might advise students about finding technical solutions to problems, students are likely to know how to access some sources that are not familiar to teachers.
- Students are likely to teach each other. They will work independently but not individually; forcing them to work individually is not likely to lead to positive outcomes.

## 4. FINDINGS IN CONTEXT

### Background

- This initiative has provided opportunities for students to create game elements or ‘levels’ in a well-known video game, *Little Big Planet 2 (LBP2)* marketed by the major game company, *Sony*. It has involved students in team-based approaches and project-based activities. The content and nature of this project has interested a range of students with different interests.
- The initiative was established and managed by *inspire*, Wolverhampton’s Local Education Partnership (LEP), developed and supported by *Interactive Opportunities*.
- Initially, 15 secondary, special and short-stay schools across Wolverhampton LEP requested involvement in the project.

### The project

- The initiative, run through after-school clubs (and in a small number of cases in-class lessons) was supported through a series of workshop events.
- Students generally applied to lead teachers in their schools to be involved, and one or more teams were set up to work on the project. The aim of the project was to develop a game element or ‘level’. The student creator team needed to set up problems for a game-play character to solve, and the intention was that these problems should include some focus on aspects of Wolverhampton.
- The project ran between October 2011 and February 2012. Three workshop events were run across this period of time, roughly at monthly intervals, to support teachers and students involved in the project. These workshops were led by *Interactive Opportunities*.
- Workshop events were open to a lead teacher and two student ambassadors from each school. Those attending were able to gain ideas about planning and carrying out the project. The needs of teachers and students were accommodated through largely parallel sessions at these events.

### The research study

- The aim of the research study was to track the development and outcomes of the project, and to identify both short-term and long-term skills developed by students and teachers. Short-term skills included thinking skills, problem solving, researching skills, generating ideas, identifying solutions, making and evaluating outcomes. Long-term skills included interests in and aspirations about careers in the gaming and visual effects industries.
- For the research, a case study approach was adopted. Within this approach, qualitative evidence was gathered largely from observations of workshops, and discussions with teachers, while quantitative evidence was gathered from surveys completed by students and teachers following each workshop event.

### Project development and patterns of working

- These projects often attracted students who had not necessarily been involved in other projects or mainstream activities. Different team members were able to contribute different interests and skills to different elements involved in creating game levels.
- Involvement in after-school clubs required a high commitment from students, both in terms of attendance and in terms of the work undertaken. Many students also worked on the project at home, individually or in organised groups.
- In the team group activities, whether in in-class or after-school sessions, high levels of in-depth and focused discussion were generated and recognised in many instances.
- The affordances provided by the game were clearly important; the fact that students could construct and create in this game (rather than just playing it) was vital and central to the entire activity. Some students took central roles in identifying the features that the games software could offer in creating new levels.
- Many teachers found that they did not need to drive engagement, but that they did need to provide a structure, a framework, and to act as a facilitator. Additionally, an understanding at a

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technological level was found to be important in some cases, and teachers needed to know that they could gain and have access to details and knowledge they required at regular intervals or as they needed it.

- Enthusiasm for the project was very high at the outset (from 12 teacher and 19 student responses following the first workshop, 10 teachers and 18 student ambassadors gave unqualified responses that the project would be worthwhile), but different factors affecting student attendance came into play, especially during the first two months of the project. These factors in some cases affected team membership in a wide way and subsequently the continued viability of an individual team project was not always possible.

### Project outcomes

- This has been an important and successful project in a number of respects.
- Schools and students valued being able to work with popular and world-leading brands and products such as *LBP2*. They also valued contact with key professionals at the workshop events.
- Opportunities for students to be immersed in planning and creating, and having direct contact with professionals, provided a way of working that many had not previously experienced. This way of working was widely welcomed by students, and reports from teachers indicated that some students gained enormously from this element alone.
- Communication between teachers and key supporters was important. This communication often happened within the workshop events, while blogs and discussion forums accessible for those involved were not used widely in this project.
- Opportunities for students and teachers to gain and share ideas within the workshops was a vital component of the project. The importance of this during the first and second workshops was reported by both students and teachers.
- The completion rate for the project was in the order of 50%; about half of the teams that started were able to complete the project (teams in 7 schools completed levels by the end of the project).
- The project in at least one school was felt to be so successful and worthwhile, in terms of supporting student needs and leading to positive outcomes, that it will be integrated into the school curriculum in the future.
- Although some teams were not able to conclude the project by creating a level, there were many experiences and skills that they gained along the way, which were in themselves important. In one school that did not complete levels, for example, project involvement was reported by teachers to improve attendance at school and to improve engagement in lessons.
- Integrating aspects of Wolverhampton into the game levels was not an easy task. It was in this area that a great deal of challenge arose and a great deal of creativity was employed by students. Affordances of the video game creator in some cases limited what was possible and feasible in this respect.

### Outcomes for students and teachers

- Students involved in the first workshop gave their reasons for being involved; they felt it would be a worthwhile project, focused on an aspect that matched their personal interests, offering involvement in and gaining from new ways of working, opportunities to be involved in creative activity, and opportunities for working with others.
- Teachers at the same event gave their reasons why they felt it would be a worthwhile project; they said it focused around their concerns for widening learning opportunities or pedagogies, impacting the needs of individuals, developing team working, considering longer-term careers and interests, and supporting school curriculum development.
- Students felt the first workshop was useful; they reported it provided opportunities to create levels and try things out in the game, opportunities to play the game, to talk to those involved in game creation industries, to meet others and to work and share with them, and being given advice and demonstrations from professionals.

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- In the first workshop, teachers welcomed the presentation about the video games industry, receiving clear ideas of objectives of the project, clear ideas and resources for planning the project, knowing how to gain technical support if needed, and being able to play the game to become more familiar with it.
- At the time of the second workshop, the project was already in place, and the needs of students and teachers at that time had clearly shifted. In that second workshop, students welcomed opportunities to find out about technical features when creating levels, processes they could use when creating levels and aspects concerned with future planning. Teachers welcomed opportunities to share practices with other schools, seeing student engagement, and having information to take the project forward.
- In the third workshop, some teams were at more advanced stages of creating a new game level. In that workshop, students welcomed further opportunities to look at details for creating and designing game levels, being able to work with others in other teams, and planning for the end of the project.
- Following the third workshop, students reported that they felt the project had been useful particularly in terms of enhancing team working and team skills, personal interests, gaining technical skills, and gaining project skills.

### Student skills

- Many students believed their skills had been enhanced by the time they had reached the interim stage in the project. They reported that they felt the skills that had been developed particularly were team working (50 out of 55 students), communicating (42 out of 55), thinking (40 out of 55), generating ideas (34 out of 55), problem solving (32 out of 55), and research skills (32 out of 55). Student ambassadors highlighted other skills – logical thinking (15 out of 26 student ambassadors), artistic (14 out of 26), team working (22 out of 26), planning (17 out of 26), and leadership skills (19 out of 26).
- By the middle of the project, teachers felt that the skills most developed in their students were thinking (6 out of 10 teachers), team working (6 out of 10), generating ideas (6 out of 10), planning (6 out of 10) and communicating skills (5 out of 10).
- An analysis, of self-reported responses from a matched student group about their individual skill elements at the beginning and at the end of the project, indicated that a range of individual skill elements in each skill set have moved further towards the ideal across the period of the project:
  - Thinking skills (5 out of 5).
  - Problem solving skills (3 out of 5).
  - Researching skills (4 out of 5).
  - Generating ideas (4 out of 5).
  - Identifying solutions (3 out of 5).
  - Making skills (3 out of 5).
  - Evaluating skills (5 out of 5).
  - Communicating skills (4 out of 5).
  - Scripting skills (4 out of 5).
  - Story boarding skills (2 out of 5).
  - Sequencing skills (3 out of 5).
  - Logical thinking skills (3 out of 5).
  - Artistic skills (4 out of 5).
  - Team working (5 out of 5).
  - Planning skills (3 out of 5).
  - Leadership skills (4 out of 5).
- The introduction of this project provided opportunities for students to review their skills in ways that might not have arisen before. This being the case, it is likely that the later survey scores offer a more realistic picture of skills from the students, as their experiences of self-assessing their skills when responding in the first survey were much more limited. Skill elements that were strongly

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reported at the end of the project (assessed through student self-reporting at a level of 67% or more of the ideal scores), and clearly of importance in terms of future application to employment and training contexts, were:

- I usually think about things from different viewpoints.
- I usually take other people's ideas into consideration.
- I can think of ways to handle problems.
- I can usually find details and information I need.
- I usually try out my idea to make sure it works.
- I modify what I'm doing if things need to change.
- I think carefully about what I've done and whether it's as good as it could be.
- I think about information and ideas, and whether they are useful or not.
- I check with other people whether they can understand easily what I've written.
- I check how things are going regularly.
- Student awareness of the video games industry and potential career paths shifted across the period of the project. Numbers of students reporting their potential interests moved more towards two extreme positions – more indicating they were positively contemplating, or were positively rejecting, certain career path options.
- The numbers strongly contemplating careers in video games industries, in games software industries, and in visual effects industries all increased across the period of the project (6 more students indicated strong interest in the video games industries, 5 more in the games software industries, and 4 more in the visual effects industries, all out of a total of 31 students).

### Comments at the end of the project

- As one student said: *“What [I]’ve learnt in the workshop has been tra[n]slated into our game level, [I]’m thankful for the workshop as it has helped our game come to life and be what we want it to be. The things that [I]’ve found more useful are the help from the students that create games, help on planning the story from the leaders at the workshop and the chance to have a long time to just work on the game which meant I was able to really concentrate on the game development.”*
- As one teacher said: *“It has allowed the children an opportunity to be creative in a media form they might otherwise never have been able to [use,] as well as working in groups with students they do not usually work [with] in developing their independence and teamwork.”*
- Another teacher said: *“Children could relate to materials. Great for peer assessment and problem solving skills. It has enabled students to be part of an engaging project. However, in my experience the leaders tended to be the game programmers and the other team members did not have as much work to produce and lost interest a little sooner.”*



## 5. BACKGROUND AND PROJECT CONTEXT

### The project and those involved

*inspire*, Wolverhampton's Local Education Partnership (LEP), established a project in 2011 focusing on the use of a video game to support aspects of learning in a number of its Building Schools for the Future (BSF) schools. Working in collaboration with *Sony PlayStation* and *Media Molecule* (who are software developers of video game technologies for *Sony*), *inspire* supported the BSF schools taking part. The schools used video gaming technologies in ways that were designed to raise self-esteem, pride and motivation, using the technology in new ways applied to education.

*inspire* managed the project, while *Interactive Opportunities* (who handle *PlayStation* education strategy in the United Kingdom [UK]) provided direct support and guidance for teachers and students. *Interactive Opportunities* personnel provided workshops and on-site help, suggesting appropriate approaches to take and techniques to use (to 'help schools bridge the gap' and to get 'the best out of the game'). The project, using the *Little Big Planet 2* video game running on *Sony PlayStation 3* gaming consoles, sought to develop a range of skills in the short term – it aimed to develop engagement, thinking skills, creativity, problem solving, researching skills, generating ideas, identifying solutions, making and evaluating outcomes. In the longer term, with a known significant skills gap in the gaming and visual effects industries (Livingstone and Hope, 2011), the project sought to develop interest and aspirations for students involved, and to provide a wider understanding of career pathways and development opportunities, both for students and for the teachers involved. The objectives and practices deployed in this project also linked with the desire of video games industries to focus on more educational perspectives within products.

### Schools and students involved

In September 2011, *inspire* gained interest from a wide range of BSF schools. In total 15 schools signed up to the project and 260 learners were initially involved (mainly in Key Stage 3, 11 to 14 years of age). Each school received 20 free licensed copies of *Little Big Planet 2* for use by students and teachers at school and at home, and one *Sony PlayStation 3* console to support school-based activity.

Each school worked with some 10 to 15 students in one or more teams. To gain important details to run the project, each school selected one teacher and two student ambassadors, who were involved in workshop events, supported by personnel from *Interactive Opportunities*. Three workshops were run during the Autumn Term 2011. In these workshops, teachers and students had access to experts from the gaming industry; they received practical advice, feedback on their development, and ideas and offers of extension activities. Online support and resources were provided throughout the duration of the project. The teachers and student ambassadors took ideas and experiences back to their individual schools, and then worked with all students involved in the creative element of the activity in after-school clubs (some 10 to 15 students in each school).

### The video game

*Little Big Planet 2* (LBP2) is a video game played by some 4 million people in the UK alone; the game enables 'levels' to be created, saved, and played by others. There have been over 200,000 'levels' created internationally. The intention of the Wolverhampton LEP project was to provide a school team, through a teacher and two student ambassadors, with skills and knowledge to be able to create 'levels' that other students in the school could then try out and play.

A 'level' is a game event; a character encounters a range of obstacles in moving across the screen environment and needs to solve a series of problems (which might be questions to answer or puzzles to solve, for example). In this project, a student creator team needed to set up these problems for a game-play character to solve, and the intention was that these problems should be focused on aspects of Wolverhampton. Different school groups could focus on different aspects of Wolverhampton's environment, history and life, so a number of different 'levels' could be created across all schools.

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Some might focus on Wolverhampton industries, while others might focus on historical aspects, or locality and architecture, or music, for example. The student creator teams needed to take a design approach to the creation of a 'level' – designing it beforehand, writing up their ideas in detail, refining them, putting them into practice, and evaluating them. Technologies were used to support this approach – for example, ideas and progress could be recorded on a blog, and practice could be shared with others. It was anticipated that other students in the school would try out and play the 'levels', and would provide feedback to the creator team. 'Levels' created by teams were to be published and played live on the *PlayStation Network*.

### **The time line for the project**

Within each school there were students who were ambassadors (those attending workshops and sharing their experiences with others), creators (those in after-school clubs who created a 'level'), and players (those who had not created a 'level', but who played it and tried it out and provided feedback).

The project was launched with a teacher briefing on 28<sup>th</sup> September 2011. Three workshops were subsequently run by *Interactive Opportunities* during the Autumn Term 2011. The first of these was run on 5<sup>th</sup> October 2011, providing details to get the project started. The second focused more on progress being made and heightening the skills of creator teams on 3<sup>rd</sup> November 2011, while the third focused on a review of game 'levels' being produced on 6<sup>th</sup> December 2011. Across the period of the project, three advisors from *Interactive Opportunities* were available to visit schools, to support the teams working in the after-school clubs.



## 6. RESEARCH DESIGN AND APPROACHES

### The research design

The purpose of the research study with *Little Big Planet 2 (LBP2)* was to identify, across all schools using these technologies in Wolverhampton LEP: the development of 21<sup>st</sup> century skills - the skills that employers and trainers are asking for, that might be developed in the short term (over a 6 month period); the widening of career opportunities - the longer term routes that students and teachers become aware of when they create games; and a consideration of 'building scenes for learning' - alternatives to texts or notes, that have in the past been presented to students in book or video form, or have been created as text notes by students, which could be developed through these forms of technologies.

The project provided opportunities for students and teachers to be involved in activities from which two distinctly different sets of skills and understanding might develop:

- Short-term outcomes, involving learning aspects such as thinking skills, problem solving, researching skills, generating ideas, identifying solutions, making and evaluating outcomes. As a part of the support for the project, students were introduced to and encouraged to use a framework called PRISME (Problem, Research, Ideas, Solution, Make and Evaluate) to achieve professional outcomes. They were encouraged to work through processes including scripting, story boarding, sequencing and logical thinking. Additional skills such as artistic skills were involved in the design process and when teams were planning 'levels'.
- Long-term outcomes, concerned with interests in and aspirations about careers in the gaming and visual effects industries. These aspects were to be introduced through exposure to support personnel from *Interactive Opportunities*, exposure to online support and resources from *Media Molecule*, and, at the end of the project, a visit by a selected number of students to the *Media Molecule* production offices.

The study approach and methods were designed to cover these two distinct areas of potential impact. The research approach took account of a previous related study undertaken by the lead researcher (Passey, 2006), commissioned by the then government department for education (DfES), together with pertinent research studies and reports (such as the review by the DfES, 2005; and the recent Nesta review by Livingstone and Hope, 2011).

### Research approaches

The overall approach adopted for this research aimed to develop a robust case study, which would include elements in the research report of both a qualitative (indicating the types of outcomes, their characteristics and their importance) and a quantitative (indicating frequencies and levels of outcomes arising) nature. The case study was developed and reported using elements suggested by Yin (1994): an overview of the case study project (its objectives, issues, and topics being investigated); field procedures (including role of the researcher, access to evidence, and sources of information including documents, interviews, and direct observation); case study questions (specific questions that the investigator explored during data collection); and an analysis of the results (in terms of relevance and relationship to the proposed framework).

The research sought to answer a number of specific and pertinent questions:

- How do students and teachers judge their thinking, problem solving, researching, idea generating, solution identifying, making, evaluating, scripting, story boarding, sequencing, logical thinking, and artistic skills at the outset of the project?
- How do students and teachers judge their awareness and knowledge of career pathways and career development needs in the gaming and video effects industries?
- How do these areas of skills develop across the period of the project?
- What do students and teachers gain and achieve by the end of the project?

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- What examples of practice and outcomes indicate that key skills have been gained and achieved?
- What lessons does this project offer to the wider educational and industry communities?

### **Research study structure**

The study was structured to enable the gathering of appropriate evidence to answer the research questions listed above. To explore the development of short-term and long-term outcomes by students and teachers, a form of initial benchmarking was required, followed by two further evidence gathering exercises – an interim exercise in late Autumn Term 2011, and a final exercise at the end of the project in February 2012. To plot progress as the project developed, and to explore how and which skills developed over time, a round of evidence gathering was undertaken about half way through the Autumn Term (in November 2011). The timing of the evidence gathering coincided with the three workshop events; a researcher attended each workshop event, and appropriate data gathering instruments were created and made available at those workshops for completion by teachers and students (or very soon afterwards for those students not attending the workshops themselves). Data gathering instruments were developed and provided in online form, using the facility available to the Department of Educational Research, called *SNAP*.

### **Research methods**

Research evidence was gathered in a range of ways. Evidence was gathered when the researcher attended the three meetings run by the LEP and *Interactive Opportunities* for teachers and two student ambassadors from each school. Quantitative data was gathered through a baseline skill questionnaire, through an interim skill survey, and through a final skill questionnaire once ‘levels’ had been completed. The evidence was enhanced by discussions with teachers and teams in some schools, and from final audio and video feedback from all teams completing a game ‘level collected by the project advisor from *Interactive Opportunities*.

### **Ethical considerations**

None of the data gathered for this study were ‘personally sensitive’. To ensure security, anonymity and confidentiality for those involved, the following approaches were adopted:

- Online questionnaires for students and teachers. These were produced using *SNAP*. Information about the nature of the questionnaire and its uses were provided for those accessing them. Users were asked to use a character pseudonym rather than their name, but they were asked to provide their school name when completing questionnaire details. The online survey system used, *SNAP*, did not set up any electronic links with individuals or electronic systems when the online questionnaires were completed.
- Subsequent discussions with teachers were handled in a similar way. Confidentiality and anonymity relating to individuals and to individual schools was guaranteed.

### **Schedules for the study**

There was a need to develop bespoke data gathering tools for this study, in order to match evidence gathering to the aims of the project, and in order to match the design of the tools with the age groups and different categories of stakeholders (teachers, student ambassadors, student creators, and student players) involved.

Schedules were devised, drafted and shared with agreed project personnel, and made accessible online, ready for use for the first round of data gathering on 5<sup>th</sup> October 2011. Other schedules were devised and were accessible prior to or immediately following the other two workshop event dates.

### **The evidence base**

At the outset, 15 schools were enrolled in the project. Evidence for this report was gathered from observations at workshop events, but more was gathered via online questionnaires from schools directly, from teachers, students involved, from some visits and discussions, and from the audio and

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video feedback gathered at the end of the project. The extent of the school evidence base reported is shown in Table 1 following. This table shows that evidence was gathered from 13 of the total 15 schools.

**Table 1: Extent of school evidence base gathered for this report**

School	Responses to Survey 1			Responses to Survey 2			Responses to Survey 3			Discussions with teachers in schools
	Teachers	Students		Teachers	Students		Teachers	Students		
		Ambassadors	Team members		Ambassadors	Team members		Ambassadors	Team members	
A	2	2	6	2	1	1	-	-	-	-
B	-	-	-	-	-	-	-	-	-	-
C	1	2	12	1	3	13	1	2	7	1
D	1	2	3	1	1	2	-	-	-	-
E	1	2	3	1	3	3	-	-	-	-
F	1	1	8	1	4	8	-	2	4	-
G	1	-	2	-	-	-	-	-	-	1
H	1	2	17	1	4	10	1	3	8	-
I	-	-	-	-	-	-	-	-	-	-
J	1	2	3	-	-	1	-	-	1	-
K	1	2	4	-	6	1	-	2	1	1
L	-	-	-	-	-	-	-	-	-	1
M	1	1	-	1	-	-	-	-	-	-
N	1	1	15	-	1	3	1	2	9	-
O	-	2	15	-	1	11	-	-	1	-
$\Sigma$	12	19	88	8	24	53	3	11	31	4

It should be noted that some student responses did not indicate the names of their schools, and these records are not included in the figures shown in this table, but are included in the responses presented in subsequent sections of this report.

Using student and teacher responses as an indicator of completion, 7 schools completed the project and provided levels of evidence at the end of the project. (It should be noted that the final audio and video feedback from these 7 schools completing 'levels' is not shown in this table.)

## 7. A SHORT REVIEW OF THE RESEARCH LITERATURE

### **A short background to research into games-based learning**

There has been a great deal of research conducted in the area of games-based learning. A number of reports provide a range of summaries and overviews, and consider current and future implications (DfES, 2005; Bober, 2010; Kirkland, Ulicsak and Harlington, 2010; Ulicsak and Williamson, 2011; Livingstone and Hope, 2011). The most recent of these reports highlights the current context and future concerns for the UK video-games industries; it argues for a need to support wider interest in and recruitment in areas of video game development skills.

Other reviews and research reports have focused more on the learning outcomes arising from uses of video-games in educational settings. Rosas *et al.* (2003) in their overview and meta-analysis of 15 research studies reported that uses of games could strengthen and support aspects of school achievement, cognitive abilities, motivation towards learning, and attention and concentration. But at an individual research study level, it is clear that not all studies show all of these outcomes, and that there are important key determining characteristics to consider at an individual project or games-use level. For example, Kebritchi, Hirumi and Bai (2010) studied a total of 193 students and 10 teachers using a mathematical game and their results “indicated significant improvement of the [mathematical] achievement of the experimental versus control group.” But, “No significant improvement was found in the motivation of the groups.” Also, “In addition, Kebritchi, Hirumi and Bai (2010) found that what teachers did before and after game play was as important, if not more so, to learning than the game itself, further substantiating the importance of design” (Hirumi, 2011). Engagement with games-based learning is also not necessarily gender biased. Carbonaro, Szafron, Cutumisu and Shaeffer (2010) studied game construction in grade 10 English classes and “showed that females enjoyed this activity as much as males and were just as successful.” These researchers concluded overall that “a) computer game construction is a viable activity for teaching higher-order thinking skills that are essential for Science; b) computer game construction that involves scripting teaches valuable Computing Science abstraction skills; c) this activity is an enjoyable introduction to Computing Science; and d) outcome measures for this activity are not male-dominated in any of the three aspects (higher-order thinking, Computing Science abstraction skills, activity enjoyment).” Importantly, the studies focused on learning that each specific game could support, but across short time scales, while future impacts and transfers of learning outcomes were not explored.

### **Some key points concerned with this research**

So, if research in this area is to meet a number of future needs, the scope and duration of research studies needs to match the forms of findings being sought. The ways that employment ideas develop as well as those of short-term skills need to be considered carefully within a research design. Current games-based learning research studies are often short-term, they look at specific indicators, and do not necessarily identify longer-term transfer and motivational outcomes. Importantly, games vary, and outcomes from student involvement will clearly relate to the structure and affordances provided by specific games.

## 8. THE PROJECT IN SCHOOLS

### Important features of *LBP2*

It is certainly possible to play *LBP2*, but, importantly, it is also possible to construct games or ‘levels’. This form of game construction is important; it is the creation of games or ‘levels’ that is the focus for this project, rather than the gaining of knowledge or ideas through playing the game. The completion of successful game construction requires a wide range of skills to be brought together. Some of those skills are technical, but others include artistic, team working, logical thinking and planning skills. This project provided a framework through which school teams could construct games or ‘levels’.

### How the project worked in schools

The project was organised and supported by Wolverhampton Local Education Partnership (LEP), *inspire*. Schools taking part asked students to apply to be involved in a project team. Generally, teachers chose members that would work in teams. *Interactive Opportunities (iO)* introduced ideas and a project structure to teachers and school ambassadors through the three one-day workshops. Teams worked most often in an after-school club, but some worked within lesson time (especially those teams working in special and short-stay schools). Student members often had identified roles, but they also worked collaboratively and flexibly to bring elements of planning and structure together.

### The first workshop

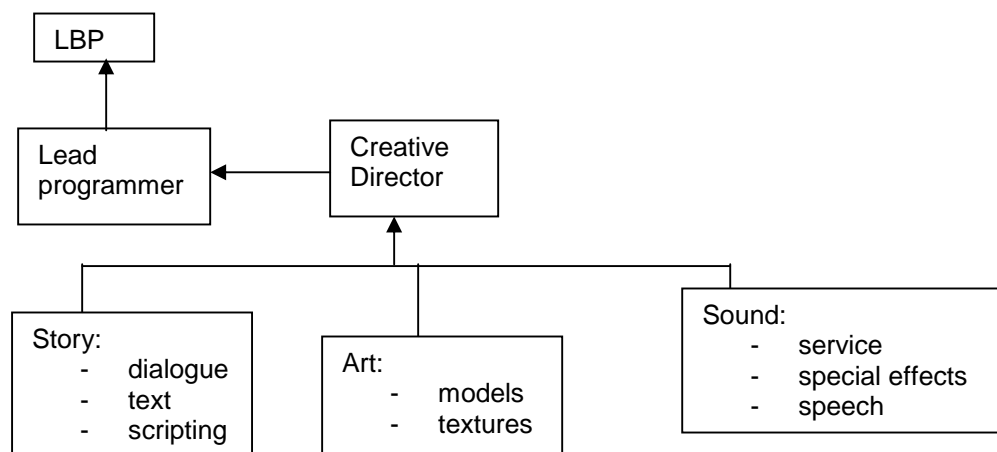
The first workshop (and subsequently the other two workshops) was run by *Interactive Opportunities*. The managing director of *Interactive Opportunities* was supported by three other support providers, who focused more on providing details about the background technologies, supportive technologies such as the blog, and ideas about the competitive element of the project. Two young computer game designers seconded from their college courses also attended and supported student ambassadors directly. The workshop was divided largely into two parallel sessions – one session supporting the teachers; and the other session supporting the student ambassadors.

A key speaker at the workshop was a well-known games developer, Jon Hare. He was able to put the aims of the project into a professional games development context. He indicated how the UK had fallen from its lead video games development position of being first or second internationally, to a fifth or sixth position currently. He emphasised the roles of creativity in the industry – both being able to think creatively to develop games, but also to have ‘business creativity’. He highlighted the need to balance artistic, technological and business sense; ‘high innovation does not ensure business sales’. He said that it was not until 1990 that 3-dimensional (3D) graphics were introduced to games development, and that he had used 3D on the Amiga platform from 1991 in games development, producing perhaps one new game each year. He said that the approach adopted in games development was to focus on a successful game and then consider how to convert it to a new game. He said that, at that time, publishers were often quite small businesses, but that this phase of development was superseded by a phase when much larger companies were involved, such as *Sony*. He said that it was not until 1998 that 3D elements of games were involved very strongly, and that 2004 marked the start of the development of mobile games. He indicated that the industry had traditionally been quite male dominated, and that development teams could form what he called a ‘battle of egos’, but that some companies (such as *Nikitova*) had been led by women, and some half the designers in the games industry currently are women. He indicated, importantly, that he believes that the future of the industry will now depend more on ‘new’ games on ‘new’ devices, created through ‘small teams’. He said that the British Academy of Film and Television Arts (BAFTA) wants to take an active part in encouraging new people to move into video games industries. He indicated that there are opportunities for different interests and different approaches; some people like to ‘make it themselves’; others prefer to ‘work for others’. He stated the importance of fundamental roles involved in team working – a creative director (manager), lead programmer, producer, artists, and sound creators; a fusion of art, technology and business.

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Other support personnel led other sessions for teachers and for students. One of the lead support personnel described and demonstrated to teachers the technology systems that were being made accessible to schools. He indicated that each school would be provided with a *Sony PlayStation3* unit, a controller, and a USB cable, but no screens, as the technology could be connected to a projector or a high definition (HD) monitor with a high definition multimedia interface (HDMI). Contact details for teachers were gathered, and he indicated that a website was being created as a channel for information, and that it would include a blog, to discuss points, observations and questions via a forum. He emphasised that the project was using an online resource to create *LBP2* levels.

The managing director of *Interactive Opportunities* focused on the question - what to do next. He indicated that a starting point would be to do a brainstorming activity, to think of links to Wolverhampton. He outlined what it would be useful to do in team group sessions each week over the following 3 weeks. For Week 1 he suggested creating a mind map with the student group. For Week 2 he suggested designing a 'level' sheet, considering roles and responsibilities, whether there were enough people to do all that was needed, enabling strengths of individuals, considering that the 'computer is the master', taking a multimedia approach, using voice, sound, music, imagery, pictures and movement, including the needs for design, production, editing and programming (see Figure 1 below, based on a model offered by Jon Hare). He emphasised that teams should avoid one dominant student acting, and that the focus of the development should be on one person playing the level created for *LBP2*.



**Figure 1: Roles and responsibilities involved in developing LBP2 (Source: based on a model from Jon Hare)**

The managing director of *Interactive Opportunities* went on to suggest that storyboarding of the level should be the focus of Week 3. He stressed the need to know what *LBP2* can do first, as this would influence what could be considered in terms of planning for the levels.

In the student sessions in the workshop, students started to work on levels and to create elements of levels. This initial work indicated some of the features that the game could afford and those that it could not. For example, some students needed to consider how to build within levels a feature such as strength of gravity, and they also found that it was not possible to include video. They were shown that certain fundamental elements concerned with creating the game (features in the bottom three boxes in Figure 1) could all be done at home. Students were told that: "It isn't just sitting at a computer – it's what can be done at home and without a computer."

By the end of the day, one teacher said that two student ambassadors who attended the workshop, who both experienced emotional and behavioural difficulties, had been 'more focused than they have ever been. They have not experienced *LBP* before, but really enjoyed it'. They said it was the 'best day of



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their life'. They had clearly felt it had given them a level of interest they had not experienced before. Both boys had attention deficit hyperactivity disorder (ADHD), but were, as a result of the day, looking forward to going to school - for the first time ever. They were clearly learning from actively doing rather than learning from sitting, listening and thinking, and were positively engaged in a form of activity that brought them into contact with a mix of professionals.

### Numbers responding following the first workshop

A first survey was completed by students and teachers following the first workshop. In this first survey teachers from 12 schools (secondary, special, and short stay) responded, and, in total 109 student responses were received. Of these, there were 19 student ambassador responses (from across 11 schools), and 90 student team member responses (from across 11 schools).

### Student responses to the first workshop

Of the 19 student ambassadors attending the first workshop, 18 said that they thought it would be a useful project, and one said 'not sure'. The reasons they gave for believing at that early stage that it would be a useful project were:

- Its match with their personal interests:
  - Creating your 'own stuff' or levels (3 students).
  - Being involved in something I'm interested in.
- Involvement with new aspects or possibilities:
  - Interest in different job careers (2 students).
  - Getting involved in the concept of game design and visual effects.
  - Showing and teaching in a very different way.
  - Bringing technology into the school.
- Involvement with creativity:
  - Being able to demonstrate creativity and map creating skills (2 students).
- Working with others:
  - Developing team working skills (2 students).
  - Learning how to play to someone's strengths.

When asked if they found the workshop event useful, 15 said 'yes, a lot', and 4 said 'yes, some of it'. The aspects of most interest they reported most often were concerned with creativity and problem solving, playing the game, contact with those in the games industry, and team working. The aspects of most interest or use they reported were:

- Creating levels and trying things out in the game (8 students).
- Playing the game (7 students).
- Talk from those involved in the games creation industry (7 students).
- Meeting people, working together and making friends (6 students).
- Being given advice and demonstrations from professionals (4 students).
- Good and interesting graphics (2 students).
- Understanding the relationship between the computer and making the game.
- Building trust.
- Developing the imagination.
- Leadership skills.
- Lunch.

### Teacher responses to the first workshop

Of the 12 teachers responding, 10 thought the project would be useful, and 2 said they were 'not sure'. When asked why they thought it would be useful, they indicated:

- Their interests in widening learning opportunities or pedagogies:
  - Adding another dimension to students' learning (2 teachers).
  - Investigating new teaching and learning methodologies.

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- Offering a practically-based activity but with recordable outcomes.
- Concerns about impacting on the needs of individuals:
  - Re-engaging some students (2 teachers).
  - Raising self-esteem.
- Concerns about developing team working:
  - Providing opportunities for students working together and to collaborate on a project they see as enjoyable (3 teachers).
  - Offering a chance for pupils to develop communication skills.
- Concerns about longer-term careers and interests:
  - Offering a useful insight into the games industry.
  - Encouraging pupils to consider a career in ICT and possibly the computer games industry.
- Concerns with supporting school curriculum development:
  - Providing a collaborative project where different subjects can come together (2 teachers).
  - Demonstrating to other members of staff or the senior leadership team how other equipment can be used in school.
  - Helping other staff consider the value of computer games within the curriculum.
- Concerns about potential benefits but with uncertainty about specific outcomes:
  - Benefiting in some way but not sure how and to what extent at the moment (2 teachers).

Teachers were asked how many students would be in their teams. This ranged from 5 to 20, with an average in the region of 10. When asked what the teachers thought their students would gain from the project, they indicated:

- Gains concerned with team working:
  - Working collaboratively in teams (12 teachers).
  - Listening to the ideas of others.
- Gains concerned with key skills:
  - Key creative skills (3 teachers).
  - Communication skills (3 teachers).
  - Leadership skills (2 teachers).
  - Problem solving.
  - Developing personal learning and thinking skills.
  - Researching their surroundings.
  - Project management skills.
- Gains concerned with personal or social needs:
  - Enjoyment (3 teachers).
  - Self-esteem (3 teachers).
  - Self-confidence (2 teachers).
  - Mixing with new social groups.
- Gains concerned with the games industry and career interests:
  - Better understanding of the games industry (2 teachers).
  - Possible career interests (2 teachers).
- Gains concerned with engagement in learning:
  - Engaging students with alternative teaching and learning approaches.

When teachers were asked if they found the workshop event useful, 7 said 'yes, a lot' and 5 said 'yes, some of it'. When asked which aspects they found most useful or interesting, they highlighted:

- The presentation about the video games industry (6 teachers).
- Having clear ideas of the objectives of the project (5 teachers).
- Having clear ideas and resources for planning the project (4 teachers).
- Knowing technical support is available if needed (4 teachers).
- Being able to play the game (3 teachers).
- Suggestions for roles and responsibilities within the team (2 teachers).



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- Seeing pupils working together on the program (2 teachers).
- Discussion about developing levels in the game.
- Having separate student and teacher sessions so that each could gain appropriately.
- Networking between schools.
- Opportunities for students to learn new skills while playing the game.
- Enthusiasm of the team.

### **The second workshop**

The second workshop also separated teacher and student sessions during the morning. In the teacher session, one of the lead support personnel led a discussion to allow teachers to bring forward and discuss issues arising. Some email issues were recognised, and the lead supporter clarified that there was a login available for a dedicated teachers' site in the form of a closed forum for the project. During this session, issues and responses from teachers varied, but their responses indicated a continued eagerness for the project, but highlighted the fact that students had more time available than did the teachers:

- A teacher in a short-stay school said that: "Kids are loving it", that they were "doing it in lessons, not clubs", that he was "lucky with size of groups," and that "kids are working together well".
- A teacher in a secondary school said that getting back after half term, fewer students were involved. He indicated there were issues of finding sufficient time. He was able to give three hours per week, but for all students to access the tutorials he would have liked to have provided access each lunch time. He had divided the lunch club into two sessions, then did also an after-school club. He found also that students were not so eager with storyboarding.
- A teacher in another secondary school indicated that he had only one hour available, so found that there was difficulty in handling the amount of assets students provided in the time available.
- A teacher in a special school said that he had not been able to do that much by that time, and needed a longer time-frame.
- A teacher in a secondary school indicated that he would prefer to keep to the Christmas deadline for the end of the project.

Following the discussion, it was decided that the project finish date would be the February 2012 half-term, but with some flexibility, allowing some schools to finish earlier if they wished.

Students worked on elements that would contribute to their levels in their sessions, and also shared with the professionals the work they had done on storyboarding and notes they had created. Although teams in schools had started to develop storyboards and levels, the focus of the levels on Wolverhampton was not clear in all the notes, storyboards or games being produced. Looking at the storyboards and notes created by the team groups represented at the workshop, it was clear that some had incorporated aspects of Wolverhampton into their planning and thinking more than others. Although there was no obvious integration of aspects of Wolverhampton in the case of 4 school storyboards, town places appeared in one, the school and the past of Wolverhampton appeared in one, Wolverhampton history appeared in two, places and industry appeared in three, people in Wolverhampton appeared in three, and the Wolverhampton football club appeared in one.

Some teachers indicated how they had focused specifically on aspects of Wolverhampton, in order to enable students to have ideas to incorporate into their game level. In one short-stay school the teacher ran the project in lessons, for 2 hours a week, involving students across Years 7 to 9. Some parts of lessons had focused on researching aspects of Wolverhampton that could be included in the levels being created – looking at famous people, famous places, and famous industries. Other parts of the lessons had focused on playing the games. Students in lessons had created storyboards in the first half term of the Autumn Term 2011. After the workshop, they intended to start to create levels. Although the teacher said the students tended to shy away from writing, it was noted that they were working

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together in teams – the co-operation was coming through, in terms of sharing skills concerned with making levels. In this school, groups had a maximum of 4 students.

Certainly looking at the ways that the students were recording ideas through storyboards and notes for this project raised some key questions about what is meant by learning, and how we learn. The real world exists in audio (sound surrounds us), in colour, and it is moving, rather than being static. Education has tended to make the world more static (through texts and on pages) and non-moving (in diagrammatic or in text forms). It is the mind or imagination that creates for us an internal sense of text and diagrams, perhaps putting them into colour, with moving and audio forms. It was noticeable in the notes and storyboards that students were making ‘3D colour’ notes. They put down markers that allowed them to associate ideas that they could then remember in audio, colour and moving forms. It was clear that students were doing this in order to relate their notes to the creation of levels in the game, which would be in audio, colour and moving forms. There is a question that is raised, therefore, as to whether this form of practice - creating game levels - might be changing (or lead to a changing of) educational practice potentially in certain ways. If this form of creation was taken further, the question could be asked as to whether this form of technology could be used by students in the future to create notes and presentations that would serve some students better. Although the technologies would need to be developed for this purpose more, it is a question that is certainly worthy of further and future consideration.

During the sessions, the depth of involvement of students was highlighted by some teachers in discussions. One teacher in a secondary school indicated that social outcomes arising from engagement in the project were both strong and important. He said that students felt their roles to be important (and this was also the case in another project-based activity – the BBC News School Report, evaluated by Passey, 2008; Passey and Gillen, 2009). Another teacher in a secondary school said that students were arranging meetings outside school, at their homes. A teacher in yet another secondary school said that to help to engage boys who were not engaging in mainstream activities he gave his time to support sessions three lunchtimes a week, but that the benefit arising was demonstrated by higher levels of engagement, their feeling special, feeling a sense of responsibility and the need to ‘do it’.

### **Numbers responding following the second workshop**

By the time the interim stage survey was completed, numbers of students reporting had decreased. In total, 55 student team members and 26 student ambassadors responded (81 students in total), and 10 teachers. By that time there had already been some students who had left their teams (for a variety of reasons including moving out of the area), and at least one team was no longer involved in the project.

### **Student responses to the second workshop**

Of the 26 student ambassadors responding after the second workshop, 15 said they had played *LBP2* a lot as a part of the project, while 11 said they had played it to some extent. Of these, 24 said they enjoyed playing it, while 2 said they did not. When asked what they liked about it, they highlighted:

- Creative aspects:
  - Creative activity involved in making your own levels (7 students).
  - Allowing you to use your imagination (2 students).
  - Liking making things.
- Personal challenge and purpose:
  - The challenge of trying to complete the levels successfully (3 students).
  - Everything (2 students).
  - Playing for a reason.
  - Adventure and complicated issues to address.
- The form of the game:
  - The levels (2 students).

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- Easy to play (2 students).
- Amazing features (2 students).

When asked if they had found the second workshop useful, 14 said ‘yes, a lot’, 3 said ‘yes, some of it’, and 4 said ‘not really’. They were asked which three things they found most useful or interesting.

They highlighted:

- Finding out about technical features for creating levels:
  - How to include certain features in the game level (6 students).
  - How to do more things (4 students).
  - How to use visual scripting.
  - How to edit and refine ideas.
- Processes that could be used when creating levels:
  - Experimenting when making new levels (2 students).
  - Completing more of the level itself.
- Aspects concerned with planning the project:
  - Sharing ideas with others (4 students).
  - Thinking more about what was needed to complete the project (2 students).
  - Researching about Wolverhampton.
- Playing the game (2 students).
- A specific technical aspect not focused on the project itself.

### Teacher responses to the second workshop

Teachers were asked whether they still thought this would be a useful project. Of 10 teachers responding, 6 said yes, 1 said no, and 3 said not sure. When asked what reasons there were for changing their mind, one teacher said: “I still believe it is a useful project, especially the cross-curricular links, in particular how the project links into the STEM agenda. However, there is still need to iron out the logistical issues such [as] number of devices and allocating sufficient time, inside and outside of school hours, to complete the project.” Another teacher indicated lack of support from the school overall.

When asked whether the teachers had found the second workshop event useful, 6 said ‘yes, a lot’, 2 said ‘yes, some of it’, and 1 said ‘not at all’. When asked what aspects were found most useful or interesting, teachers highlighted:

- Sharing practices with other schools:
  - Finding out about successes and problems encountered (5 teachers).
  - Finding out how other schools had approached the project (4 teachers).
  - Sharing ideas and experiences with other colleagues (3 teachers).
- Seeing student engagement:
  - Witnessing student enthusiasm and engagement (3 teachers).
- Information to take the project forward:
  - Practical information of how to move forward with the project.
  - Technical features needed.

### The third workshop

The third workshop again separated sessions for teachers and students. The teachers initially met with a lead supporter, who confirmed the end of the project period (February 2012 half term or earlier). He indicated the need to consider sustainability of the project, and also discussed the ways that levels created could be saved and handled online. Other uses of equipment to view or play the game and levels were also discussed. He indicated that a judging team for the project outcomes had at that time been decided. The lead supporter encouraged teachers to raise issues and points. One teacher shared a comment from a student that this was the: ‘Best school project we’ve ever done’. The teacher is now incorporating this project into the standard curriculum.

In another session, the managing director from *Interactive Opportunities* discussed student outcomes that had arisen that far with the teachers. He said that most groups had retained their roles and responsibilities – to design, or create, for example. He indicated that some levels created were quite complex, and that students needed to know more about the technology to complete these, but there was learning happening as the project proceeded. He said that it was difficult for some groups to stay to their story line, as they did not know what features might be possible at the outset. He said that all groups represented at the workshop event had done something to be ‘really proud of’, that students were able to discuss and describe their work well, and that they had been thinking about how easy it would be for others to get through their levels. He indicated the high levels of communication outside sessions in schools; that students wanted their outcomes to look right, and that their terminology was being clearly developed (such as use of the term ‘grapple’).

From discussions with teachers and observations of students in sessions, high commitment from students was clear in this project. One teacher said that he was ‘excited with new skills [used]’, that the focus of discussion for students could often be difficult, but that the discussion involved was at a very high level. One teacher indicated that ‘street cred’ was important, and that this project gave ‘street cred’ to students. Another teacher said that teachers could not lead on this, that students had to lead, and teachers had to facilitate.

This project provides an example of where a project-based activity has been moved into an after-school club environment. Discussions with teachers also suggested that while teachers were concerned about time needs, that teacher stress levels had not always been high – teachers had supported rather than needing to lead.

### **Numbers responding after the third workshop**

By the time the final stage survey was completed, numbers of students and teachers reporting had decreased further. In total, 31 student team members and 11 student ambassadors responded (42 students in total), and 3 teachers responded. Not only had further students left the teams (again, for a variety of reasons), but a number of teams found it difficult to complete the final stages of the project, so did not create ‘levels’ as expected.

### **Student responses to the third workshop**

Of the 11 student ambassadors responding after the third workshop, 10 thought the project had been useful, and one that it had not been useful. The reasons they gave for this were:

- Concerned with team working and team skills:
  - Focusing on team working (4 students).
  - Getting better at leadership skills.
- Concerned with personal interests:
  - Something enjoyable (2 students).
  - I like games (2 students).
- Concerned with technical skills:
  - Being shown how to create a game level.
  - Being helped with different technology.
- Concerned with project skills:
  - Being helped with skill development, using trial and error.

When asked whether they found the third workshop event useful, 8 said ‘yes, a lot’, 1 said ‘yes, some of it’, 1 said ‘not really’, and 1 said ‘not at all’. Aspects that they found most useful or interesting were:

- Techniques for creating and designing game levels:
  - How to design a level (3 students).

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- Refining and editing features.
- Producing ideas.
- Working in a team (2 students).
- Planning the project.
- Meeting students from others schools.

As one student said: “What [I]’ve learnt in the workshop has been tra[n]slated into our game level, [I]’m thankful for the workshop as it has helped our game come to life and be what we want it to be. The things that [I]’ve found more useful are the help from the students that create games, help on planning the story from the leaders at the workshop and the chance to have a long time to just work on the game which meant I was able to really concentrate on the game development.”

### Teacher responses to the third workshop

Of the 3 teachers that responded after the third workshop, all three indicated that they felt this had been a useful project. As one teacher said: “It has allowed the children an opportunity to be creative in a media form they might otherwise never have been able to [use,] as well as working in groups with students they do not usually work [with] in developing their independence and teamwork.” Another teacher said: “Children could relate to materials. Great for peer assessment and problem solving skills. It has enabled students to be part of an engaging project. However, in my experience the leaders tended to be the game programmers and the other team members did not have as much work to produce and lost interest a little sooner.”

At the end of the project, teachers reported that the number of team members involved ranged from 10 to 14 (an average of 12). When asked what the teachers thought the students had gained most, they said:

- Team working skills (2 teachers).
- Team members who were usually shy had been engaged and creative.
- Several had developed leadership qualities.
- Problem solving skills.
- Self and peer-assessment skills.
- Communication skills.
- Organisation skills.

When asked if the third workshop event was useful, one said ‘yes, a lot’ and one said ‘yes, some of it’. The other teacher was not able to attend. The aspects felt to be most useful or interesting were time to share experiences, exemplar materials, and tips and hints offered.

### How the project was run in schools

Schools approached this project in a range of ways. This depended not only on their individual contexts, but also on how they felt the project could offer benefit to the school, and to individual students. Three examples are provided here to show the variation and the forms of focus that schools took.

#### The project in School C

This short-stay school took forward this project to support specific needs of their students. The project was advertised to students, and their awareness of the project was maintained by a poster put up on the wall of the main room used for project activity. The lead teacher emphasised that an important aspect to develop in their students in the school were abilities to develop practices of independent learning – the need to develop social skills and sharing practices, which the students might well find difficult. The lead teacher said that the students generally had low self-esteem, and it had been found that it was difficult to get them to work in groups, even in using ICT, so it was felt that this project had the potential to develop levels of collaboration.

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At the first meeting about the project, decisions were made about the composition of the teams, to include students in Years 7, 8 and 9. In Year 7, 2 students were chosen, and from Year 8, 8 students were selected to together make up two teams. Other students who did not want to take part did a parallel research project. In Year 9, 2 teams were formed, with some 15 to 18 students involved.

The lead teacher found that attendance was an issue at times, but 2 lessons (1 hour each) were dedicated within the curriculum timetable to run this project. The project was run in ICT lessons, with no provision outside lessons. In total, 4 teams were involved – 2 in Year 8, and 2 in Year 9. Within an hour session, students used half the time playing the game, and half the time researching and planning. It was found that the project ‘took off really well’, and students in Years 10 and 11 became interested too. Students liked the game – one said it was the ‘best game I’ve ever played’.

The lead teacher suggested that the team needed to find a number of Wolverhampton associations that they could then link into the game levels being created in some way - 5 places, 5 people, and 5 industries. He found that the students’ experience of Wolverhampton was quite limited – the project helped to broaden their experiences.

Although the school started with a single *Sony PlayStation* set-up, the school acquired a second set-up, which was found to make it much easier to handle the width of activities involved within the lesson sessions. The lead teacher found that students did not have skills to do certain things, but did find that a great deal of speaking and listening was generated through the project. The lead teacher said that speaking and listening did not happen routinely with these students; they often had difficulty in expressing themselves. Through the project, this was found to be happening. The lead teacher also found that students took it in turn playing the game without problem. He found that in turn taking students were helping each other, rather than taking control. One ambassador took a role in a meeting in showing another student the controls of the game system – as the lead teacher said, this practice did not normally happen in lessons.

Students initially played the game (only a couple of them knew it and had played it before). They then looked at levels – and started sketching out ideas. The lead teacher asked them to create certain elements, such as a ‘Race’. He found that the activity was cross-curricular – involving, for example, knowledge about science, tourism and travel, making cars and rockets. By the beginning of December 2011, most students had finished playing the game, and were developing a final level. Each team was developing its own level. Four parts to each level were initially conceived, and those involved maintained their involvement in all elements of the project. The teams had not organised themselves through divided responsibilities, but had used individual team member strengths. There was one creator in a team, but otherwise they worked collaboratively. This matched the aims identified at the outset – to work collaboratively, rather than developing isolationist roles.

The lead teacher played an entire game to make sure he understood everything. Everyone was provided with logon facilities to ensure they all had access to everything they might need. The lead teacher created a level too – using student support, he did this so that he could show them a range of ideas. As the students had low self-esteem, the lead teacher said that they were not very forthcoming in terms of ideas, but they responded to suggestions and ideas from others.

The teams by December 2011 were creating levels, but they needed to evaluate and refine them. Quite a bit of research had been done, including research into the history of Wolverhampton. The lead teacher thought it would be difficult to make links to Wolverhampton in the levels other than through photographs – photographs or elements used included Wightwick Manor, Goodyear tyres, industry backgrounds, William Morris wallpaper, a man on a horse, and scoring a goal at the Molineux Stadium. Students in one team had included links with Wightwick Manor and the man on a horse, but in another team no Wolverhampton link had been created.



The lead teacher reported that the tools and features available in *LBP2* did limit the inclusion of elements associated with Wolverhampton. He found that it was not possible to incorporate images, that it was possible to build structures with bricks and other features but that all items were pre-determined – for example, there was no tyre available for linking to Goodyear, and it was not possible to create, for example, a Banks' beer can. He found that it was possible to change materials, and there were lots of features, but they were nevertheless limited. He also found that the quality of images when put into a structure appeared to loose definition, and there was a need to use a specific camera to gather images.

### **The project in School G**

The project in this secondary school was driven by the interests of a Year 11 student who was highly IT able, but disengaged and with a poor attitude to learning. This student was identified initially by a member of the senior leadership team, on the basis of potential leadership skills. The student, who was willing to be involved, selected a team of 7 boys, and the team worked out how to organise themselves, meeting 3 lunchtimes each week (which they committed to consistently). The team were allocated a dedicated room to use for their meetings.

The Year 11 student was a clear, direct leader, who encouraged the others. Although the interests of the team were diverse, the lead student pulled the various strands of interest and needs to develop the project together. Staff involved in the project found that they were just facilitating, offering support, while students took the lead. This model worked well for the first half term. Teachers of English saw an impact; teachers reported that students were more focused, more driven, and more responsive. Attendance and punctuality were reported to be improved by a number of staff too; detentions were reduced, and behaviour in lessons improved, but there were some negatives. Overall, the team wanted to show teachers and others in the school what they could do; so there was impact in other areas too. The team set things up in ways that they could demonstrate their abilities through the project. They planned out 4 levels and started building these using the technology.

Following the October 2011 half term break, the lead student was unfortunately not able to continue the project to its end, and no other natural leader emerged.

### **The project in School K**

In this secondary school, there were two teams that met on Thursdays and Fridays in after-school clubs. A girls' team of 5 girls met on Fridays, and a boys' team started with 5 boys, later becoming reduced to 4; they met on Thursdays. All team members were in Year 9.

A mathematics teacher initially picked up the project, and an ICT teacher joined her, in order to provide some ICT support - help with blogs, and with features in *LBP2*. Initially all students needed to send in an application to be involved in the project. All who applied managed to get a place in a team, and worked out at an early stage how to work as a team. The teams organised their own meetings. There was a notice board where teams posted what they were doing.

The girls' team had designated roles, but they all tended to work on all the aspects of the project. Two girls did more on the artistic aspects, and one girl took the overall lead. One girl used a PC tablet to draw images that would later be incorporated into the game. She used it for three weeks before she felt she could use it to create reasonable images. Three of the girls played the game at home in order to have chance to collect all the items that they needed to use, so they could be sure they could build the levels. The team designed their level and were building a level in detail at the beginning of December 2011. The game had 4 levels, but they felt they might not be able to finish them all. They indicated that the workshops had been useful, and that they had learned many techniques at the last event that they could use when completing the game.

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The game being developed looked very sophisticated. They had not encountered any problems or needs that they had not been able to address. They were clearly very well engaged and hugely enthusiastic about the project. The game was based on the structure of the school and each level represented a room or area of the school in which the lead character needed to find his friend. One level was the cafeteria; another was the library (in which the lead character goes back in time to see historic images and times in Wolverhampton).

The boys' team started out with 5 boys, but one boy moved to another school. By the beginning of December 2011 they had produced a story. The game they were creating required the lead character to reach the end through a number of challenges. The design had been completed; about half of the creation of the level had also been completed, in about 2 hours.

The ICT teacher felt that this project worked well when friendship groups could work together. Both teachers found that the project worked well, but that it was time demanding.

### **Teacher roles**

Overall, teachers 'advertised' the project opportunity to students. They selected members for teams, provided a space and technology resources, and facilitated, supported and helped. They did not teach specifically – most often they supported and acted as facilitators, but in some cases teachers developed a range of technical expertise in order to support specific needs of their working team or teams.



## 9. AN OVERVIEW OF PROJECT OUTCOMES

### **The starting skills context for those involved at the outset**

Details about starting skills and experiences were gathered as a part of the surveys that students and teachers completed. When students were asked in the first survey if they had played *LBP2* before, 72 said 'yes', 35 said 'no', 1 said 'not sure', and 1 did not respond. When teachers were asked in the same survey if they had played *LBP2* before, 5 said 'yes', 7 said 'no'. Clearly proportionately more students than teachers had played the game before.

### **Skill levels at the outset**

Students and teachers were asked about 16 specific sets of skills. These sets of skills were:

- Thinking skills.
- Problem solving skills.
- Researching skills.
- Generating ideas.
- Identifying solutions.
- Making skills.
- Evaluating skills.
- Communicating skills.
- Scripting skills.
- Story boarding skills.
- Sequencing skills.
- Logical thinking skills.
- Artistic skills.
- Team working.
- Planning skills.
- Leadership skills.

To gather levels of details about each of these sets of skills, students were given 5 specific approaches that they might take or associate with each skill set. The source of background ideas in creating these skill approaches was the Qualifications and Curriculum Development Agency document (n.d.) *A framework of personal, learning and thinking skills*.

Given a framework of the skill sets and individual approaches, students were asked which approaches they associated themselves with in each skill set; so they were asked about 80 different and specific approaches to skills in total. In each skill set they could select multiple responses rather than having to select a single response. So, for example, in the case of thinking skills, they were offered the following five approaches, and could select one or more of these in their response:

- I usually think about things from different viewpoints.
- I usually take other people's ideas into consideration.
- There are times when I depend on the thinking of others.
- I usually use other people's thoughts rather than my own.
- I don't like having to think through problems and issues.

Students and teachers indicated their associations with each of these approaches across the range of skills in the first and third surveys. Average response rates (between a minimum of 0.00 and a maximum of 1.00) for each of these approaches in each skill set in the first survey are shown in Table 2 following.

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**Table 2: Average levels of response to each approach in each skill set for students at the start of the project (n=109)**

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Thinking skill</b>	I usually think about things from different viewpoints	I usually take other people's ideas into consideration	There are times when I depend on the thinking of others	I usually use other people's thoughts rather than my own	I don't like having to think through problems and issues
Average score	0.55	0.65	0.21	0.05	0.03
<b>Problem solving skill</b>	I don't find it easy to solve problems	I can identify problems before they happen	I can think of ways to handle problems	I don't always identify all the problems	Sometimes I forget about important points when I'm trying to solve problems
Average score	0.09	0.26	0.7	0.21	0.12
<b>Researching skill</b>	I don't always manage to find the details or information when it's needed	I don't find it easy to use the information I find and to identify the points I need	I can usually find details and information I need	I don't just rely on one source of information	I always check whether a source is reliable
Average score	0.15	0.06	0.63	0.37	0.39
<b>Generating ideas skill</b>	I think about the ideas that other people are coming up with too	I usually think that my idea is better	I usually let other people come up with ideas	I can usually come up with lots of ideas to solve problems or to create things	I usually come up with one clear idea of how to solve or make something
Average score	0.6	0.16	0.3	0.43	0.28
<b>Identifying solutions skill</b>	I usually try out my idea to make sure it works	I don't usually try out ideas that other people suggest	I usually ask questions to try to find out how good other people's ideas are	I find it hard to take other people's ideas on board and to amend my own ideas	I usually try a number of things out before I make a decision
Average score	0.66	0.05	0.43	0.05	0.46
<b>Making skill</b>	I can usually make things quite easily	I modify what I'm doing if things need to change	I don't always think about how the final thing will be used	I don't always make a prototype and try it out with a few friends	I find it hard to think about how other people will use something
Average score	0.45	0.64	0.08	0.15	0.15
<b>Evaluating skill</b>	I find it difficult to take judgements about my work into account	I think carefully about what I've done and whether it's as good as it could be	I think about information and ideas, and whether they are useful or not	I don't always choose to do things that are probably quite valuable	I don't always take the views and judgements of others into account
Average score	0.08	0.68	0.46	0.06	0.11

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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Communicating skill</b>	I find it easier to talk to people than to listen to what they have to say	I find it hard to talk to some people, but easy with others	I find it easy to talk to almost everyone	I don't talk to people unless I really need to	I listen carefully to what other people have to say
Average score	0.28	0.24	0.41	0.06	0.51
<b>Scripting skill</b>	I check with other people whether they can understand easily what I've written	I don't find it easy to write in a way that others can easily understand	I can easily put my thoughts and ideas into words	I know how to put ideas that I have and from other people into words	I don't always think about who will be reading the text I write
Average score	0.61	0.1	0.48	0.29	0.1
<b>Story boarding skill</b>	I find it easy to put my ideas into picture forms with words	I can show people using pictures and words how to construct an animated story	I think I will find this hard	I've never done story boarding before	I think I need more practice at story boarding
Average score	0.49	0.5	0.07	0.12	0.21
<b>Sequencing skill</b>	I can put these into order or sequence	Sometimes I get these out of order or sequence	Sometimes I forget certain steps that are needed and have to start again	I sometimes ignore what I've forgotten and complete the task anyway	I can think of all the steps that are needed when making something
Average score	0.53	0.26	0.19	0.06	0.29
<b>Logical thinking skill</b>	I can usually organise my ideas so that I know how to act	I find it easy to organise my time and think about the things I need to do something	Organising my time is sometimes a problem for me	I often find that there are so many other things that need to be done	I don't find it easy to keep going and to persevere
Average score	0.54	0.39	0.24	0.17	0.08
<b>Artistic skill</b>	I find it hard to redraw things when there are so many different ideas to use	I can put ideas into visual form fairly easily	I can usually take other people's ideas into account when I'm creating images	I sometimes find I need to redraw things when I find out more details	When I've drawn something, I can often find ways to improve it from other people's comments
Average score	0.19	0.5	0.35	0.27	0.39
<b>Team working skill</b>	I find it hard to complete the tasks I've agreed to do when working in a team	I really prefer to work on my own	I find it easy to work with others in teams	I like working with others, and like sharing ideas and planning	I can't always agree with the decisions that are made when working in a team
Average score	0.06	0.18	0.62	0.49	0.13

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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Planning skill</b>	I don't always manage to achieve the targets or goals on time	I find it hard to keep to a plan	I don't think I use past experiences very well when I'm planning something	I usually make a plan, and set goals and targets	I check how things are going regularly
Average score	0.17	0.19	0.1	0.48	0.5
<b>Leadership skill</b>	I like to take responsibility but also to share tasks with others	I don't always find it easy to take a lead	I don't always find it easy to be constructive when problems arise	I really prefer other people to take the lead	Other people usually think I'm fair and considerate to others
Average score	0.59	0.16	0.05	0.24	0.35

### Student skills at the interim stage

When the second interim skill survey was completed by student team members, they were asked about their perceptions of skills being enhanced, rather than being asked about specific approaches within each skill set. From their responses, certain important skills were identified by the students as being enhanced after only a few months. It is interesting to note that these skills are those often highlighted by and required by employers and trainers; at the top of the list of common responses were team working, communicating, and thinking skills (see the list in Table 3 following). Those responses coloured green indicate responses of perceived gains from 50% or more of the students.

**Table 3: Numbers of responses from student team members (n=55) in 'yes' change rank order**

Skill stated to be developed after second workshop and before third workshop	Number stating 'no'	Number stating 'not sure'	Number stating 'yes'
Team working	1	3	50
Communicating skills	2	7	42
Thinking skills	2	12	40
Generating ideas	4	16	34
Problem solving skills	6	15	32
Researching skills	10	13	32
Planning skills	12	15	27
Identifying solutions	5	24	26
Making skills	13	19	22
Evaluating skills	9	22	22
Logical thinking skills	9	20	21
Scripting skills	15	20	19
Sequencing skills	11	23	19
Artistic skills	20	14	19
Leadership skills	20	17	18
Story boarding skills	24	14	15

### Student ambassador skills at the interim stage

Not surprisingly, as student ambassadors attended workshops, and as they needed to share ideas and knowledge they had gained from these workshops with others, they reported somewhat different enhancements in terms of skills. Notably, leadership and planning skills appeared more often (see the list in Table 4 following). So, involvement in these forms of activities led to different gains for different students, but potentially all valuable in their own right. Those responses coloured green indicate responses of perceived gains from 50% or more of the students.

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**Table 4: Example levels of skill responses from student ambassadors (n=26)**

Skill stated to be developed after second workshop and before third workshop	Number stating 'no'	Number stating 'not sure'	Number stating 'yes'
Logical thinking skills	2	9	15
Artistic skills	8	4	14
Team working	2	2	22
Planning skills	5	4	17
Leadership skills	2	4	19

### Teachers' views of skills at the interim stage

Teachers' views of student skill enhancements reflected largely what the students themselves said. Teachers reported that thinking, team working, generating ideas and planning skills were the most enhanced student skills (see the list in Table 5 following). Those responses coloured green indicate responses of perceived gains for almost all students from 50% or more of the teachers.

**Table 5: Levels of skill responses developed by students reported by teachers in 'yes' rank order (n=10)**

Which skills do you think team members have used or developed so far? (Please click the category that applies best.)	Yes for almost all	Yes for some	Not sure	Not for many	For none at all
Thinking skills	6	3	0	0	1
Team working	6	3	0	0	1
Generating ideas	6	2	0	1	1
Planning skills	6	1	0	2	1
Communicating skills	5	4	0	0	1
Researching skills	4	3	1	0	2
Problem solving skills	3	5	0	1	1
Sequencing skills	3	1	2	2	2
Making skills	2	5	1	1	1
Logical thinking skills	2	3	3	1	1
Story boarding skills	2	3	1	2	2
Evaluating skills	2	1	1	3	2
Identifying solutions	1	7	1	0	1
Leadership skills	1	6	1	1	1
Scripting skills	1	3	2	3	1
Artistic skills	0	5	1	3	1

### Teacher views at the final stage

At the end of the project, three teachers offered their assessments of the level of skills reached by students involved. These are collated and shown in Table 6 following. Responses are ordered by rank, in decreasing order of responses with 'very good skills'. In this survey teachers indicated the number of students they felt gained enhanced skills in each category.

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**Table 6: Levels of skills developed by students reported by teachers (n=3)**

How would you judge the abilities of student team member skills?	Very good skills	Good skills	Average skills	Below average skills	Poor skills
Team working	13	5	1	0	0
Making skills	11	2	2	1	0
Communicating skills	10	2	0	0	1
Identifying solutions	9	6	1	0	0
Researching skills	8	5	2	0	0
Problem solving skills	8	3	4	1	0
Leadership skills	7	4	3	1	0
Thinking skills	7	1	6	2	1
Evaluating skills	6	6	3	0	0
Planning skills	6	6	4	0	0
Generating ideas	6	5	6	0	0
Scripting skills	6	2	4	5	0
Story boarding skills	6	2	4	4	2
Logical thinking skills	6	2	4	0	2
Artistic skills	5	3	5	3	0
Sequencing skills	5	2	2	3	2
$\Sigma$	119	56	51	20	8

Teachers indicated that they felt that students generally had gained quite high skills in many areas, and that there were few students with poor skills. Teachers noted that some students were involved throughout the project, and they reported on those that maintained their involvement to the end of the project. These data do not, therefore, provide evidence of how the project supported skill development for students attending for shorter time periods. Key questions arising are whether the students developed certain skills more strongly across the period of the project, and, indeed whether their self-assessments of their skills were able to be based on greater experience as a result of the project.

**Student skill gains at the final stage**

Students responding in the third and final survey provided details about their associations with the 80 skill approaches. Average responses for all students (42 in total) for each of the approaches in each skill set in the final survey are shown in Table 7 following. Again, the average response levels range between 0.00 at a minimum to 1.00 at a maximum.

**Table 7: Average response levels for each approach in each skill set for students at the end of the project (n=42)**

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
Thinking skill	I usually think about things from different viewpoints	I usually take other people's ideas into consideration	There are times when I depend on the thinking of others	I usually use other people's thoughts rather than my own	I don't like having to think through problems and issues
Average score after	0.71	0.64	0.36	0.21	0.05
Problem solving skill	I don't find it easy to solve problems	I can identify problems before they happen	I can think of ways to handle problems	I don't always identify all the problems	Sometimes I forget about important points when I'm trying to solve problems
Average score after	0.05	0.49	0.76	0.22	0.12

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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Researching skill</b>	I don't always manage to find the details or information when it's needed	I don't find it easy to use the information I find and to identify the points I need	I can usually find details and information I need	I don't just rely on one source of information	I always check whether a source is reliable
Average score after	0.07	0.10	0.81	0.43	0.48
<b>Generating ideas skill</b>	I think about the ideas that other people are coming up with too	I usually think that my idea is better	I usually let other people come up with ideas	I can usually come up with lots of ideas to solve problems or to create things	I usually come up with one clear idea of how to solve or make something
Average score after	0.74	0.07	0.60	0.55	0.29
<b>Identifying solutions skill</b>	I usually try out my idea to make sure it works	I don't usually try out ideas that other people suggest	I usually ask questions to try to find out how good other people's ideas are	I find it hard to take other people's ideas on board and to amend my own ideas	I usually try a number of things out before I make a decision
Average score after	0.79	0.02	0.62	0.00	0.55
<b>Making skill</b>	I can usually make things quite easily	I modify what I'm doing if things need to change	I don't always think about how the final thing will be used	I don't always make a prototype and try it out with a few friends	I find it hard to think about how other people will use something
Average score after	0.62	0.67	0.17	0.19	0.10
<b>Evaluating skill</b>	I find it difficult to take judgements about my work into account	I think carefully about what I've done and whether it's as good as it could be	I think about information and ideas, and whether they are useful or not	I don't always choose to do things that are probably quite valuable	I don't always take the views and judgements of others into account
Average score after	0.12	0.79	0.64	0.10	0.02
<b>Communicating skill</b>	I find it easier to talk to people than to listen to what they have to say	I find it hard to talk to some people, but easy with others	I find it easy to talk to almost everyone	I don't talk to people unless I really need to	I listen carefully to what other people have to say
Average score after	0.40	0.29	0.43	0.12	0.69
<b>Scripting skill</b>	I check with other people whether they can understand easily what I've written	I don't find it easy to write in a way that others can easily understand	I can easily put my thoughts and ideas into words	I know how to put ideas that I have and from other people into words	I don't always think about who will be reading the text I write
Average score after	0.66	0.15	0.51	0.46	0.20



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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Story boarding skill</b>	I find it easy to put my ideas into picture forms with words	I can show people using pictures and words how to construct an animated story	I think I will find this hard	I've never done story boarding before	I think I need more practice at story boarding
Average score after	0.57	0.45	0.10	0.29	0.29
<b>Sequencing skill</b>	I can put these into order or sequence	Sometimes I get these out of order or sequence	Sometimes I forget certain steps that are needed and have to start again	I sometimes ignore what I've forgotten and complete the task anyway	I can think of all the steps that are needed when making something
Average score after	0.74	0.13	0.28	0.13	0.41
<b>Logical thinking skill</b>	I can usually organise my ideas so that I know how to act	I find it easy to organise my time and think about the things I need to do something	Organising my time is sometimes a problem for me	I often find that there are so many other things that need to be done	I don't find it easy to keep going and to persevere
Average score after	0.59	0.44	0.24	0.20	0.10
<b>Artistic skill</b>	I find it hard to redraw things when there are so many different ideas to use	I can put ideas into visual form fairly easily	I can usually take other people's ideas into account when I'm creating images	I sometimes find I need to redraw things when I find out more details	When I've drawn something, I can often find ways to improve it from other people's comments
Average score after	0.24	0.41	0.44	0.44	0.51
<b>Team working skill</b>	I find it hard to complete the tasks I've agreed to do when working in a team	I really prefer to work on my own	I find it easy to work with others in teams	I like working with others, and like sharing ideas and planning	I can't always agree with the decisions that are made when working in a team
Average score after	0.10	0.19	0.62	0.62	0.26
<b>Planning skill</b>	I don't always manage to achieve the targets or goals on time	I find it hard to keep to a plan	I don't think I use past experiences very well when I'm planning something	I usually make a plan, and set goals and targets	I check how things are going regularly
Average score after	0.26	0.19	0.14	0.57	0.62



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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Leadership skill</b>	I like to take responsibility but also to share tasks with others	I don't always find it easy to take a lead	I don't always find it easy to be constructive when problems arise	I really prefer other people to take the lead	Other people usually think I'm fair and considerate to others
Average score after	0.61	0.24	0.15	0.29	0.34

This set of responses, however, comes from a group that is not matched to the group providing responses in the initial survey. To identify more accurately the differences between before and after responses, matched sets are selected from the before and after groups. The total number of students in this matching group is 31.

It is also important to recognise that these different skill approaches do not all have the same 'weight'. Some skill approaches are more strongly concerned with positive skill attributes, while others are more neutral, and indeed some are not highly desirable in terms of positive skill attributes. To gain a more objective view of skill gains, therefore, factors will be applied in the case of each skill approach. Table 8 following shows the skill score factor that has been applied in each case for this analysis.

**Table 8: Factors applied to each skill approach (a weighting concerned with positive skill attributes)**

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Thinking skill</b>	I usually think about things from different viewpoints	I usually take other people's ideas into consideration	There are times when I depend on the thinking of others	I usually use other people's thoughts rather than my own	I don't like having to think through problems and issues
Factor applied	3	3	2	-1	-2
<b>Problem solving skill</b>	I don't find it easy to solve problems	I can identify problems before they happen	I can think of ways to handle problems	I don't always identify all the problems	Sometimes I forget about important points when I'm trying to solve problems
Factor applied	-3	2	3	-1	-2
<b>Researching skill</b>	I don't always manage to find the details or information when it's needed	I don't find it easy to use the information I find and to identify the points I need	I can usually find details and information I need	I don't just rely on one source of information	I always check whether a source is reliable
Factor applied	-2	-2	2	2	3
<b>Generating ideas skill</b>	I think about the ideas that other people are coming up with too	I usually think that my idea is better	I usually let other people come up with ideas	I can usually come up with lots of ideas to solve problems or to create things	I usually come up with one clear idea of how to solve or make something
Factor applied	2	-2	-2	3	1

LBP2 project evaluation

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Identifying solutions skill</b>	I usually try out my idea to make sure it works	I don't usually try out ideas that other people suggest	I usually ask questions to try to find out how good other people's ideas are	I find it hard to take other people's ideas on board and to amend my own ideas	I usually try a number of things out before I make a decision
Factor applied	2	-3	2	-3	2
<b>Making skill</b>	I can usually make things quite easily	I modify what I'm doing if things need to change	I don't always think about how the final thing will be used	I don't always make a prototype and try it out with a few friends	I find it hard to think about how other people will use something
Factor applied	2	3	-2	-2	-1
<b>Evaluating skill</b>	I find it difficult to take judgements about my work into account	I think carefully about what I've done and whether it's as good as it could be	I think about information and ideas, and whether they are useful or not	I don't always choose to do things that are probably quite valuable	I don't always take the views and judgements of others into account
Factor applied	-3	3	3	-1	-2
<b>Communicating skill</b>	I find it easier to talk to people than to listen to what they have to say	I find it hard to talk to some people, but easy with others	I find it easy to talk to almost everyone	I don't talk to people unless I really need to	I listen carefully to what other people have to say
Factor applied	-2	-1	3	-2	2
<b>Scripting skill</b>	I check with other people whether they can understand easily what I've written	I don't find it easy to write in a way that others can easily understand	I can easily put my thoughts and ideas into words	I know how to put ideas that I have and from other people into words	I don't always think about who will be reading the text I write
Factor applied	3	-1	2	2	-3
<b>Story boarding skill</b>	I find it easy to put my ideas into picture forms with words	I can show people using pictures and words how to construct an animated story	I think I will find this hard	I've never done story boarding before	I think I need more practice at story boarding
Factor applied	2	3	-2	1	1
<b>Sequencing skill</b>	I can put these into order or sequence	Sometimes I get these out of order or sequence	Sometimes I forget certain steps that are needed and have to start again	I sometimes ignore what I've forgotten and complete the task anyway	I can think of all the steps that are needed when making something
Factor applied	2	-2	-1	-3	3
<b>Logical thinking skill</b>	I can usually organise my ideas so that I know how to act	I find it easy to organise my time and think about the things I need to do something	Organising my time is sometimes a problem for me	I often find that there are so many other things that need to be done	I don't find it easy to keep going and to persevere

LBP2 project evaluation

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
Factor applied	3	2	-2	-1	-1
<b>Artistic skill</b>	I find it hard to redraw things when there are so many different ideas to use	I can put ideas into visual form fairly easily	I can usually take other people's ideas into account when I'm creating images	I sometimes find I need to redraw things when I find out more details	When I've drawn something, I can often find ways to improve it from other people's comments
Factor applied	-2	2	3	3	2
<b>Team working skill</b>	I find it hard to complete the tasks I've agreed to do when working in a team	I really prefer to work on my own	I find it easy to work with others in teams	I like working with others, and like sharing ideas and planning	I can't always agree with the decisions that are made when working in a team
Factor applied	-2	-2	2	3	1
<b>Planning skill</b>	I don't always manage to achieve the targets or goals on time	I find it hard to keep to a plan	I don't think I use past experiences very well when I'm planning something	I usually make a plan, and set goals and targets	I check how things are going regularly
Factor applied	-2	-2	-2	3	3
<b>Leadership skill</b>	I like to take responsibility but also to share tasks with others	I don't always find it easy to take a lead	I don't always find it easy to be constructive when problems arise	I really prefer other people to take the lead	Other people usually think I'm fair and considerate to others
Factor applied	3	-2	-2	-1	2

Looking at the individual approaches within each skill set, it is possible to consider an ideal score that a student or student group should gain for each skill approach, by using the weighing factor applied to each individual skill approach as an ideal score. Differences between average reported skill approach levels before and after the project, compared to the ideal scores for each skill approach, are shown in Table 9 following.

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**Table 9: Average ideal scores for the student matched group before and after the project (n=31)**

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5	Totals (Positive shifts out of 5)
<b>Thinking skill</b>	I usually think about things from different viewpoints	I usually take other people's ideas into consideration	There are times when I depend on the thinking of others	I usually use other people's thoughts rather than my own	I don't like having to think through problems and issues	
Factor applied	3	3	2	-1	-2	
Average before	1.55	1.84	0.19	-0.13	0.00	
Average after	2.23	2.13	0.90	-0.23	-0.13	5/5
<b>Problem solving skill</b>	I don't find it easy to solve problems	I can identify problems before they happen	I can think of ways to handle problems	I don't always identify all the problems	Sometimes I forget about important points when I'm trying to solve problems	
Factor applied	-3	2	3	-1	-2	
Average before	-0.39	0.52	2.13	-0.16	-0.39	
Average after	-0.19	0.97	2.23	-0.26	-0.32	3/5
<b>Researching skill</b>	I don't always manage to find the details or information when it's needed	I don't find it easy to use the information I find and to identify the points I need	I can usually find details and information I need	I don't just rely on one source of information	I always check whether a source is reliable	
Factor applied	-2	-2	2	2	3	
Average before	-0.32	0.00	1.16	0.84	1.06	
Average after	-0.13	-0.26	1.74	1.03	1.65	4/5
<b>Generating ideas skill</b>	I think about the ideas that other people are coming up with too	I usually think that my idea is better	I usually let other people come up with ideas	I can usually come up with lots of ideas to solve problems or to create things	I usually come up with one clear idea of how to solve or make something	
Factor applied	2	-2	-2	3	1	
Average before	1.10	-0.13	-0.58	1.16	0.26	
Average after	1.61	-0.13	-1.61	1.74	0.35	4/5
<b>Identifying solutions skill</b>	I usually try out my idea to make sure it works	I don't usually try out ideas that other people suggest	I usually ask questions to try to find out how good other people's ideas are	I find it hard to take other people's ideas on board and to amend my own ideas	I usually try a number of things out before I make a decision	
Factor applied	2	-3	2	-3	2	
Average before	1.23	-0.19	0.77	0.00	0.77	
Average after	1.68	-0.10	1.42	0.00	1.29	3/5

LBP2 project evaluation

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5	Totals (Positive shifts out of 5)
<b>Making skill</b>	I can usually make things quite easily	I modify what I'm doing if things need to change	I don't always think about how the final thing will be used	I don't always make a prototype and try it out with a few friends	I find it hard to think about how other people will use something	
Factor applied	2	3	-2	-2	-1	
Average before	0.52	2.13	-0.13	-0.19	-0.19	
Average after	1.29	2.13	-0.39	-0.45	-0.13	3/5
<b>Evaluating skill</b>	I find it difficult to take judgements about my work into account	I think carefully about what I've done and whether it's as good as it could be	I think about information and ideas, and whether they are useful or not	I don't always choose to do things that are probably quite valuable	I don't always take the views and judgements of others into account	
Factor applied	-3	3	3	-1	-2	
Average before	-0.10	2.13	1.26	-0.10	0.00	
Average after	-0.29	2.61	2.03	-0.13	-0.06	5/5
<b>Communicating skill</b>	I find it easier to talk to people than to listen to what they have to say	I find it hard to talk to some people, but easy with others	I find it easy to talk to almost everyone	I don't talk to people unless I really need to	I listen carefully to what other people have to say	
Factor applied	-2	-1	3	-2	2	
Average before	-0.52	-0.19	1.45	-0.13	0.97	
Average after	-0.84	-0.32	1.45	-0.26	1.55	4/5
<b>Scripting skill</b>	I check with other people whether they can understand easily what I've written	I don't find it easy to write in a way that others can easily understand	I can easily put my thoughts and ideas into words	I know how to put ideas that I have and from other people into words	I don't always think about who will be reading the text I write	
Factor applied	3	-1	2	2	-3	
Average before	1.94	-0.13	0.77	0.52	-0.19	
Average after	2.23	-0.13	1.10	1.03	-0.77	4/5
<b>Story boarding skill</b>	I find it easy to put my ideas into picture forms with words	I can show people using pictures and words how to construct an animated story	I think I will find this hard	I've never done story boarding before	I think I need more practice at story boarding	
Factor applied	2	3	-2	0	0	
Average before	0.97	1.35	0.00	0.00	0.00	
Average after	1.23	1.35	-0.19	0.00	0.00	2/5

LBP2 project evaluation

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5	Totals (Positive shifts out of 5)
<b>Sequencing skill</b>	I can put these into order or sequence	Sometimes I get these out of order or sequence	Sometimes I forget certain steps that are needed and have to start again	I sometimes ignore what I've forgotten and complete the task anyway	I can think of all the steps that are needed when making something	
Factor applied	2	-2	-1	-3	3	
Average before	1.03	-0.71	-0.23	-0.29	0.77	
Average after	1.42	-0.32	-0.32	-0.29	1.16	3/5
<b>Logical thinking skill</b>	I can usually organise my ideas so that I know how to act	I find it easy to organise my time and think about the things I need to do something	Organising my time is sometimes a problem for me	I often find that there are so many other things that need to be done	I don't find it easy to keep going and to persevere	
Factor applied	3	2	-2	-1	-1	
Average before	1.55	0.65	-0.52	-0.23	-0.03	
Average after	1.94	0.90	-0.39	-0.23	-0.10	3/5
<b>Artistic skill</b>	I find it hard to redraw things when there are so many different ideas to use	I can put ideas into visual form fairly easily	I can usually take other people's ideas into account when I'm creating images	I sometimes find I need to redraw things when I find out more details	When I've drawn something, I can often find ways to improve it from other people's comments	
Factor applied	-2	2	3	3	2	
Average before	-0.52	0.77	1.26	0.77	0.71	
Average after	-0.45	0.90	1.65	1.35	1.16	4/5
<b>Team working skill</b>	I find it hard to complete the tasks I've agreed to do when working in a team	I really prefer to work on my own	I find it easy to work with others in teams	I like working with others, and like sharing ideas and planning	I can't always agree with the decisions that are made when working in a team	
Factor applied	-2	-2	2	3	0	
Average before	-0.06	-0.26	1.29	1.35	0.00	
Average after	-0.13	-0.32	1.42	1.94	0.32	5/5
<b>Planning skill</b>	I don't always manage to achieve the targets or goals on time	I find it hard to keep to a plan	I don't think I use past experiences very well when I'm planning something	I usually make a plan, and set goals and targets	I check how things are going regularly	
Factor applied	-2	-2	-2	3	3	
Average before	-0.45	-0.39	-0.39	1.26	1.35	
Average after	-0.58	-0.32	-0.32	1.94	2.03	3/5

## LBP2 project evaluation

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5	Totals (Positive shifts out of 5)
<b>Leadership skill</b>	I like to take responsibility but also to share tasks with others	I don't always find it easy to take a lead	I don't always find it easy to be constructive when problems arise	I really prefer other people to take the lead	Other people usually think I'm fair and considerate to others	
Factor applied	3	-2	-2	-1	2	
Average before	1.94	-0.45	-0.06	-0.26	0.45	
Average after	1.84	-0.58	-0.26	-0.32	0.77	4/5

These data show that a range of individual skill approaches have moved further towards the ideal score associated with individual positive skill attributes across the period of the project:

- Thinking skills (5 out of 5).
- Problem solving skills (3 out of 5).
- Researching skills (4 out of 5).
- Generating ideas (4 out of 5).
- Identifying solutions (3 out of 5).
- Making skills (3 out of 5).
- Evaluating skills (5 out of 5).
- Communicating skills (4 out of 5).
- Scripting skills (4 out of 5).
- Story boarding skills (2 out of 5).
- Sequencing skills (3 out of 5).
- Logical thinking skills (3 out of 5).
- Artistic skills (4 out of 5).
- Team working (5 out of 5).
- Planning skills (3 out of 5).
- Leadership skills (4 out of 5).

The introduction of this project has provided opportunities for students to review their skills in ways that might not have arisen before. This being the case, it is likely that later survey scores offer a more realistic picture of skills from the students, as their experiences of self-assessing their skills when responding in the first survey were much more limited. From Table 9, some skill approaches were much more strongly reported at the end of the project (assessed through student self-reporting at a level of 67% or more of the ideal total scores). These are:

- I usually think about things from different viewpoints.
- I usually take other people's ideas into consideration.
- I can think of ways to handle problems.
- I can usually find details and information I need.
- I usually try out my idea to make sure it works.
- I modify what I'm doing if things need to change.
- I think carefully about what I've done and whether it's as good as it could be.
- I think about information and ideas, and whether they are useful or not.
- I check with other people whether they can understand easily what I've written.
- I check how things are going regularly.



## LBP2 project evaluation

This skills approach framework has provided two measures of outcomes to be identified: the number of skill approaches within a skill set that shift across the period of the project; and those skill approaches that approach the ideal score and that are reported very commonly. Measures of shifts of individual skill approaches can also be identified over a period of time (as shown in Table 9).

Experience from this project indicates that this skill framework can be used to support assessment of soft skills. A number of further steps would enable the framework and instrument to be developed as a more robust device:

- Checking the skill approaches listed with an expert group.
- Checking the skill approach factors applied (ideal scores) with an expert group.
- Developing three skill frameworks from this core material – for student self-report; peer review-report; and teacher review-report.
- Considering how individual scores gained from reports at any stage would be assessed through a triangulation or negotiation of the three scores: student self-report; peer review-report; and teacher review-report.
- A defined means to report scores to be discussed and agreed with an expert group.

### Awareness of the video games industry and possible career paths

Part of this project has been concerned with developing higher levels of awareness in students about the video games industry, and about potential future career paths. Following the first workshop, and after the third workshop, students were asked to report their levels of awareness about and interests in video games industry career paths. From the matched group of 31 students, Table 10 following indicates the shifts in their responses across the period of the project.

**Table 10: Shifts in levels of awareness by students of the video games industry and potential career paths**

Have you ever thought about?	Yes, a lot		Yes, sometimes		Not really		Not at all	
	Before	After	Before	After	Before	After	Before	After
<b>A career in the video games industries</b>	8	14	14	11	7	4	2	2
<b>What it would be like working in creating video games</b>	16	10	11	13	2	6	1	0
<b>A career in the games software industries</b>	6	11	16	11	8	7	0	2
<b>What it would be like creating games using software</b>	9	8	14	15	7	5	0	2
<b>A career in the visual effects industries</b>	4	8	13	14	11	5	1	3
<b>What it would be like creating visual effects</b>	10	9	8	13	8	8	4	8

The results show two main trends:

- The experience of the project is tending to move responses in the later survey to the extremes – more students are positively contemplating, or positively rejecting, certain options.
- The numbers of students strongly contemplating careers in video games industries, in games software industries, and in visual effects industries have all increased across the period of the project (6 more students are contemplating a career in the video games industries, 5 more in the games software industries, and 4 more in the visual effects industries, all out of a total of 31).

## 10. CONCLUSIONS AND IMPLICATIONS

### Outcomes and discussion points

A number of key points arise from findings gathered across the period of this study. Points arising at different times indicate that:

- This initiative has focused on the creation of game elements or ‘levels’ in a well-known and popular video game marketed by a major game company, *Sony*, involving team-based and project-based activities. The content and nature of this project has interested a range of students, but not all students.
- The initiative, run through after-school clubs (and in a small number of cases in-class lessons) has been supported through a series of workshop events.
- Workshop events have involved a lead teacher and two student ambassadors from each school, who have gained ideas about planning and carrying out the project.
- Importantly, these projects have attracted students who have not necessarily been involved in other projects or activities, or in certain mainstream activities. Different team members have been able to contribute different interests and skills to different elements involved in creating game levels. As one teacher said: *“Less confident children have been more communicative and self-esteem has noticeably improved over the weeks.”*
- Involvement in after-school clubs has required a high commitment from students, both in terms of attendance and in terms of the work undertaken. As one teacher said: *“They actually turn up at lunchtimes to work on storyboards.”*
- In the team groups, high levels of in-depth and focused discussion have been generated and have been recognised in many instances. As a head teacher said, following an observation of a session: *“I have never seen so much speaking and listening taking place in one lesson.”*
- The affordances of the game are important; the fact that students can construct and create in this game (rather than just playing it) has been vital and central to the entire activity. As one teacher said: *“The use of technologies not normally associated with the classroom has engaged the students and has enabled them to gain an insight into how game creation can evolve from planning through to the end product.”*
- Many teachers have found that they do not need to drive engagement, but that they do need to provide a structure, a framework, and to act as a facilitator. Additionally, technological understanding can be important, and teachers need to know that they can gain and have access to details and knowledge they require at regular intervals or as they need it.
- Enthusiasm for the project was very high at the outset, but many factors affecting student attendance have come into play, and this happened especially during the first two months of the project. These factors have in some cases affected team membership in a wide way and have meant that the continued viability of an individual team project has not always been possible.
- Although some teams have not been able to conclude the project by creating a game level, there are many experiences and skills that they have gained along the way, which have in themselves been important.
- Integrating elements of *Wolverhampton* into the levels has not been an easy task, and this element has offered particular challenges and been addressed through particular forms of creativity. Affordances of the video game creator have limited what has been possible and feasible in this respect.
- The completion rate for this project has been in the order of 50%; about half of the teams have been able to complete the project (in 7 schools). In some cases teams have required specific support at certain times to complete a game level.

### Implications for future project development

- Schools and students value being able to work with popular and world-leading brands and products such as *LBP2*. For future projects this feature should be adequately considered.
- The affordances of any video game need to be clearly understood, so that the parameters of any project can be defined in terms of reasonable expected outcomes. If possible, additional features or affordances would make this project more worthwhile. Discussion with video game developers would be a worthy step to take.
- The time line for the project originally set is feasible for some schools, but a 5 or 6-month time line would appear to be feasible for most schools and teams.
- Lead teachers welcome the forms of project planning advice and guidance that they received in workshops. This form of advice and guidance should be provided in the future.
- A key talk from a lead video game creator was welcomed by teachers and students alike, and set the focus of the project into a useful wider context. This is an important element to include in future projects.
- Communication with key supporters is important, but blogs and discussion forums have not been used widely in this project. Students have used their own communication facilities rather than using bespoke forms.
- Opportunities for students and teachers to gain and share ideas within the workshops was a vital component of the project. Sessions to enable this to happen in the future need to be built into project designs.
- Reasons why students felt this would be a worthwhile project focused around their personal interests, gaining from new ways of working, opportunities to be involved in creative activity, and working with others. These are key elements to include in future project designs.
- Students felt the first workshop was useful as it provided opportunities to create levels and try things out in the game, opportunities to play the game, to talk to those involved in games creation industries, to meet others and to work and share with them, and being given advice and demonstrations from professionals. These key elements should be accommodated in future workshops.
- Reasons why teachers felt this would be a worthwhile project focused around their concerns for widening learning opportunities or pedagogies, impacting the needs of individuals, developing team working, considering longer-term careers and interests, and supporting school curriculum development. Future project designs should also accommodate these concerns.
- Teachers welcomed the presentation about the video games industry, having clear ideas of objectives of the project, clear ideas and resources for planning the project, knowing how to gain technical support if needed, and being able to play the game to become more familiar with it. These elements should be accommodated in future workshops.
- In the second workshop, students welcomed opportunities to find out about technical features when creating levels, processes when creating levels and aspects concerned with planning. Teachers welcomed opportunities to share practices with other schools, seeing student engagement, and having information to take the project forward. In the third workshop, students welcomed opportunities to look at details for creating and designing game levels, working in a team, and planning the project. Future workshops should account for these concerns, as well as ensuring that teachers are aware of support they can draw on, and how they can do this.
- Enhanced skill developments have been identified by students and teachers commonly at all stages of this project. Future projects could benefit from using a skill approach framework to identify skill development arising more specifically.
- Projects in future should account where possible, and measure where possible, the different ways that benefits and outcomes arise – for the school, for teachers, and for students.

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### Appendix: Analysing soft skill gains across the period of the project

An instrument to measure soft skill gains has been developed and deployed specifically for this project. An instrument of the type devised could be used in a number of ways to ‘measure’ or ‘assess’ outcomes. The description here indicates forms of analysis that were undertaken in addition to those included in the main report above, and indicates the ways that the different measures arising need to be considered in terms of different levels of validity. Within the main report itself, and within the summary, only those measures and outcomes that are considered valid have been included.

#### *Comparing average response rates before and after*

By comparing response rates in a later survey to those in the first survey, have average responses in each skill element gone up or down or remained the same for each approach in each skill set? Differences between the average response scores for the two surveys are shown in Table 11 following. Where the difference is more than 10% from the starting score, these differences are coloured yellow.

**Table 11: Differences between average response levels for each approach in each skill set for students before (n=109) and at the end of the project (n=42)**

Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Thinking skill</b>	I usually think about things from different viewpoints	I usually take other people’s ideas into consideration	There are times when I depend on the thinking of others	I usually use other people’s thoughts rather than my own	I don’t like having to think through problems and issues
Average score	0.55	0.65	0.21	0.05	0.03
Average score after	0.71	0.64	0.36	0.21	0.05
Difference	0.16	-0.01	0.15	0.16	0.02
<b>Problem solving skill</b>	I don’t find it easy to solve problems	I can identify problems before they happen	I can think of ways to handle problems	I don’t always identify all the problems	Sometimes I forget about important points when I’m trying to solve problems
Average score	0.09	0.26	0.7	0.21	0.12
Average score after	0.05	0.49	0.76	0.22	0.12
Difference	-0.04	0.23	0.06	0.01	0
<b>Researching skill</b>	I don’t always manage to find the details or information when it’s needed	I don’t find it easy to use the information I find and to identify the points I need	I can usually find details and information I need	I don’t just rely on one source of information	I always check whether a source is reliable
Average score	0.15	0.06	0.63	0.37	0.39
Average score after	0.07	0.10	0.81	0.43	0.48
Difference	-0.08	0.04	0.18	0.06	0.09
<b>Generating ideas skill</b>	I think about the ideas that other people are coming up with too	I usually think that my idea is better	I usually let other people come up with ideas	I can usually come up with lots of ideas to solve problems or to create things	I usually come up with one clear idea of how to solve or make something
Average score	0.6	0.16	0.3	0.43	0.28
Average score after	0.74	0.07	0.60	0.55	0.29
Difference	0.14	-0.09	0.3	0.12	0.01

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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Identifying solutions skill</b>	I usually try out my idea to make sure it works	I don't usually try out ideas that other people suggest	I usually ask questions to try to find out how good other people's ideas are	I find it hard to take other people's ideas on board and to amend my own ideas	I usually try a number of things out before I make a decision
Average score	0.66	0.05	0.43	0.05	0.46
Average score after	0.79	0.02	0.62	0.00	0.55
Difference	0.13	-0.03	0.19	-0.05	0.09
<b>Making skill</b>	I can usually make things quite easily	I modify what I'm doing if things need to change	I don't always think about how the final thing will be used	I don't always make a prototype and try it out with a few friends	I find it hard to think about how other people will use something
Average score	0.45	0.64	0.08	0.15	0.15
Average score after	0.62	0.67	0.17	0.19	0.10
Difference	0.17	0.03	0.09	0.04	-0.05
<b>Evaluating skill</b>	I find it difficult to take judgements about my work into account	I think carefully about what I've done and whether it's as good as it could be	I think about information and ideas, and whether they are useful or not	I don't always choose to do things that are probably quite valuable	I don't always take the views and judgements of others into account
Average score	0.08	0.68	0.46	0.06	0.11
Average score after	0.12	0.79	0.64	0.10	0.02
Difference	0.04	0.11	0.18	0.04	-0.09
<b>Communicating skill</b>	I find it easier to talk to people than to listen to what they have to say	I find it hard to talk to some people, but easy with others	I find it easy to talk to almost everyone	I don't talk to people unless I really need to	I listen carefully to what other people have to say
Average score	0.28	0.24	0.41	0.06	0.51
Average score after	0.40	0.29	0.43	0.12	0.69
Difference	0.12	0.05	0.02	0.06	0.18
<b>Scripting skill</b>	I check with other people whether they can understand easily what I've written	I don't find it easy to write in a way that others can easily understand	I can easily put my thoughts and ideas into words	I know how to put ideas that I have and from other people into words	I don't always think about who will be reading the text I write
Average score	0.61	0.1	0.48	0.29	0.1
Average score after	0.66	0.15	0.51	0.46	0.20
Difference	0.05	0.05	0.03	0.17	0.1
<b>Story boarding skill</b>	I find it easy to put my ideas into picture forms with words	I can show people using pictures and words how to construct an animated story	I think I will find this hard	I've never done story boarding before	I think I need more practice at story boarding
Average score	0.49	0.5	0.07	0.12	0.21
Average score after	0.57	0.45	0.10	0.29	0.29
Difference	0.08	-0.05	0.03	0.17	0.08



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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
<b>Sequencing skill</b>	I can put these into order or sequence	Sometimes I get these out of order or sequence	Sometimes I forget certain steps that are needed and have to start again	I sometimes ignore what I've forgotten and complete the task anyway	I can think of all the steps that are needed when making something
Average score	0.53	0.26	0.19	0.06	0.29
Average score after	0.74	0.13	0.28	0.13	0.41
Difference	0.21	-0.13	0.09	0.07	0.12
<b>Logical thinking skill</b>	I can usually organise my ideas so that I know how to act	I find it easy to organise my time and think about the things I need to do something	Organising my time is sometimes a problem for me	I often find that there are so many other things that need to be done	I don't find it easy to keep going and to persevere
Average score	0.54	0.39	0.24	0.17	0.08
Average score after	0.59	0.44	0.24	0.20	0.10
Difference	0.05	0.05	0	0.03	0.02
<b>Artistic skill</b>	I find it hard to redraw things when there are so many different ideas to use	I can put ideas into visual form fairly easily	I can usually take other people's ideas into account when I'm creating images	I sometimes find I need to redraw things when I find out more details	When I've drawn something, I can often find ways to improve it from other people's comments
Average score	0.19	0.5	0.35	0.27	0.39
Average score after	0.24	0.41	0.44	0.44	0.51
Difference	0.05	-0.09	0.09	0.17	0.12
<b>Team working skill</b>	I find it hard to complete the tasks I've agreed to do when working in a team	I really prefer to work on my own	I find it easy to work with others in teams	I like working with others, and like sharing ideas and planning	I can't always agree with the decisions that are made when working in a team
Average score	0.06	0.18	0.62	0.49	0.13
Average score after	0.10	0.19	0.62	0.62	0.26
Difference	0.04	0.01	0	0.13	0.13
<b>Planning skill</b>	I don't always manage to achieve the targets or goals on time	I find it hard to keep to a plan	I don't think I use past experiences very well when I'm planning something	I usually make a plan, and set goals and targets	I check how things are going regularly
Average score	0.17	0.19	0.1	0.48	0.5
Average score after	0.26	0.19	0.14	0.57	0.62
Difference	0.09	0	0.04	0.09	0.12



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Skill	Approach 1	Approach 2	Approach 3	Approach 4	Approach 5
Leadership skill	I like to take responsibility but also to share tasks with others	I don't always find it easy to take a lead	I don't always find it easy to be constructive when problems arise	I really prefer other people to take the lead	Other people usually think I'm fair and considerate to others
Average score	0.59	0.16	0.05	0.24	0.35
Average score after	0.61	0.24	0.15	0.29	0.34
Difference	0.02	0.08	0.1	0.05	-0.01

Considering each of the 80 different skill set approaches, there was a greater than 10% shift when comparing the before with the after response levels in 63 of these cases (54 with a greater than 10% positive shift, and 9 with a greater than 10% negative shift).

Those 54 skill approaches where students showed increased responses of greater than 10% on the starting levels are listed here. Those where there are large differences reported (of 0.1 or more) are highlighted in grey and placed at the top of the list:

- I usually think about things from different viewpoints.
- There are times when I depend on the thinking of others.
- I usually use other people's thoughts rather than my own.
- I can identify problems before they happen.
- I can usually find details and information I need.
- I think about the ideas that other people are coming up with too.
- I can usually come up with lots of ideas to solve problems or to create things.
- I usually try out my idea to make sure it works.
- I usually ask questions to try to find out how good other people's ideas are.
- I can usually make things quite easily.
- I think carefully about what I've done and whether it's as good as it could be.
- I think about information and ideas, and whether they are useful or not.
- I find it easier to talk to people than to listen to what they have to say.
- I listen carefully to what other people have to say.
- I know how to put ideas that I have and from other people into words.
- I don't always think about who will be reading the text I write.
- I've never done story boarding before.
- I can put these into order or sequence.
- I can think of all the steps that are needed when making something.
- I sometimes find I need to redraw things when I find out more details.
- When I've drawn something, I can often find ways to improve it from other people's comments.
- I like working with others, and like sharing ideas and planning.
- I can't always agree with the decisions that are made when working in a team.
- I check how things are going regularly.
- I don't always find it easy to be constructive when problems arise.
- I don't like having to think through problems and issues.
- I don't find it easy to use the information I find and to identify the points I need.
- I don't just rely on one source of information.
- I always check whether a source is reliable.
- I usually let other people come up with ideas.
- I usually try a number of things out before I make a decision.
- I don't always think about how the final thing will be used.
- I don't always make a prototype and try it out with a few friends.

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- I find it difficult to take judgements about my work into account.
- I don't always choose to do things that are probably quite valuable.
- I find it hard to talk to some people, but easy with others.
- I don't talk to people unless I really need to.
- I don't find it easy to write in a way that others can easily understand.
- I find it easy to put my ideas into picture forms with words.
- I think I will find this hard.
- I think I need more practice at story boarding.
- Sometimes I forget certain steps that are needed and have to start again.
- I sometimes ignore what I've forgotten and complete the task anyway.
- I find it easy to organise my time and think about the things I need to do something.
- I often find that there are so many other things that need to be done.
- I don't find it easy to keep going and to persevere.
- I find it hard to redraw things when there are so many different ideas to use.
- I can usually take other people's ideas into account when I'm creating images.
- I find it hard to complete the tasks I've agreed to do when working in a team.
- I don't always manage to achieve the targets or goals on time.
- I don't think I use past experiences very well when I'm planning something.
- I usually make a plan, and set goals and targets.
- I don't always find it easy to take a lead.
- I really prefer other people to take the lead.

Those 9 skill approaches where students showed decreased responses of greater than 10% are listed here. Those where there are large differences reported (0.1 or more) are highlighted in grey and placed at the top of the list:

- Sometimes I get these out of order or sequence.
- I don't find it easy to solve problems.
- I don't always manage to find the details or information when it's needed.
- I usually think that my idea is better.
- I don't usually try out ideas that other people suggest.
- I find it hard to take other people's ideas on board and to amend my own ideas.
- I find it hard to think about how other people will use something.
- I don't always take the views and judgements of others into account.
- I can put ideas into visual form fairly easily.

However, the use of response rates as measures of outcomes does not account for 'weighting' of each individual skill approach. Some skill approaches contribute to a positive skill attributes more than others, and indeed, some are desirable while others are not desirable.

### *Average scores that account for weighting*

Table 12 following shows overall skill scores calculated by using the weightings shown in Table 8, which relate to positive skill attributes, for each of the 31 students before and after the period of the project.

**Table 12: Overall student skill scores relating to positive skill attributes (n=31)**

Student	Skill score before	Skill score after	Difference
1	26	74	48
2	12	77	65
3	8	62	54
4	13	72	59
5	21	62	41
6	37	77	40
7	18	77	59
8	23	42	19
9	19	71	52
10	69	47	-22
11	32	36	4
12	31	31	0
13	17	26	9
14	44	41	-3
15	11	-3	-14
16	82	83	1
17	55	17	-38
18	20	48	28
19	32	33	1
20	57	83	26
21	32	0	-32
22	33	16	-17
23	67	31	-36
24	0	12	12
25	54	37	-17
26	29	24	-5
27	77	75	-2
28	28	50	22
29	29	48	19
30	38	69	31
31	63	53	-10

Across the period of the project, 12 students had not increased or decreased in terms of their self-reporting of skills relating to positive skill attributes, while 19 had increased in this respect. Looking more specifically at the individual skills, it is also possible to consider an ideal score that a student or student group should gain for each skill, by summing the factors applied to each individual skill approach as a way of producing an ideal score for each skill set. Using this form of analysis, average ideal scores can be calculated from across all individual responses. The ideal scores before and after are shown in Table 13 following.

**Table 13: Average ideal scores and those of the matched group before and after the project (n=31)**

Skill	Ideal score	Average for all elements for all students (n=31)	Distance from the ideal score	Smallest distance (before or after)
<b>Thinking skill</b>	5.00			
Total score before		3.45	1.55	
Total score after		4.90	0.10	A
<b>Problem solving skill</b>	-1.00			
Total score before		1.71	-2.71	B
Total score after		2.42	-3.42	
<b>Researching skill</b>	3.00			
Total score before		2.74	0.26	B
Total score after		4.03	-1.03	
<b>Generating ideas skill</b>	2.00			
Total score before		1.81	0.19	

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Skill	Ideal score	Average for all elements for all students (n=31)	Distance from the ideal score	Smallest distance (before or after)
Total score after		1.97	0.03	A
<b>Identifying solutions skill</b>	0.00			
Total score before		2.58	-2.58	B
Total score after		4.29	-4.29	
<b>Making skill</b>	0.00			
Total score before		2.13	-2.13	B
Total score after		2.45	-2.45	
<b>Evaluating skill</b>	0.00			
Total score before		3.19	-3.19	B
Total score after		4.16	-4.16	
<b>Communicating skill</b>	0.00			
Total score before		1.58	-1.58	
Total score after		1.58	-1.58	
<b>Scripting skill</b>	3.00			
Total score before		2.90	0.10	B
Total score after		3.45	-0.45	
<b>Story boarding skill</b>	5.00			
Total score before		2.71	2.29	
Total score after		3.03	1.97	A
<b>Sequencing skill</b>	-1.00			
Total score before		0.58	-1.58	B
Total score after		1.65	-2.65	
<b>Logical thinking skill</b>	1.00			
Total score before		1.42	-0.42	B
Total score after		2.13	-1.13	
<b>Artistic skill</b>	8.00			
Total score before		3.00	5.00	
Total score after		4.61	3.39	A
<b>Team working skill</b>	2.00			
Total score before		2.52	-0.52	B
Total score after		3.23	-1.23	
<b>Planning skill</b>	0.00			
Total score before		1.39	-1.39	B
Total score after		2.74	-2.74	
<b>Leadership skill</b>	0.00			
Total score before		1.61	-1.61	
Total score after		1.45	-1.45	A

Using the distance between the average reported scores and the ideal scores, it is possible to see those individual skills that have scores after the project that are nearer to the ideal. The skill scores that are nearer to the ideal after the project are:

- Thinking skills.
- Generating ideas.
- Story boarding skills.
- Artistic skills.
- Leadership skills.

However, this form of measure does not account for the individual nature of each skill approach. The validity of this form of measure is questionable; distance from the ideal for each skill approach is clearly a much more reliable and valid indicator. This measure is described within the main report and is used to identify shifts across the period of the project.

### About the author

**Dr Don Passey** is a Senior Research Fellow and a Director of the newly established Centre for Technology Enhanced Learning in the Department of Educational Research at Lancaster University. He has wide experience with developing and using evaluation and research methods to look at technological innovation, and has studied and reported on outcomes of uses of leading edge technologies and their impacts on teaching and learning over the last 20 years.

He has recently completed an evaluation for Espresso that has looked at outcomes and uses of digital resources across their very wide user base, and studies for Wolverhampton LA on the implementation of a parental reporting pilot in 5 schools, and on the implementation of the LP+ learning platform.

He is undertaking a range of studies on home access and uses of technologies to support young people's learning, has previously undertaken an evaluation study for the BBC looking at outcomes of the BBC News School Report project, and a number of studies for Becta looking at potential uses of technologies with young people who are not in employment, education or training (NEET). He has over the past few years undertaken a series of evaluation studies on how schools in Aston Pride have supported the development of community and home access to ICT, as well as a review of the ICT development practices and outcomes arising in Wolverhampton LA. He was commissioned by the BBC to look at learning uses and outcomes of the BBC jam resources at an early stage of their development. He previously completed studies on the role and learning benefits of IT Academies for the DfES, the use of broadcast video clips in schools and uses of multimedia support for at risk young people for the BBC, the uses of specific online learning resources for regional broadband consortia (RBCs), the ways in which ICT is linked to pupil motivation for the DfES, the role of ICT in supporting learning practices for disadvantaged communities for a NDfC project, the outcomes of uses of interactive whiteboards, and the development of e-learning practices across RBCs and local authorities (LAs). He has undertaken studies and reported previously on the outcomes and implementation of Pathfinder LEAs for the DfES, the development of Year 7 online course materials for mathematics for RM, and the use of a number of integrated learning systems in schools. He previously led a team that investigated the outcomes of laptop use in schools and homes as part of the Microsoft UK Supported Anytime, Anywhere Learning Project, and led a study for the Qualifications and Curriculum Authority (QCA) looking at the implications of uses of ICT for coursework in examination assessment.

He has worked with government agencies, commercial and non-commercial groups, educational institutions and schools, in undertaking research to inform both policy and practice. He has been a consultant to the DCSF (then DfES) on a number of projects, and has worked on the development of innovative approaches to data management systems in schools and LAs. He has worked with commercial companies in the UK, Switzerland and Germany, with state pedagogical research institutions in France and Germany, with educational groups in Hong Kong, Bermuda, and Peru, with LAs across England and Scotland, with RBCs, and with individual schools. He established, in collaboration with the Specialist Schools and Academies Trust (SSAT), a Masters in Research course in Innovation in School Practice for teacher practitioners, focusing on researching the uses of data and technologies within schools and in homes.

He is a member and vice-chair of the International Federation for Information Processing (IFIP) Working Group on Information Technology in Educational Management and a member of an international Working Group on Elementary Education and ICT. He is a member of the BCS Schools Expert Panel. He has written widely on aspects of leading edge ICT uses in primary and secondary education, and is on the editorial board of the IFIP journal.

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