

The eyeMagic Book

A Report into
Augmented Reality Storytelling
in the Context of a Children's Workshop
2003

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The “Magic Book”: A report into augmented reality storytelling in the context of a children’s workshop

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1 Introduction

The “Magic Book” describes an innovation in the application of augmented reality technology to children’s literature. A story by Gavin Bishop entitled *Giant Jimmy Jones* was written specifically for the purpose of being transformed from the physical reality of a picture book to an Augmented Reality (AR) artefact mediated by computer technology. This technology allows tableaux and animated sequences incorporating sound tracks to appear “magically” in three dimensions during the reading/viewing process. This transformation was primarily constructed by professionals (animators, 3D modellers, IT experts) using their respective skill sets but a children’s workshop was developed to gauge the extent to which children could be engaged in the process.

In September, 2003, during the development of the Magic Book, a group of children workshopped the technology and constructed their own AR scenes using the *Anim8or* programme. Ten children, 7 girls, 3 boys, aged 10-14, attended a five-day workshop during which they were introduced to AR technology, shown Gavin Bishop’s work in progress, given lessons on picture book art (including paper engineering) and finally lead through a process of 3D computer modelling to construct scenes for their own version of *Giant Jimmy Jones* to be incorporated into an AR environment.

This report provides:

- a critical review of augmented reality representations of storytelling within children’s literature,
- a brief review of the uses of augmented reality representations in education,
- a description and analysis of the development of *Giant Jimmy Jones* as a literature-based AR project,
- a description of a small case study of children’s learning about AR and its associated technology
- an exploration of the type of educative opportunities that the technology might bring
- some global observations by children’s literature specialists on the (potential) value of augmented reality presentations of literature and literacy learning.

The researchers did not approach the workshop with a specific research question in mind; rather, using grounded theory, attempted to collect data and identify issues as they arose.

2 Defining Terms

Augmented reality derives from the interface of computer technology with human perception and has been described (Milgram quoted in Billinghurst, 2000) in terms of a mixed reality continuum. Whereas in physical reality, people perceive a physical object to be an actual presence, and whereas in “virtuality” people perceive, through the mediation of computer technology, a fantasy creation as having the attributes of a physical presence, in Augmented Reality there is (ideally) a seamlessness between “reality” and “virtuality such that people can perceive within the physically real environment, virtual objects and sequences. This continuum, according to Milgram is dependent upon how much of the user’s world is generated by computer:



Reality-Virtuality (RV) Continuum

Azuma (1997) in a survey of the field defines augmented reality in the following terms:

Augmented reality (AR) is a variation of Virtual Environments (VE), or Virtual Reality as it is more commonly called. VE technologies completely immerse a user inside a synthetic environment. While immersed, the user cannot see the real world around him [sic]. In contrast, AR allows the user to see the real world. Therefore, AR supplements reality, rather than completely replacing it. Ideally, it would appear to the user that the virtual and real objects coexist in the same space, similar to the effects achieved in the film “Who Framed Roger Rabbit?”

He further defines AR as having three distinct features. Firstly, the technology combines the real and the virtual; secondly, the augmented event is interactive in real time and finally, the augmented environment is registered in three dimensions. The technology has been applied to a range of disciplines inclusive of medical, military, engineering maintenance and repair, entertainment and education.

3 The Magic Book and Children's Literature: A literature review

In the case of the Magic Book, AR has been employed to enhance the communication of narrative for the child as reader/viewer¹. Billingham et al (2001) describe the technology as follows:

The Magic Book interface consists of handheld augmented reality display (HHD), a computer graphics workstation, and the physical book. Users have their own handheld display and computer to generate their own individual scene views. These computers network together or exchange information about avatar positions and the virtual scene each user views. The HHD is a handle with a Sony Glasstron PLM-A35 display mounted at the top, an Intersense Intertrax inertial tracker at the bottom, a small colour video camera on the front of the Glasstron display, and a switch and pressure pad embedded in the handle...The camera output connects to the computer graphics workstation. Computer graphics overlay video of the real world and the resulting composite image is shown in the Glasstron display. In this way users experience the real world as a video-mediated reality.

The Magic Book has drawn upon the paper engineering sub-genre of the picture book (McKenzie, 1992; Billingham, Kato & Poupyrev, 2001) whereby, in the tradition of the "pop up" book, additional textual features are engineered into the book as artefact that may be described either as gimmick (Whalley & Chester, 1988) or as value-added (McKenzie, *ibid*). Clearly it could be instructive to clearly delineate the value-added aspects that paper engineering brings to the picture book in order to determine the extent to which those features ought to be evident in AR-based picture books as an issue of quality. It is interesting to note that whilst Billingham and Patch note the similarities of AR and paper engineering picture books, there seems to be no evidence of a detailed analysis of the historical tradition of the "pop-up" as a semiotic system that might reasonably have informed the development of the project.

Johnson (1992) acknowledges that though at one level "pop-ups" are simply popular forms of entertainment as evidenced by their short shelf-life, nevertheless paper engineering (or as he puts it, the book as architecture), through its use of three dimensionality, draws upon other sign systems like sculpture with a consequential expansion of the range of interpretative story telling. He argues that "it is clear that art has the power to get beneath the surface of the human predicament and make profound statements about it" and that children's paper engineering picture books like the Ahlberg's (1986) *The Jolly Postman* has a part to play in this process.

So little research has been done into how the book form itself influences and conditions conceptualisation...Our children will need training in acquiring new decoding skills since the ones they presently use-processing lines of words- will be inadequate. The "reader" is now required to make a journey, not metaphorically as has been the case in the past, but actually, through doors into pages, along corridors in pull-out actions, through turning wheels to discover important pieces of information; subtleties of meaning can only be found by opening folders, extracting books from within books, which themselves are in pockets and relate to each other, more complex forms later in the book; the reader must search for clues under pop-up sections, open out pages to several times the book's overall size to follow a map, and search for a hidden object-one could go on and on.

This comment about the need for visual literacy seems now to be dated given changes to National Curricula, but the list of what paper engineering involves is a salutary reminder of how the book as object has developed and what value-added difference might mean for paper engineering.

¹ The term reader/viewer is used to assert the literary/artistic essence of the experience as opposed to the term "user" as found in IT sources which implies the centrality of technology.

Indeed, in the last decade another sub-genre of the picture book, the picture activity book, has expanded considerably in response to consumer demands for gaming interactivity (board games, card games and CD-Rom storybooks). Activities include “pick a path,” spot the differences, exercising physical dexterity (including jigsaw puzzles), finding missing pictorial elements and solutions to mazes, logic games, and verbal and mathematical problems. It is clear that the producers of AR materials need to be cognisant of how children’s literature has developed in the last decade not only to identify the range of interactivity already available but also to exploit the advantages of AR.

Whatever, the heart of the Magic Book as technology has to be the fact that it is a medium, not the story (other than in a consciously metafictional way). Producers of AR materials must aim for a seamless technology so that the power of the story (however negotiated) is paramount. Nandi (2003) has pointed out that the MR term “immersion” is similar to the literary idea of the suspension of disbelief that is an essential element in entering a narrative. In this moment, the reader ignores the fictionality of the narrative, that his/her emotional identification with character/plot is mediated by language, and instead, his/her fictional world becomes a virtual world populated by solid objects and embodied individuals. Nandi argues that:

The delicate moment is the triggering of the suspension of disbelief, which then allows [the reader/viewer] to forget minor technical glitches and to focus on the narrative.

Whilst there are critical literacy and ethical issues implicit in a medium where virtuality and reality are seamless, from a narrative point of view, the challenge for the Magic Book is for the technology to enhance storytelling.

This has been recognised by MacIntyre et al (2001) and Braun (2003) in that, as producers of AR materials, they both utilised a collaborative approach to storytelling. That is, they respectively analysed approaches to storytelling drawing upon other theoretical frameworks which then preceded the application of the technology to a specific project. MacIntyre et al (2001) asserted that “remediating” current media using New Media theory and Media Studies was an essential pre-requisite for successful AR applications.

In the case of AR, we believe that film and stage production will be an important source of relevant earlier media forms, just as they have been for interactive narratives and virtual narrative. For example, filmmakers have a century of experience in telling stories through characters and camera work, and stage directors have an even longer tradition of controlling a story and the viewer’s attention without the luxury of camerawork.

MacIntyre *et al* identify some specific techniques for characterisation drawing upon film and theatre studies. They then proceed to indicate how these traditions underpinned, for example, the construction of an AR representation of a scene from Lewis Carroll’s *Alice Adventures in Wonderland*. The focus of this project was the development of a range of primitive actions based on the Mad Hatter’s Tea Party.

Narrative movement is an essential component of a literary/filmic experience and is usually formulated in Aristotelian terms as follows. The reader/viewer’s emotional trajectory through a story experience is usually sequential whereby, having been orientated to a problem, the reader/viewer identifies with a protagonist, undergoes mounting suspense through a series of episodes leading to a climax wherein the protagonist overcomes the antagonist and consequently the reader/viewer undergoes a catharsis of feeling, a purging of emotion. Identification, suspense and catharsis are traditionally seen as essential elements in the experience of story.

Control of such narratives is traditionally in the hands of the author who decides the nature and implications of the episode and the form of closure that the narrative brings. However, more recent postmodernist (picture book) narratives are more self-effacing on the part of the author given that the reader/viewer is positioned to be more in control in negotiating both story and meaning. Indeed, AR presentations of story fit very much within the pastiche approach in postmodernist picture book texts and could reasonably draw upon such techniques in the presentation of story. It needs to be said that non-specialists in children's literature often perceive the linear plot as the sole structure in the presentation of story narratives and not realise that there are a range of plot structures within children's literature that may more usefully serve AR forms of story (McKenzie, 1992). For example, concept and activity picture books that use episodic structures may benefit from the use of AR technology.

There is some debate about the nature of narrative movement in an AR environment. The question at issue is the extent to which the linear plot (or "novella" in Braun's terms) is a useful construct in developing AR materials. In essence, how much control over narrative movement should remain in the hands of the author and how much should be devolved to the reader/viewer in order to fully exploit the AR environment? What finally is the nature of reader/viewer satisfaction in AR (Braun, 2003) and is the notion of catharsis of feeling a useful construct for AR? Will AR change the nature of storytelling for children (as much as hyperfiction² has changed concepts of story and closure)? There have been a variety of responses to these issues.

MacIntyre et al (2001) used techniques from film and drama to constrain the reader/viewer to a limited range of actions in order to progress narrative movement. Though recognising the centrality of linear plots in the presentation of story, these researchers also used models of storytelling associated with CD-Rom interactivity to develop an AR ghost story. For example, using the idea of "procedural nodes" they developed a seamlessness by constraining reader/viewer action and by developing continuous primitive story elements (akin to motifs) to produce forward narrative movement.

Braun (2003) utilised the morphological study of the folktale using Proppian approaches as a basis for developing an AR project, whilst at the same time, utilising techniques from Audience Participatory Theatre (APT). In attempting to define the nature of story, Braun recognises the central challenge of AR as a medium of storytelling in contrast to game play: achieving mimesis or believability and narrative movement. He argues that role play as found in APT provides the techniques for both interactivity and the personal experience of catharsis. The AR project entitled *Geist* (ghost or spirit) demonstrated, according to Braun, the validity of the model.

MacIntyre & Bolter (2003) again used techniques associated with film and theatre and in an AR project based on an original teleplay entitled *Three Angry Men*, involved reader/viewers as participants in multiple point of view narratives (in contrast to the singular point of view of the traditional linear narrative). Though the plot is fixed, multiple viewpoints shift focus away from action and more onto reflection, allowing greater educative possibilities. In this AR project, the reader/viewer was able to become different characters within a jury setting, debating the nature of crime and punishment.

² The term hyperfiction applies to a web based fiction whereby reader/writers actively pursue/construct a range of possibilities for plot action such that there is little sense of an ending. See <http://www.hyperfiction.net/> and <http://www.duke.edu/~mshumate/hyperfic.html> for examples.

It is clear that the full use of AR environment necessitates a reconceptualisation of the nature of story and its presentation on the part of the author. Tension may be described in terms of agency versus control between the author and reader/viewer in the construction of a satisfying narrative which traditionally has been defined in terms of narrative movement or the linear plot (Fencott, 2001). Other technologies and storytelling contexts such as film, theatre, videogames and interactive CDs may, by being “remediated,” be useful in developing specific narrative strategies. The reconceptualisation that currently seems to be developing in the literature indicates that collaborative approaches using expertise from different media is the way to go. The concept of the “author” needs to be expanded to be inclusive of a range of expertise needed to take advantage of *la difference*. For those who are aware of the debate between John Tenniel and Lewis Carroll with regard to the respective roles of author and illustrator, let alone the sometimes controversial role of the publisher in book production, this is not unsurprising! In the case of AR and the book, what constitutes a satisfying and possibly educative narrative is still evolving.

4 A Literature Review of Augmented Reality (AR) in Education

Given that the technology of AR is relatively new and that most AR research development and applications have been focused on industry, medicine and the military, AR is the new kid on the block in education (Shelton, 2002). There is clearly a need for research into educational uses of AR materials in terms of the extent to which student achievement is assisted by AR applications. At this point in time, it is fair to say that reliable and valid evidence is limited, which is as to be expected in terms of the recent history of AR. Nevertheless, there are some powerful pointers as to what AR could mean in education to justify continued research and development.

Shelton (2002a) reviewed different AR projects in education noting an increasing diversity of applications across disciplines. AR projects have included astronomy (earth-sun relationships), chemistry and biology (molecular structure and model making) and dance. In each case, the manipulation of spatial objects leading to advanced spatial awareness formed the basis of learning, largely at senior levels of the school.

Fruland (2002) used a case study approach in examining the educative usefulness of using virtual reality technology in science enquiry by middle and high school students. With a limited sample of four pairs of students, little can be said in terms of validity but some issues were identified in the research. Fruland noted that an oversupply of data-rich programmes could overwhelm younger learners and without careful research and management, reinforcement of incorrect learning could persist. Eye-strain and motion sickness were issues for some students. The positive gain for the students was that the immersive environment gave greater sense of presence and interactivity which greatly enhanced the representation, perception and understanding of complex data.

Kaufman (2003) argued that there are specific advantages in using AR materials in teaching spatial concepts in a geometry curriculum, having developed appropriate software. He recognised the specific difficulties of cost and school's capacity to utilise the technology at this point in time, but also details specific learning advantages. However, no actual case study research was located to support his argument.

Billinghamurst (2003) argued that AR offers unique educational benefits; firstly, there can be a seamless interaction between virtual and real communicative environments that results in value-added user interactions, secondly, the seamlessness between physical and virtual objects in AR environments presents new teaching/learning strategies even for children with limited computer experience (what he calls "tangible interface metaphor"), and finally, the immersive and animated possibilities of AR means that texts are no longer static objects but enable new interactions with learners.

A search of Academic Search Elite, ERIC and Professional Development Collection revealed little further information with regard to research in the educational uses of virtual/immersive realities. Clearly, this is to be expected given the current stage of development. However, there are suggestive possibilities in what is currently known. For example, research that compares student achievement, Gardner's (1989) multiple intelligence theory and immersive technology could prove useful in that it seems evident that immersive learning may have richer benefits for learners with particular learning styles. There is some evidence, for example, that immersive learning is valuable for learners with special needs (Parsons & Mitchell, 2002).

5 The Development of the Magic Book *Giant Jimmy Jones*

5.1 The production process

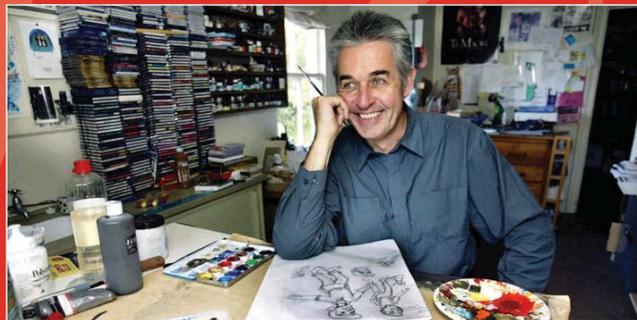
The following posters from HitLab (NZ) and UltraLab detail how the Magic Book was produced.

STEP ONE: Storyboard

(Gavin Bishop)

The first step in creating the “Giant Jimmy Jones” eyeMagic book was to make a storyboard. The author, Gavin Bishop, roughly sketched out what was going to be shown on each page of the book. These sketches showed important things such as who the characters were in each scene, what they were doing, and where they were placed relative to each other. The storyboard was drawn several times before the final sets of pictures were selected.

Once Gavin was happy with the rough sketches, he spent a lengthy time painting full-sized pictures that could be used for the Giant Jimmy Jones book. Each of these pages took many hours to draw and paint, so making a storyboard first saved him a lot of time. When the pages were finished they were scanned and printed to make the final book.



Gavin Bishop working on the final illustrations for the book

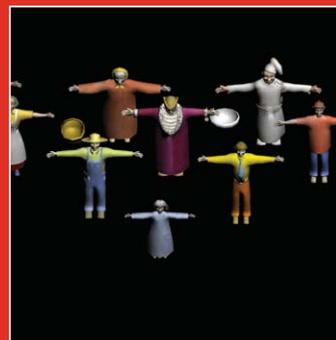
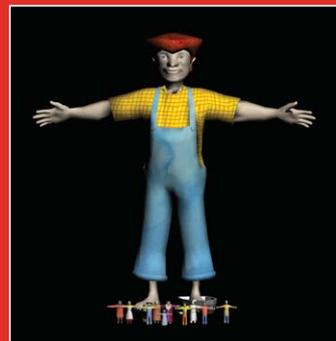


STEP TWO: Three-dimensional (3D) modelling (One Glass Eye)

In the Giant Jimmy Jones eyeMagic book virtual images appear to be popping out of the real book pages. These objects were made by One Glass Eye, a Christchurch-based 3D computer modelling company. The process of modelling involves making a 3D computer model from a picture of an object. One Glass Eye took Gavin's storyboard and his final pictures and worked with him to carefully make 3D characters and objects. They used special computer modelling software to create and colour 3D objects. One Glass Eye worked particularly hard to make sure that the virtual images looked exactly like Gavin's pictures. This was helped by using scans of parts of the pictures and applying these scans as textures on the virtual images. The final result was a set of computer generated 3D scenes that looked very similar to Gavin's illustrations.



Campbell McGrouther from One Glass Eye working on the 3D models for Giant Jimmy Jones eyeMagic.



STEP THREE: Animation

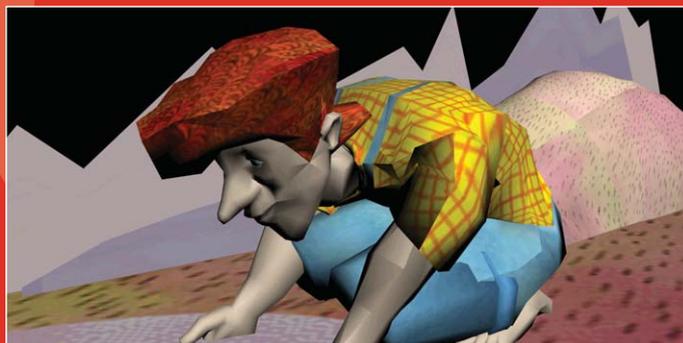
(Claudia Nelles — HIT Lab NZ)

The virtual models seen in eyeMagic are animated, coming to life when a person looks at the pages of the real book, through the handheld display. Claudia took the still models made by One Glass Eye and animated them. Once Claudia found out from Gavin what movements he wanted each of the characters to make she animated the models.

For example, on one of the pages Giant Jimmy Jones pushes away the clouds to make the sun shine for a picnic. To make this happen, the still 3D models of Jimmy Jones, the clouds and other parts of the scene were loaded into some animation software. Claudia then decided how long the animation would take place and how long each of the characters were supposed to remain in their positions.



Claudia Nelles — HIT Lab NZ Intern



STEP FOUR: Natural feature tracking

(Dr Hirokazu Kato — University of Osaka)

When a person looks through a handheld display at the book page they will see 3D images leaping from the pages of the real book. If they move around and look at the book from different positions, the 3D objects will still appear to be attached to the page. This works by a process called 'Natural Feature Tracking' and uses computer software originally developed by Dr Hirokazu Kato.



The camera in the handheld display tracks the natural features on the page

The handheld display has a small camera attached to it and when the camera sees the book pages, software on the computer searches for parts of the pictures that are most different from each other (the natural features). For example, the edge of a building or the shape of Giant Jimmy Jones' head. Once the computer software recognises these natural features it places 3D animated pictures onto the pages.



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STEP FIVE: The finished product (HIT Lab NZ)

Once the storyboard, 3D modelling, animation and natural feature tracking were completed and combined there was only one thing missing from the book — sound. Gavin Bishop worked with a composer Patrick Sheppard to create the audio narration. When a person turns the pages on the book, they hear Gavin Bishop reading the story and see his real pictures come to life as 3D animated images.

A special handheld display was also made so people could view the 3D images in the book and a wooden kiosk was built to store the computer inside.

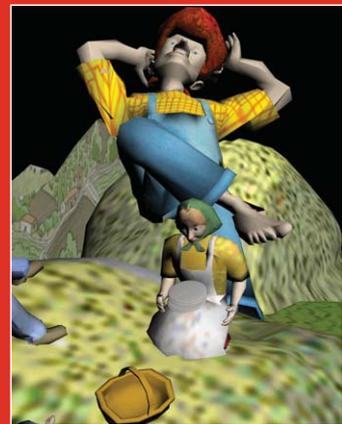
The Giant Jimmy Jones eyeMagic book is an example of one way new technology could change forever the future of reading.



Claudia testing the finished product — Giant Jimmy Jones eyeMagic



Composer Patrick Sheppard



5.2 An analysis of the value-added difference of illustration and AR

The following chart compares and contrasts the type of information offered by the different media: the text, the illustrations and Augmented Reality.

Text	Illustrations	Augmented Reality
<p>Page 1 Jimmy Jones was a giant He lived in the mountains and slept in a valley for his bed. The clouds were his blankets and the lake was his bath.</p> <p>Page 2 Everyone in the village loved him. He shaded them from the sun when it was hot? He brought them rain when it was too dry. But when it was time for a picnic he pushed away the clouds.</p> <p>Page 3 One morning <i>Giant Jimmy Jones</i> said, “I would like to go for a walk. I would like to walk right around the world. “But,” he said “I do not have any shoes.”</p> <p>Page 4 The villagers looked at one another. “Where can <i>Giant Jimmy Jones</i> get some shoes that are big enough?” they asked. “Perhaps the carpenters could build him some giant wooden ones,” suggested an old woman.</p> <p>Page 5 “Or perhaps the tailors could sew him some giant woollen shoes,” suggested a young man</p> <p>Page 6 “I think the bakers could bake him some giant pastry shoes?” said another villager. “These would all take far too long,” said the mayor. “<i>Giant Jimmy Jones</i> wants to go for his walk now.”</p>	<p>The age of the giant.</p> <p>Aspect of the giant’s personality (eg. smiling, non-threatening) and clothing</p> <p>Some sense of size and scale.</p> <p>Aspects of setting, eg. traditional village, the pastoral, rolling hills.</p> <p>Sub-plot: the balloonist?</p> <p>Village defined as a small family.</p> <p>Directionality of the giant: against the flow of the action.</p> <p>No development of the sub-plot.</p> <p>More villagers appear as characters. One older woman appears dominant.</p> <p>Little development of subplot:</p> <p>Carpet laid. Tailor identified by collar and tie.</p> <p>Mayor and bakers appear. Bakers have no individuality.</p> <p>No sub-plot development.</p>	<p>Country music.</p> <p>Slightly awkward gait.</p> <p>Verbal track: author reading (continues...)</p> <p>Greater sense of topography.</p> <p>Giant mimes something large: the sense of the whole world.</p> <p>Sense of gestures and body language.</p> <p>Feet highly cropped: slightly surreal.</p> <p>Pastry cooks cook.</p>

Text	Illustrations	Augmented Reality
<p>Page 7 Just then a little girl spoke up. “I think my uncle could help. He’s a fisherman.” “A fisherman?” (said the villagers) “What sort of shoes could a fisherman make for a giant?”</p> <p>“Well,” said the little girl, “he has two old boats that he doesn’t use any more. I’m sure that they would fit Giant Jimmy Jones’ feet.” “What a good idea,” said the giant. “I will go and try them on this very minute.”</p> <p>Page 8 At the edge of the lake, Giant Jimmy Jones slipped his feet into the fisherman’s boats. They were a perfect fit. Off he went in his new shoes. He walked and walked right around the world And was back again in time for dinner.</p>	<p>Giant reappears as a gentle giant.</p> <p>Focus on giant/child interaction through implied leading lines.</p> <p>Giant direction now in a protagonist’s mode: heroic.</p> <p>Giant carries umbrella and leaves villagers. Left to right movement.</p>	<p>Giant and child point to direction.</p> <p>Villagers static and in a direction.</p> <p>Farewell scene.</p> <p>Choir sings plus credits. Cube in motion.</p>

It can be seen from this analysis that little further narrative information accrued from the use of AR technology despite the potential of the balloonist as a subplot giving the possibility of further story to be told. It can however be argued that the author’s voice as narrator and animation aspects added aesthetic elements not picked up by this analysis. It is fair to say though that the sub-plot of the balloonist could have added an extra dimension (or alternative viewpoint) to the overall story, if told through an AR animated sequence that may have added considerable edge. For this to occur, the animators needed to envisage themselves as artists in their own right.

6 A Case Study of a Children's Workshop

Schools in the Christchurch area were invited to send two students each, on a first come, first served basis, to take part in a five-day workshop using Anim8or. This 3D drawing programme was chosen for its ease of operation and its suitability for the construction of objects intended to enhance Gavin Bishop's Magic Book story, *Giant Jimmy Jones*. The ten student pairs selected for the workshop came from two high schools and three primary schools in the local area.

The Anim8or training was conducted by Claudia Nelles of Hitlab (University of Canterbury) and the activities to introduce the regular picture book and the pop-up picture book were conducted by John McKenzie as researcher participant.

Each day, a teacher from one of the contributing schools was available to make observations of individual students and to comment on their own perceptions of the group's reactions to the workshop. The second College of Education researcher acted as recorder/observer throughout the workshop.

Students' prior abilities and interests

The task for the researchers on Days One and Two was to gather preliminary data about students' interests and aptitudes by means of questionnaires asking the them about their prior experience of, and attitudes to reading, writing, drawing and the use of computers.

Two of the students saw themselves as avid readers who read widely, and five identified themselves as avid readers who followed specific interests. One said, "I love reading, but I only read fiction". All these avid readers were female. Two of the remaining students (all boys) claimed that they enjoyed reading, but it was not a main interest. The remaining boy, a fourteen-year-old, claimed to read only to access information and not for pleasure. He said, "I read when there's nothing else I need to do".

None of the students described themselves as avid writers whose main interest was writing about all subjects; however, two girls claimed to be avid writers in specific areas of interest. Most of the students claimed to enjoy writing, but did not describe it as a main interest. One student (a boy) claimed to write "when I need to" and not for pleasure. The students who were most and least interested in writing were all female.

Three students said that drawing was a main interest; one, a girl, saying, "I always draw whenever I can". The majority said they enjoyed art, but not as a main interest, though one boy said, "I don't do much drawing or painting – I'm not very good at it".

Not unexpectedly, more than half of the students, including the three boys, saw themselves as avid and extensive computer users for whom computing was a main interest; two were avid users with specific interests. Two of the younger girls, however, were more hesitant about computer use, saying, "I only usually write for fun or play games on the computer", and "I am not very confident except when I know I can do it easily".

Between them, the students had a good deal of experience with computers. Some mentioned having used computers at home since they were aged six or seven; they had done courses, entered computer competitions and had access to numerous programmes on both PC and Mac.

One girl said, “I have done a[n] Australian computer skills exam. I can work with Powerpoint, Word, Publisher, Internet Explorer [and] I am currently learning to make an i-movie on laptops.” Another listed her experience as “Kid’s Congress, Australian Computer [Competition], computer skills class” with “iBook, iMac, PC, Laptop, etc.” using “Word, Powerpoint, Publisher [and] Excel.” The oldest boy had an impressive *curriculum vitae* in which he said “[I] can use Office, Studiomx, 3D Max, Maya, Blender 3D, Mac OS, Premiere, U-read, photoshop, almost anything.” This boy had also done a computer-building course and had built a computer from scratch. One of the older girls had “designed a web page with Animated Helper”, and one of the younger girls had used basic drawing programmes at home, and it seemed that experience with computers among the group appeared to have more to do with age than with gender.

To summarise: the majority of students had volunteered for the workshop on the basis of their interest in enhancing their skills on the computer. Only one student had expressed an interest in writing and illustrating her own stories. Understanding therefore of the nature and structure of storytelling may well have been rudimentary, especially with visual narratives.

Students’ attitudes to picture books

Given that the students were going to be asked to provide illustrations for a picture book, it was thought necessary to see if they understood that picture books could be of interest to young people of their own age (as well as to small children), and that the visual narrative has the capacity to augment, elaborate and even challenge the text.

At the outset, the students had mixed reactions to the concept of picture books. While they felt that the creation of picture books required time and nearly all of them thought and that this involved the use of creativity, as did any other art, they had mixed feelings about who picture books were intended for. Some believed that picture books were essentially for young children; the same number felt that picture books were for all ages and others said picture books were for children and young people, but not adults.

On Day One, before the workshop activities began, most of the students thought that picture book artists should be free to create whatever they wanted to, but there was still a strong belief among them that pictures in a picture book should accurately reflect what the words say.

Interestingly, none of these students saw the picture book as being particularly relevant to them, and although most said they would occasionally pick up a picture book, none admitted to borrowing or buying a picture book for themselves.

Learning about the picture book

Because the end-point of the workshop was to produce the illustrations for a picture book, albeit an animated one, it was important that the students were aware of the possibilities of visual narrative.

After students had examined and discussed a number of well-known modern picture books, the beginning of *Just Another Ordinary Day* was read aloud. This picture book, written and illustrated by Rod Clement, is a humorous book in which way-out pictures challenge the everyday expectations set up by the text describing Amanda’s “ordinary” school day. Students were asked to draw their own illustration to include Mr Wilson, the science teacher, and they very quickly understood that Mr Wilson need not be a regular teacher in collar and tie.



As a result of their discussions, the students established that in a picture book:

- The pictures do not have to reflect the text exactly
- The pictures can challenge readers' expectations of the text
- The pictures can tell stories not mentioned in the text
- The pictures can add interest and humour

The pop-up picture book

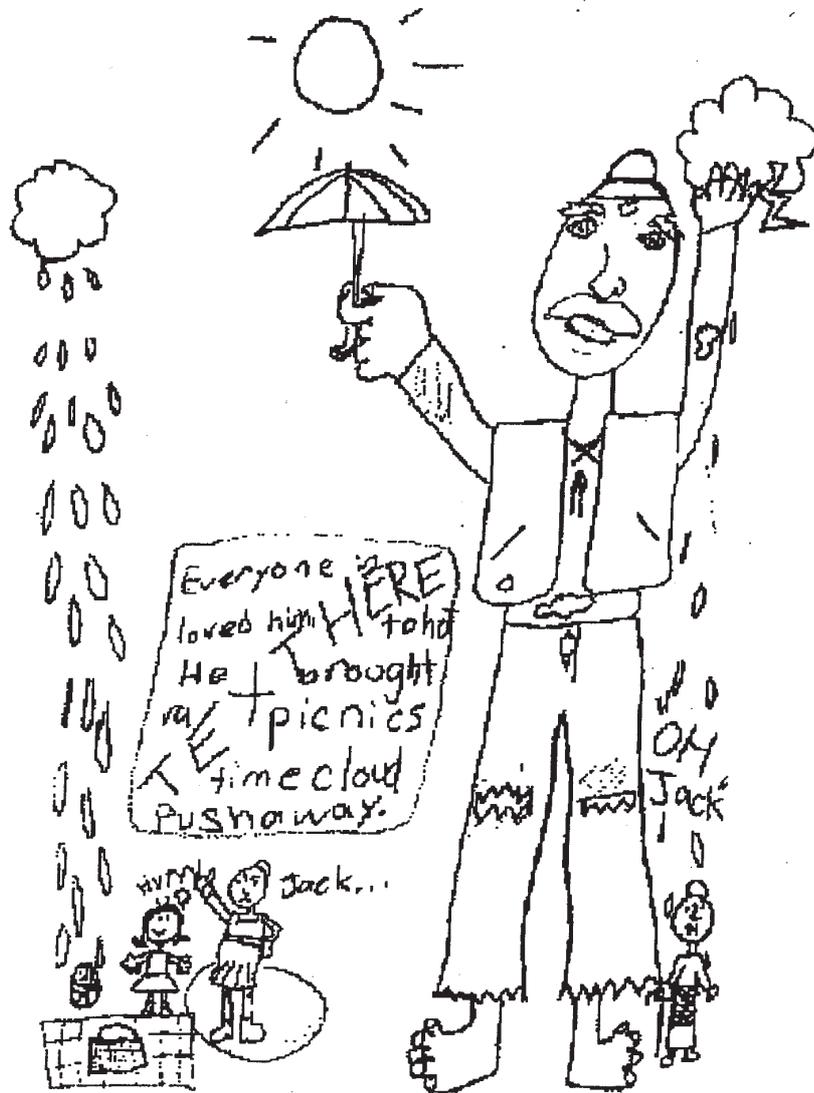
As an extension to the picture book study, on the morning of Day Two, students were introduced to the concept of the pop-up picture book. This was felt to be the nearest paper equivalent of the proposed AR book and the intention was to show students that paper engineering must contribute more than mere novelty to a picture book; it must in some way add to the story experience, just as Augmented Reality should in the proposed "Magic Book". They examined and discussed a number of examples of pop-up picture books (good and bad). They were asked to look particularly for books in which the contribution of the paper engineering actually enhanced the picture book experience.

As a result of their discussions, students established that in a good pop-up book, the pop-up feature is more than just a gimmick. The pop-up feature enhances the visual narrative by adding an element of surprise, humour, new information and a learning opportunity.



Planning illustrations for *Giant Jimmy Jones*

Gavin Bishop's story *Giant Jimmy Jones* was read aloud to the students. Then students, working in pairs, were given different pages to illustrate. After discussion with their partners, they drew their illustrations in pencil on paper. Despite examining some very sophisticated picture books and some excellent examples of paper engineering, most students produced drawings that did no more than reflect Gavin Bishop's text. However, two of the younger girls chose to represent the giant and the villagers as eggs instead of people, and one of the older girls depicted the world as a sphere (with New Zealand figuring prominently) around which *Giant Jimmy* declared his intention to walk.



Everyone in the village loved him
He shaded them from the sun when it was hot.
He brought them rain when it was too dry.
But when it was time for a picnic
he pushed away the clouds. (Page 2)

The Anim8or Programme

In the afternoon of Day One, Claudia, the technical expert, explained the process of 3D modelling and the difference between virtual reality and augmented reality. (Virtual reality requires a headpiece; augmented reality requires a head-mounted display which adds 3D models to the real environment. A marker is required to trigger the display.)

(On Day One it was necessary for students to share available computers in groups of three or four, by day two they were working in pairs with one group of three; by Day Three they had access to individual computers.)

Animations in the programme are produced by combining and shaping “primitives” (basic building blocks of squares and cubes). Students were shown how to select a shape, show faces (in three dimensions), select a point, extend a point and apply a mesh (to modify the shape), then to apply surface shading to make the object appear solid. By the end of Day One students were able to produce and rotate a basic house shape with a solid appearance, (including roof and windows). Days Two and Three covered the skills needed to construct other objects.

In constructing a fish, under Claudia’s direction, students decided which primitives to select, applied a mesh, highlighted the intersections, and extruded points to modify the shape of the object. They used the line tool to construct a fin which they were then able to scale, click, and drag towards the body shape. Copy and rotate functions were used to create a second tail fin, which could then be dragged into position.

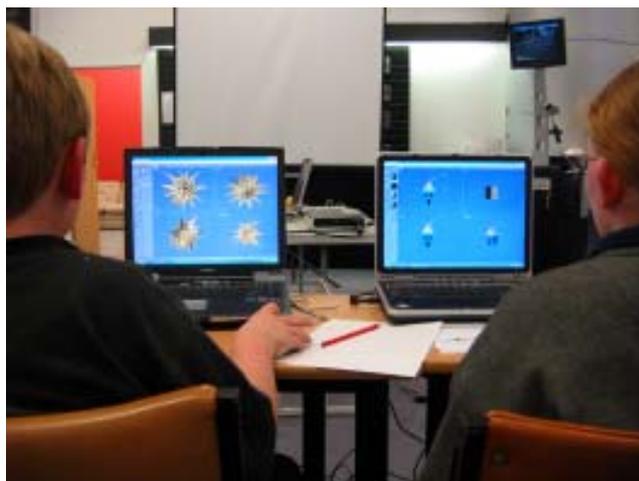
To construct a hand, students were shown how to access and modify a suitable shape for the palm, then how to select a face and extrude a thumb and fingers. They were shown how to choose and apply a suitable skin colour from the colour palette, then how to apply the colour to selected faces.

Finally, working in pairs on Days Three and Four, students planned the page they would illustrate for the story *Giant Jimmy Jones*. Each pair undertook to create the objects needed for their scene, and between them, they began busily creating: mountains, lakes, the sun, Giant Jimmy, houses, hands, feet, a globe, trees, flowers, a picnic blanket, clouds, fish, flowers and people. Students created their. Additional teaching covered the following:

When the construction of objects was well under way, students were shown how to construct the base landscape for their three-dimensional animation and also how to add textures to create more realistic 3D objects. They were shown how to take objects and textures created in “object mode” and place into a “folder” to be transferred into “scene” mode for the creation of the planned picture.

When the final scenes were ready they were collected from the individual computers to be combined by the technical expert for the final presentation as page illustrations by the student pairs.

The workshop concluded on Day Five with the presentation of students’ own interpretations of Gavin Bishop’s Magic Book story *Giant Jimmy Jones* to an invited audience of parents and friends. All of the students received a certificate of attendance and achievement and a copy of the Anim8or programme to take home.



Summary of the Workshop: What the students thought

The students were given a questionnaire (see appendix) to complete at the end of Day One and another at the end of Day Five.

At the end of Day One students listed three things they had learnt. While most mentioned aspects of the Anim8or programme, and the Magic Book concept, it was clear that they had also understood some important points about the nature of visual narrative. An eleven-year-old girl summarised, “picture books aren’t necessarily boring and the artist doesn’t have to keep to the text”. Students were also interested in the Magic Book concept, including “how we can see a 3D picture with just using a camera”, “What markers are and how they work” and “the technology needed to make a magic book”.

Most of the students’ enthusiasm, however, was for the computer skills they had learnt: “how to use Anim8or to make my own things”, “spheres, cubes and this funny shape” as well as “heaps about rotating and colouring computer 3D animations” and “how to make and colour 3D text on the computer”.

Students’ Comments at the end of the Workshop

At the end of the workshop, all of the students rated it “very exciting” or “mostly exciting”, three of the younger girls being the most positive. For all of them “the best part” was one aspect or another of their use of the Anim8or programme: “Learning how to put a model into a Magic Book” said a fourteen-year-old girl, and “making a page for the book” said an older boy. The “worst parts” of the workshop was for most students purely organisational: “having to stay in for lunch”, “having to share computers” and “having to wait for people to catch up”.

Asked what she thought about the workshop one girl enthused “the workshop was a fantastic experience and I loved working here. It would be a great pleasure to come back again”; a boy said “it was so cool. [I’d] definitely be interested in doing it again”. A number of the students said it was “great fun”.

Comments from Teachers

Teachers made observations on individual students during the five days. Most of these comments focussed on how individuals were behaving in a new social context and how they were coping with the challenged of the computer programme. In general most students kept in their school pairs on the first day and did not interact freely with the larger group. Later, however, it was good to see younger and older students sharing ideas and interacting socially.

At the end of each day, teachers were asked for general comments. The teacher on Day One looked particularly at the potential of the programme in different learning contexts, analysis, synthesis and problem-solving, saying it may provide a dimension of combining verbal and visual features to add meaning when presenting findings/ideas. The teacher on Day Two say the workshop as “very engaging, and with advances in technology [it] will be very realistic”. The teacher on Day Three saw potential in students “being able to visualise a concept and change/manipulate to realise that concept”. While the teacher on Day Four, who had a strong interest in the use of computers saw the workshop as “a highly motivational format for communication” using a “multi-sensory approach to learning [which] links text, image, sound and movement”. While the teacher who saw the end product on Day Five, declared that the potential was “endless - this concept could go as far as a teacher wanted it to go!”

The teachers were not unanimous in their estimation of the Anim8or programme for curriculum delivery. “[It] could provide another tool, particularly for synthesising ideas – higher level thinking - [with] has cross-curricular potential, said the teacher on Day One, while other teachers saw value in the programme as an “exciting . . . tool to support learning, as well as display new learning”, “great for extension of English programmes”, and valuable in a small group setting: “group interaction and working with others is of great benefit. The value of 1-1 computer with directed teaching is more than evident”. However, one teacher had a negative reaction. She said “curriculum delivery involves more interactive participation between children and texts. In 3D children would have a physical barrier to interaction.”

All of the teachers recognised difficulties in using the Anim8or programme in a school setting. These included: time constraints within a classroom setting; the problem of “other noise” within the classroom environment; the limited availability of software and/or expertise in school setting when help is required; frustrations that arise in trying to achieve realistic results, and the time required for learning to use the programme, and the necessity of both teachers and students to be computer literate. One teacher complained that the programme was “too involving” because “computer games now equal less social interaction”. This teacher also claimed that the programme “raises expectation levels for the kids and will possibly leave a lot of fabulous children’s books looking out of date or old-fashioned and not used”.

Nevertheless the teachers did see some special advantages. One teacher said, “I can [see] this could be a very powerful tool for a special learner who recognises their limitations in other learning styles. Another teacher, in interview, saw a particular value in 3D animation in areas of non-fiction in which difficult 3D concepts needed to be taught.

Conclusion with regard to the Workshop

From a purely practical point of view, students aged 10-14 who volunteered for this workshop were able to learn the skills needed to produce three dimensional objects on a landscape base to create an AR scene. They enjoyed the experience and expressed an interest in taking part in further workshops. In this context, their problem-solving skills in were definitely exercised and their computer skills enhanced. They tended to work well in collaboration and benefited from small-group teaching and one-to-one assistance.

Teachers were, on the whole positive, about the value of the workshop to their students and the potential of such a programme used in a school setting, but expressed a number of practical reservations.

The students who took part in the workshop already had extensive computer experience and some interest in writing. However, their drawing skills seemed not to be highly developed. Whether this was a function of age or of limited practice, was not established. The scenes produced did not, in the researchers' opinions, greatly enhance aspects of "story" as viewed in a conventional picture book, although at least one student had a sophisticated idea that was not able to be carried out. Older students were better able to cope with the drawing challenges, but even these students did not initially see the picture book as having much to offer them as a narrative experience. It seems that the students may still have much to learn about the complex possibilities of visual narrative.



7 Some Observations with regard to AR Storytelling and Children's Literature

The picture book as a genre and AR technology: what is the difference?

The picture book is a sophisticated genre (Nodelman, 1988). This is not generally understood in the public arena where the picture book is associated with young children learning to read and therefore the picture book is deemed *ipso facto*, simple. Nothing could be further from the truth. Given the complex relationship between words and pictures in visual storytelling as well as the increasingly sophisticated nature of children's experience of television (as in Homer Simpson), producers of AR as part of a picture book must be thoroughly familiar with the medium and children's increasingly sophisticated expectations. Indeed, the picture books of Alan and Janet Ahlberg have shown that the postmodern picture book is part of early childhood experience!

There are distinct, potential differences between the picture book genre (specifically paper engineering) and the AR mediated "book."

Firstly, the possibility of animation brings a different dimension in terms of the passing of time, the delineation of action and body language, additional textual communication (text being defined here as the tradition of image and narrative) and the choice of dramatic moment. Animation may be able to give more subtle clues as to the development of character and choice of action through the portrayal of body language independent of the text, and indeed, possibly in an ironic relationship to the text (Nodelman, 1988).

Secondly, the particular feature of AR (that which magically "is" and "is not") may be pertinent to a specific genre (as in the ghost or horror story) or motif within a genre. For example, in a retelling of "Snow White," the mirror could be the specific location of AR whereby different characters perceive different messages. Or it may foreshadow an outcome whereby words (being beautiful) are interrogated by an animation (the transformation of beauty to ugliness). AR would thus be a targeted element within an illustration.

Thirdly, though three-dimensionality also marks paper engineering as a sub-genre, the possibility of change through passing time that marks AR allows for further possibilities of storytelling when three dimensional representation changes over time (as in the idea of decay and death having external signs). Objects can be seen to be changing through time before the eyes of the reader.

Fourthly, there is the possibility for the reader to be actively engaged in object manipulation and making choices that consequently influence plot sequence. As interactivity becomes more technologically seamless, multiple viewpoints could be used to tell the story as different characters give different takes on the action. This allows for a greater complexity of story and interpretation. Clearly, postmodern emphases on the metafictional, the parodic and the playful could be used to great effect using AR approaches. A re-presentation of the folktale, for instance, whereby the AR environment reveals postmodern play with the traditional book would playfully draw attention to the metafictional (McKenzie, 2003).

Finally, given transactional theories of the reading process (Rosenblatt, 1978), it is now known that reader/viewer prior knowledge profoundly influences the nature of meaning. The novelty of AR and the lack of readerly expectations allows the possibility of new forms of storytelling. Whilst the physical reality of the open picture book may excite particular expectations of story based on traditional prior knowledge, AR with its virtual environment can unsettle such expectations and exploit the new. For example, (ignoring technological limitations for the moment), a video clip based on historical materials could be seamlessly evoked within a historical fiction. Imagine an appeal from Hitler directly to the reader within the context of a representation of a war genre! It seems reasonable to expect then that the producers of the Magic Book to have exploited *la difference* and that the project could be assessed in these terms.

It would be fair to say that the technology is new and that *Giant Jimmy Jones* is at the cutting edge. But it would also be fair to say that because the concept of story and authorship has to be reconceptualized, then the potential of AR is yet to be realised, especially in a fictional setting. The developers of the Magic Book deserve commendation for opening the debate.

The Trade Picture Book and the Reader: What is the implication for illustration?

There is a difference in visual narration between the “reader” as a production and a trade book. In the case of the reader, the art work closely mirrors the text in that the illustration is used as a text decoder, part of the cueing system. The illustrator is considerably constrained in terms of the spaces available to be inventive and possibly distractive of the didactic purpose of the text: that is to say, to teach the child to read. *Giant Jimmy Jones* was originally designed as a reader that therefore reasonably constrained the illustrations to be mirror images. It is curious therefore to employ AR technologies (especially a sound track of the author reading the text) that removed the necessity of the child to read at all. Thus, “*Giant Jimmy Jones*” became more of a technology mediated read aloud. It is the technological equivalent of the lapsit. The author, with some prescience, noted in the interview (see appendixes) that the technology could become a babysitter.

Hence, it is misleading to assert, as in the *Opening Day*, that the Magic Book was the new face of reading. Indeed, the words could have been removed completely from the picture book (as in the wordless book) and meaning would not have been lost. Further, that might have been a good thing. It would have resulted in the AR being essential and not simply a novelty. The removal of the words would have been more cognitively challenging for the child as viewer. The danger of AR in a reader is that it makes reading superfluous.

This is no criticism of the author who is an expert in both creating readers and trade books. What is being argued is the necessity of being clear about the nature of visual storytelling for different purposes, different audiences and using maximally different technologies.

For these researchers, the potential of AR is not in the picture book as “reader” but in the trade picture book. The best trade picture books (published with the public commercial market in view as opposed to the educational market) give much more scope for the artist to find the gaps and spaces of a text and literally play with the words, often telling contradictory stories (and hence creating an ironic relationship between words and pictures). The artist here becomes a performer in his/her own right; the book a performative object, as opposed to being a didactic object.

The AR Book as a Site of Performance

This element of performance marks the best of paper engineering and becomes, literally the hook that invites the reader too to become a performer. He/she manipulates objects (and by implication plot, character and setting). Performance in this sense, both by designers and viewers, is the name of the game. Performance may mean:

- the AR character is a completely different character (that doesn't exist in the words) who suddenly gives a different take on the action, inviting the reader to investigate the AR environment for a different purpose. The sound track may oblige the reader to assume a particular interpretative stance with the words that an initial reading may have glossed over.
- the AR character is a book character but, through technology, is able to be questioned, challenged and as a consequence, acts differently. The “manipulation” of the character results in a different plot. The reader is invited to analyse and make ethical choices.
- a book character needs to have a specific object for him/her to be able to continue and the reader manipulates the AR environment to locate the object and perhaps present it in a particular way. The reader is invited to identify with the AR's character and closely observe the “material world.”
- the AR character foreshadows future action (or introduces new characters) by comments made, or body language displayed before the words give permission. The reader is challenged to predict.

This seems reasonable given the evidence in the literature review that collaboration is the way to go utilising other performative traditions in the visual arts (film/video, theatre and opera), visual education (drama as a learning medium, the picture book, computer based learning) and interactive storytelling (CD Rom stories, gaming).

Augmented Reality and Non-fiction

The makers of the Magic Book took on a brave new world when they focused on a fictional experience as their first project in incorporating AR into the book. Given that the review of the educational uses of AR had exclusively focused on information problem solving and transfer of knowledge (as in non-fiction), it can be seen that *Giant Jimmy Jones* is unique.

The distinction between fiction and non-fiction is a contested distinction in that two schools of thought exist. On the one hand, some reading specialists assume that the distinction is inherent in the book as object (Nicholson, 1998) whilst other literary specialists assert that the distinction is inherent in the reader's stance (Rosenblatt, 1978). That is, Nicholson (1998) argued that the direct teaching of specific structures found within non-fiction texts would enhance reading progress. Conversely, Rosenblatt (1978) argued that two stances could be identified in readers as they approached any text and that these stances defined the fiction, non-fiction distinction. That is, a reader could approach a text with a view to take away information (the efferent stance) or to “live through” an experience within a text (the aesthetic stance).

AR technology has the capacity to exploit both views of the fiction, non-fiction distinction. For example, a reader/viewer, in making a particular choice in terms of manipulating objects (and plot) could be asked to assume an efferent stance as they apply knowledge about the real world in making the choice. The consequences of choice can be a learning event that requires the

reader/viewer to think further about the real world (causes and consequences). Equally, a book presentation of information could, through the application of AR invite the reader/viewer to respond emotively (by using sound and a sequence) thus inviting an ethical relationship with knowledge. It has been argued that wisdom emerges from an integration of knowledge and wonder (McKenzie, 1992; 2002).

In a more conventional sense, an investigation into the use of paper engineering in the presentation of information could benefit the application of AR in non-fiction. A brief examination of modern non-fiction presentations would reveal an extraordinary creativity in technology and design. The pleasure of being entertained being integrated with the pleasure of learning is entirely valid.

Some Practical Matters

A librarian was interviewed after three weeks of the AR *Giant Jimmy Jones* being available for public consumption. Her comments indicated that the AR technology fascinated adults as much as children (who generally mediated the use of the machine); that the equipment (both design and use) was not user-friendly for the implied reader/audience (a Year One or Two child); that the technology was not yet robust for all children to experience the full AR technology and that she was not aware of the child being a captured audience throughout the complete book experience in that mastering the technology was a problem for many. It would be fair to say that reader/viewer's expectations are challenged by the AR *environment*.

8 Conclusion

HitLab (NZ) and UltraLab are to be commended for pushing the boundaries of what constitutes the book as an artefact. Like any new venture, there will be supreme moments of success where future possibilities seem to be realised in the moment and there will also be time where desire does not meet reality. In the case of the Magic Book, it is the view of these researchers that the window of opportunity has been partially opened; but there are gaps and spaces that need to be considered.

Primarily, the new technology means that story and its presentation has to be reconceptualized and that therefore, collaborative ventures are necessary utilising the diverse skills of professionals whose business it is to both theorise and apply concepts of stories in different media. Specifically in the case of the Magic Book, the project could have been enhanced with the appropriate professional development for all participants in the manner suggested above.

There seems to be no question that AR will prove to be a highly effective medium both for entertainment and education and the enthusiasm and pleasure of children involved in the workshop is evidence of this. As participating teachers asserted, little imagination is needed to recognise how AR could potentially greatly enhance learner achievement and curriculum delivery. This project points to some of the ways that this may be achieved.

9 Recommendations

- That future developments of AR and the book involves a greater collaboration of professional knowledge and skill sets as the concept of story/authorship is being “remediated.”
- That paper engineering as a semiotic system is specifically explored as an exemplar prior to undertaking further AR developments.
- That future workshops with children include detailed and specific instruction in picture book design/visual narration.
- That specific pre-teaching in 3D drawing is part of future workshops prior to using computer programmes.
- That future research focuses on some specific educational issues such as the utility of AR and Gardner’s theory of multiple intelligences; the impact of AR on higher order thinking and using AR with children with special abilities and needs.
- Some attention is given to equipment design when AR is intended for public consumption, mindful of the implied audience.

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10 Appendices

10.1 Transcripts of a conversation with author Gavin Bishop and John McKenzie

John: Knowing what you know now about the process, what would you do differently if you were starting again?

Gavin: Well I think now I feel as if I would be able to put some systems into place which I didn't have at the start of this project. I mean, I didn't know about or understand any of the systems that would make the process of preparing artwork for the magic picture book. I didn't understand, but I've picked up on the way on that. I didn't know for example that all the characters need to be designed individually, as individual pieces. It's all very well just drawing the picture like it would be in a book with people doing things in the picture relating to one another and so on. I didn't understand that each one of those characters would have to be drawn into another scheme that the computer modellers would be able to copy and make three dimensional models from, I didn't understand that. So, I would be aware of that now.

I don't think I would start the final artwork as soon as I did. I would leave that until quite a lot of the animation and modelling had been done, because I can see that there are some things that they (the animators) can't do. Well. I'd like to. I'd like to leave room for some sort of development to take place from them.

John: Which actually leads me to another question: to what extent do you see the animators as artists who have freedom to create as opposed to servants who must reflect?

Gavin: They're trying to be that, they're trying to be servants that must reflect what I've illustrated, what I've drawn.

John: This is a first [attempt at a Magic Book]. Would you see that as a problem? Is it an issue?

Gavin: They keep saying to me that I can introduce texture into these models, that for example, an old lady's coat can have a kind of furry texture. I've been unsure about how far I should go down that track because if you give one coat a texture, what do you do with everything else? Do you do that to everything else too? In the book my illustrations are going to look as if they've been drawn by hand and painted with a paint brush. That's, that's how I've made them and I think we've come to the understanding - the illustrator - the animators and myself - the modellers - that it's probably best if we can make models to look as much like the illustrations as possible and so they've gone as far as getting me to make sort of swatches of colour, painted with a watercolour red finish and texture and they've been scanning those swatches and superimposing them onto their models, so that the dungarees that the child wears have got watermarks and watercolour effects similar to the dungarees that the giant wears in the illustration.

John: So that, as a consequence, there is a lot more subtlety?

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- Gavin: Yes. They're really working very hard to pull the two things together. They could easily go down the track where they ended up with a giant that looked like something out of *Shrek*, you know, with detailed textures and, oh you know, that, that kind of (thing).
- John: Do you see them ever having the freedom of composition, I mean, where, where does their creativity begin and end and your creativity begin and end in the collaboration? I mean can you see them say "look we would like to do it this way because of x, y or z?" How would you see that?
- Gavin: Well it would almost do me out of a job. I wouldn't be needed after a while if they came up with those sorts of suggestions. But I could see that, you know, while we're working on it they might say, "look this giant looks a bit uncomfortable sitting on this floor plan that we've made, couldn't we shift him further across the page or something or other so he looks better there". That might mean that I would need redo that illustration with the giant changing position on my illustration. Yes, quite obviously something that's going to work as a two dimensional proposition on a flat surface may not be OK as a 3 dimensional thing, you know in virtual reality.
- John: But the actual visual conception of what Jimmy Jones character looks like - you would see as retaining the right to envisage (that)?
- Gavin: I think so. In fact there's a slight problem I can see at the moment. Because I'm going to have to do all the artwork again because we've eliminated a lot of the characters. I (had) too many characters in the original pictures. The giant that I drew and made a modelling scheme for, is a much younger character. I'd say he'd be a person of say between 18 and 22, whereas the character that has come from the modeller is an older guy.
- John: Because that's often the conception we have of a giant?
- Gavin: I think that's (right) - whereas my giant is a young springy kind.
- John: So the collaboration between the animators and you as artist, is an interesting new business.
- Gavin: It certainly is for me. I underestimated the amount of drawing that I probably needed to have done right from the start. I needed to have done a lot more informational drawings for these animators and modellers to work with.
- John: You know this morning we were looking at the difference between gimmick and value added. From all your experience of the value added that pictures do that words don't, what do you see the value that 3D animation does that 2D pictures don't?
- Gavin: Well I think the most obvious thing would be it'll have a novelty value that will attract people into that book that may not have ever looked at a book before otherwise. ...
- John: With all due respect that's a marketing business that is external to the book. My question is more internal. Think of *The House that Jack Built*, think of *Tom Thumb*-the pictures do a lot more than the words give permission.
- Gavin: That's right.
- John: So pictures add value to words. What value do you see this 3D animation?

Gavin: I'm not sure, I really don't know. I can't make up my mind what this thing is that we're making anyway. I can't decide whether it is reading, is it a video or is it a little movie theatre, just a toy? I don't know and actually I'm keeping a pretty open mind about it. I mean I don't actually want to start agonising over the philosophy behind it or anything like that, because I think I'd start to freeze up thinking "Oh is this what I'm supposed to be doing".

I really haven't thought about what it is that I'm doing, I just can see it as a fascinating, fascinating process and a chance to get to work in an area where that is just so fascinating.

John: Tell me, if you, if you were to agonise, not over Jimmy Jones, but say, see this as a door that opens up to future and imagine four years down the track ...?

Gavin: Yes, I'd love to do another book.

John: But four years down the track with more technology?

Gavin: Yes.

John: Perhaps a lot more micro technology, so it's not big cumbersome instrument and it's all inherent in the book?

Gavin: That's right. So you buy the book and it's there.

John: And all you need is the glasses.

Gavin: That's right, that's right. Somehow in the back cover of the book is the computer or whatever

John: Yes, or the microchips are embedded in the print.

Gavin: That's right. It's going to happen in a couple of years' time.

John: What do you see as the new possibilities of the experience of story generally? Because it's gone beyond book into something else, still it's got to be about story.

Gavin: I think that the thing that will bring it to life is if you can bury into the book a lot of stuff that the reader has to actually discover, and may never find because it's actually full of infinite possibilities, a bit like talking to a person, you know. By asking the right questions or by having a kind of relationship with that person you find out things about them.

John: So in a way, you would see it as a hybrid between the computer game (and the book) that's got an infinite range of possibilities, and you can be stuck at a level until you've nussed it out?

Gavin: That's right

John: and/or hyperfiction?

Gavin: That's right. But on an even more sophisticated level, rather than just dealing with it as an adventure game where you have to solve problems to make progress through the book and all that sort of stuff, you may be able to interview people, you know, you may be able to talk to a character who tells you about their life, and you may only find out what that character chooses to tell you because of the way you've asked the questions.

But don't you think there are so many sophisticated ways of using this technology, it doesn't have to be all entertainment or adventure or excitement does it? (There's) nothing wrong with those things (but) it doesn't have to be an Indiana Jones - it can be quite subtle.

John: so what you're suggesting is that through the technology giving you further dimensions to the book, the reader may be required to be more engaged in the text?

Gavin: Yes. I just think it's so fascinating. I haven't thought too much about it because I find that the minute I start thinking about things like that they get in the way of the creative juices. I work much better if I don't think too much about what I'm doing.

John: Tell me did that happen with *The House that Jack Built*?

Gavin: Yes it did. It all happened in about an hour for that book, because it had been stewing away in my head for many, many years.

John: (And) *Tom Thumb*?

Gavin: No, *Tom Thumb* I went back, back and forwards over that quite a lot and pulled lots of ideas together. That's more complicated in a way.

John: It's a lot more layered.

Gavin: Yes it is, although I did that more consciously, whereas *The House that Jack Built* just sort of tumbled out in that sort of shape.

John: Yes. So sometimes in the creative process there is the instantaneous, but there are other times where it is a lot more conscious as you're trying to layer it.

Gavin: But that's a secondary sort of approach that comes later. Once you've captured (the idea). It's a bit like capturing a butterfly, you know. You grab it and then you decide what you're going to be doing with it, how you use it. The *Tom Thumb* thing - I scribbled down the first ideas that came into my mind, I scribbled down and did my whole book just very, very roughly, then I turned back and started playing around.

John: I wonder if we (could) return to the question of 3D animation doing something more than ordinary 2D pictures don't. Lets put it round the other way. Given the technology how would you redo or reenvision the writing process? Would you at any stage say "Hey, because I want this animation to take place and I want this type of scenario/tableau to work, my story and the way that I write stories will be different."

Gavin: Well I think, you see a lot of the story with this new technology can be spoken, you don't need to have the text.

John: So in fact there could be a lot more words because they're spoken.

Gavin: Yes, and as we were talking about before, further down the track when the technology becomes more sophisticated, there's no reason why the amount of dialogue [should not be] determined by the reader. You see?

John: Yes

Gavin: And the reader could decide, he wants to have quite a long conversation with this giant. It might go on for half an hour. Whereas another young reader might only want to say, "Oh, hello Jimmy Jones, where are you going to?" And get a short answer and that would be enough and turn the page.

John: So we're looking at another technology which is the, the voice recognition technology coming into the book perhaps? Where if I ask the question, the book recognises a pre-planned question and has its response.

Gavin: Well, computers can do that though can't they?

John: Computers can do that now, so there are other possibilities of technology coming into it.

Gavin: It's enormous this thing, huge.

John: We were talking before about the cost of paper engineering and I said, had you thought of the publishing cost in production of this technology? The question still stands: is it commercial? Who's going to publish other than university [and] Hitlabs (with) research grants and all the rest of it?

Gavin: The nature of technology seems to be that it gets cheaper and cheaper. Look at video technology, well when we first bought our first video recorder it cost me \$1400 and that was on special and it was a really very, very (expensive) and now look you can go and buy them ...

John: For \$129.

Gavin: \$129, is that right?

John: So at this stage it's not a question that one should ask?

Gavin: It's not a concern of mine. If somebody wants to market this, then the first few examples of the magic book may be very expensive, but I can see within five years that technology's going to become so sophisticated, and as we were saying before, I can imagine it being built into the cover of the book. You just simply pick up the book and it's all there.

They were saying at Hitlab, they're developing at the moment either here or in Japan, some little chip, and you simply look across the room wherever you want to and the images will appear as 3 dimensional forms just in front of you. You won't even need to attach it to a book.

John: Pretty amazing

Gavin: Yes. A sort of hologram.

John: ...It produces an interesting question and that is the extent to which, particularly young children will confuse virtual reality, reality, fantasy, the real world?

Gavin: It would be great if you couldn't get a baby sitter wouldn't it?

-
- John: Well, it would be interesting the extent to which it changes the process of the world, particularly with younger ones where the question do 3 year olds, 4 year olds distinguish between reality and fantasy and at what point do they begin to make the distinction between one and the other, the real and the imaginary. Now if you put chips on and suddenly a fantasised world (materialised) what impact would that have?
- Gavin: Eventually the chips will be done away with and replaced with something simple...
- John: It produces some very interesting questions, philosophic and otherwise.
- Gavin: To get back to our picture book that we're working on at the moment, one of the things that we haven't solved yet, is duration and time, and for example, when you open the book up and you see the giant pushing the clouds apart to allow some sun to come in, where does he stop? He's actually going to walk across the page pushing the clouds. We're not sure what happens when he walks from one side to the other. Does he disappear or does he quickly shoot back to the beginning and repeat it again. Does he just keep repeating that for as long as you look at that page? We don't know how that's going to fit.
- John: Yes, so there's a lot of experimentation
- Gavin: A huge amount. That's going to continue until the deadline rears up.
- John: When is the deadline?
- Gavin: I'm not sure, sometime, sometime in October I think it has to be all finished and put together and put on display down at the new library.

Transcripts of Teacher/IT specialist interviews

Teacher No. 1 (Male)

Doreen: I'll just ask you about any impressions you've got so far?

Teacher: Ah well, I mean the kids are completely interested aren't they? They're really well motivated; they're really interested in what's happening, and what they've created they're really rapt with. You can see that they're really enjoying what they're doing and the quality of what's been done is really fantastic.

Doreen: The particular project is to do with a picture book so can you see any value in what they're doing in the picture book field?

Teacher: We were (saying) before that picture books are such a specialised area or genre in the field of literature, that they're often undervalued but I can see that by including this sort of technology and having this sort of thing as a possibility in the future, that it will keep, will keep books - in some form anyway - it will keep books as being something which is really interesting and motivating for students. I was talking with John - I wonder if this could be a particular area (for) boys and literature? It could be a link because they, they enjoy so much doing this sort of work with the computers. Being able to include the digital technologies and literature, I think would be really powerful - could be really powerful, yes.

Doreen: Can you see a, any other applications ?

Teacher: For the Magic Book technology?

Doreen: Yes, for the technology itself, just off the top of your head?

Teacher: Well, one of the things that some of the students at (our school) have been working with is a programme called Blender which has similarities to the programme that you're working with here, and the creation of three dimensional images that look really real and can be manipulated and moved around on screen. I think it has huge possibilities.

I'm really into fly fishing. Now for me to learn how to tie new flies, I either have to be with someone who's a fly tier or I have to look at a book, and it's extremely difficult to pick up the process from a book and to look at something on a two dimensional form that is, in fact, three dimensional. So I think that there's a huge amount of possibility for a range of areas . Just imagine, say in fly-tying, you could have the three dimensional image there which you can look at and rotate and it's much easier to understand what it's going to be like, so you can create it more easily.

A classic one that I personally would be (interested in is) car engines and the assembly and disassembly of things like that. (It could be used) as an instructional tool I suppose, yes as well as just for the book.

IT: Maybe you buy for example some kit-set furniture or something, and you want to know how to build it up, and then you can just see step by step.

Teacher: Absolutely

-
- IT: So you just press one key and then you, you see where one piece of, of the furniture moves - where it should be - and you can just do it in real(ity) next to it.
- Teacher: Yes.
- IT: That's one option that you can have with that kind of technology. So it's not just a book; it's a lot of things you can do with it. But (the) book is interesting because it's a new (kind) of pop-up book and everybody can use it.
- Teacher: Yes
- Doreen: I was interested in what you were saying about your school doing it because I felt that the two from your school had some background in that kind of programme and yet they seemed to be as absorbed as everyone else in doing this.
- Teacher: Well, as far as I know, the two students from our school haven't been using the Blender application themselves, so for them I think that this, this programme is still very much, new, still new learning for them. But it was interesting when I was doing an observation there of, she was creating flowers and she had created a couple of different flowers in the time I was watching her but she went back and started to do another one of the same style as she had before, so we were having a chat about flowers and she said how she'd tried to make a tulip and she was going through, she was saying oh, you have to, what's it called? Dis, no not dissect, I don't know, she said there was something that she tried to do to change the flower to make it the way she wanted to.
- One of the other girls just showed me that she got a ball and then she did it and it made it look very, very smooth and spherical. I'm not sure, it doesn't matter, but she, what happened was, she knew or she felt that there was a way to make what she wanted to. But she became frustrated in that and couldn't get it to work and, and rather than that turning her off she was still really happy to go back to the skills that she did have to make the other and just improve that and hone those skills. So at the moment, I think the programme is still, from the skills they have picked up, it's still good enough to hold their attention and, and allow them enough creativity.
- IT: Yes, I was looking for a very long time for a programme I wanted to use. I had a look at Blender as well, but that's a completely different interface to all the other programmes I've seen before. It reminded me of, of sound programmes. It's a completely new way of 3D modelling so I couldn't handle it (at first) because I'm used to Macs. And all the others - they're all alike, they have the same interface and this one is just so different.
- So it has a lot of opportunities (possibilities?) I guess. Even for sound and stuff like that, but I thought this is most probably too complicated. If they want to switch to another interface it's more easy for them if they use something like this because that's so similar to all the others.
- Teacher: Yes, I, I think you're right. That's the problem that the students at (our school) have found who are using Blender, that it's very specific to its own programme and they are struggling. We're struggling to find mentors who use Blender to try and help them out because people aren't picking it up. Because I think it's so different, it's not transferable. (But) they're still very reluctant to pass it up because they're still at the stage where they're working within it and, and trying to master it, I suppose, but as individuals they're the sort of people who don't listen to us anyway, terribly much.

Teacher No. 5

- Doreen: Day 5 and teacher 5. Any comments you've got to make about anything they've done or what the purpose of the book might be and all those kinds of things. What are your general comments?
- Teacher: Well what they've done, what they've achieved is I think pretty amazing for 10 to 14 year old children and I just see they've all got computer skills which is a added bonus but I think just seeing the looks on their faces today was summed up what they think they achieved.
- Doreen: Having seen the finished product
- Teacher: Yes, and seeing the reactions to the finished product was probably sums up how incredible what they've done in 5 days.
- Doreen: Do you think it's a gimmick or is it just this 5 day's work or is there a long term gain?
- Teacher: Oh I think it's long term
- Doreen: What kind of gains?
- Teacher: Well, for an extension for more able children it would be an amazing thing, any curriculum concept could be brought to like as such
- Doreen: Well. why do you say "more able" because I wonder if all of these are able?
- Teacher: They've got to be computer literate.
- Doreen: Yes
- Teacher: Because to be implemented within a classroom programme you've got to have a teacher that can be there all the time or have children, the likes of these, to be able to peer-teach how to use it. But I think the uses of it are endless, it depends on the children.
- Doreen: You're thinking of the end product, is there any use in just the, the process?
- Teacher: Oh yes, yes
- Doreen: What?
- Teacher: The whole thing right from the beginning, the process of planning you know from, from like what I've seen today, from the simple sentence, then to planning it, visualise, you know doing it, a drawing plan - to then putting that plan into action as such - the whole planning process so the children who wanted to jump straight in you could see they, they hit problems early on because they didn't have good vision, their long term vision but those children who spent longer with the planning, the thinking, they got a, probably more rewarding result.
- Doreen: Right, so they could see the value of planning.
- Teacher: Yes. So the process is probably as important as the end result, but that would be all part of your teaching as well.

Doreen: Right. Can you see any value for the book - idea of, of the magic book - can you see it being more than a gimmick?

Teacher: Yes, I can see it as being more than a gimmick. Who could use the likes of the magic book? Well it could be, it could go anywhere. Again it could be used, it's an excellent resource for special needs children because it's some, for those children who are visual learners, I mean it's something that's alive, it's moving in front of you. I mean it could go, it's definitely not a gimmick. A sign of technology, a sign of the times as well.

Doreen: Why did you choose your two (students)?

Teacher: We chose our two in terms of their literacy and they also had the skills with the computer. So they were hand picked.

Transcript of Interview with IT specialist, Claudia Nelles, and Dr. Darnell

- Doreen: Claudia, is there anything you want to say about how the children have responded and how you feel about the programme? Pluses and minuses.
- Claudia: Well, first of all the children caught up very quick. I didn't know, because it was my first workshop, how quick they would be and how to arrange all the stuff that they will have model in the end that they will like and they will feel confident with. So that was my challenge for that workshop and it's quite nice to see that by today, by this evening, they will have the models ready, which is really a, good. They really did a good job and, and I'm happy that everything worked out fine. So what I learned from that workshop is that kids can really catch up so quick and that you can really challenge them.
- Doreen: They ranged in age from 10 to 14. Was that about right?
- Claudia: Yes. I didn't know because it could have been that the kids don't have any experience with computers and that you can have really have to start from the beginning, like how to open a file and stuff. They had some experiences already, but not too much, so they knew the basic stuff like how to open a file and to save a file, how to import a file and stuff like that. So that was essential. All the other stuff about the programme they had to learn from the beginning, and they really did a good job on that. So yes, so they will get an extra task for tomorrow which I didn't really plan, I thought that would take the whole time, but they finished earlier so I can let them make more.
- Doreen: What do you think about the value of this programme and the picture book put together.
- Claudia: Of this programme animator?
- Doreen: Yes. Does it contribute to the picture book? How do you feel about that. Have you had anything to do with picture books before?
- Claudia: Me? Well not, not really. They hired me because of my animation skills and I was more really (re)creating the story. I was just trying to make the pictures that Gavin Bishop has been drawing, in 3D, but I didn't give any input myself. I was just somebody who was working on it.
- Doreen: I realise that but I just wondered what you thought about it, because we don't know ourselves whether it's any more than a gimmick or whether there will be positive spin-offs as far as the picture book is concerned?
- Claudia: Oh, you mean the magic book itself?
- Doreen: Yes
- Claudia: Oh it will be, it will be value added, because what you couldn't see so far in the magic book is that we will have the animation and will have sound so you will not need text any more. You can have text but you don't need it and you can even add like a lot of meter (?) do you say meter stuff? You can even let some narrator speak the text of the story.
- Doreen: Would it be a natural voice?

Claudia: Yes. I mean you can (have) a computer voice or whatever you want; you can add animals' voices or whatever, but I think it would be a good idea just to let a narrator speak and tell the story and the animation just supports the narrator, or you can even leave (out) the words at all and just the animation can speak for itself. You can support the animation with sounds, like when he's pushing away the clouds. So maybe you don't need the text any more and you can just make it as an imagine and the villagers can speak to the giant and stuff so, you can really play around a lot and you can, you can add some more stuff like for example you have the narrator speaking and then you have a funny voice which just teases the narrator all the time, you know.

(You can have) some stuff which is hard maybe to explain in a normal book, but which is so easy because you have visualisation more, and you can hear, so you can add much more information to a page. I think it's a quite interesting thing and I, I'm sure that you can do a lot with it. It's just still in research so, so we have to find out what.

Doreen: So 5 days is long enough (for the workshop)?

Claudia: Yes, it is, definitely.

Doreen: It's definitely enough for the children.

Claudia: The workshops that I attended were two days always -9 hours a day in two days. Five days is a lot, but because they're kids and they knew stuff in the beginning. They needed five days, but it's enough.. It's quite a good time and it's good to have the break in between (sessions) so that they can recover and they can experiment themselves if they have a computer and they can think about the story board and stuff.

I want to add that I really enjoyed the work with John because it was just really like a handshake. He was explaining what he knows about storytelling and books and stuff and I was just doing the animation stuff, so it was easier for them to create the page because they had the knowledge from John and that just helped them to really create it so that was quite a good preparation

Doreen: That's good because he was worried, he didn't know whether he was doing the right thing or not.

Claudia: No, I think it was really good because that's a hard part to, to really see why you have to have the sketches and why you really have to think about what to put on the page. In the beginning they just wanted to put something on the page but then they started to think about, well maybe I can make something which is not in the text, or maybe now I'm doing too much which is not in the text and I have to come back to the text. So they were really thinking about that. That's important and it's good to know, so I really enjoyed that cooperation.

Questionnaires

Pre-entry for children

Name _____

Age _____

Gender _____

Please answer the following questions as honestly as you can. There is no correct answer, or an answer that the researchers want, other than what you believe to be true at this point in time. When the research is written, your name will not appear. We will invent a name for you. You will be anonymous.

Tick the box that best describe you.

1 How would you describe yourself as a reader?

- I read avidly. It is one of my main interests. I would see myself as a person who reads widely different types of books.
- I read avidly. Though it is one of my main interests, I tend to read just those types of books that interest me.
- I enjoy reading though I wouldn't describe reading as one of my main interests.
- I read when I need to (for example, when I need to get information about something that interests me) but I don't really read for pleasure in my spare time at all.
- Reading doesn't really interest me at all: I have plenty of other more interesting things to do.

Other comment that best sums me up _____

2 How would you describe yourself as a writer? Tick those boxes that best describe you.

- I write avidly. It is my one of my main interests. I would see myself as a person who always find opportunities to write on every subject or type of fiction that I can.
- I write avidly. Though it is one of my main interests, I tend to write just those types items that interest me.
- I enjoy writing though I wouldn't describe writing as one of my main interests.
- I write when I need to (for example, when I need to write for a purpose) but I don't really write for pleasure in my spare time at all.
- Writing doesn't really interest me at all: I have plenty of other more interesting things to do.

Other comment that best sums me up as a writer _____

3 How would you describe yourself as an artist? Tick those boxes that best describe you.

- I draw/paint avidly. It is one of my main interests. I would see myself as a person who always find opportunities to draw/paint on every subject/ idea that I can.
- I draw/paint avidly. Though it is one of my main interests, I tend to draw/paint just those types items that interest me.
- I enjoy art though I wouldn't describe drawing/painting as one of my main interests.
- I draw/paint when I need to (for example, when I have to in class) but I don't really draw/paint for pleasure in my spare time at all.
- Drawing/painting doesn't really interest me at all: I have plenty of other more interesting things to do.

Other comment that best sums me up as an artist _____

4 How would you describe yourself as a computer user? Tick those boxes that best describe you.

- I am always at the computer. It is one of my main interests. I would see myself as a person who always find opportunities to use the computer, be it games, chat rooms, surfing the net or whatever. I am confident and competent in computer use.
- I use the computer avidly. Though it is one of my main interests, I tend to just use the computer for my favourite things. I am reasonably competent and confident
- I enjoy the computer though I wouldn't describe using the computer as one of my main interests. I am confident and competent when I need to be.
- I use the computer when I need to (for example, when I need to compute for a purpose) but I don't really use the computer for pleasure in my spare time at all. I wouldn't describe myself as competent and confident in all the things a computer can do.
- Using the computer doesn't really interest me at all: I have plenty of other more interesting things to do. I am not overly confident or competent in using a computer.

Other comment that best sums me up as a computer user _____

Tick the following boxes that you think are true.

- 5 I think that picture books:
- are mainly for young children before they read chapter books.
 - are both for children and young people but wouldn't interest adults at all
 - are for all age groups
 - are not really "art"
 - require the same degree of creativity as any other art
 - take a long time to create and involve a lot of thought
 - are really quite simple to make
- 6 I think that the artist in a picture book must:
- copy fairly accurately what the words say
 - be free to create whatever the artist feels or wants to portray

Tick the box that best describes you:

- 7 I often look out for picture books in the shop and would be quite happy to buy one that interests me.
- I quite often pick up picture books in the library to read them for my pleasure
 - I think picture books are pretty cool but I don't let my friends see me read them.
 - I might occasionally pick up a picture book if I have nothing better to do.
 - Quite frankly, I would never think to pick up a picture book unless I was required to do so as part of schoolwork.

Thank you for your help!

Post-workshop Questionnaire

Name (Your real name)

Please answer the following questions as honestly as you can. There is no correct answer, or an answer that the researchers want, other than what you believe to be true at this point in time. You may not want to answer every question. When the research is written, your name will not appear. We will invent a name for you. You will be anonymous.

1 Which of the following statements best describes you.

(a) I learnt new things about how picture books work:

all of the time most of the time some of the time not often never

If so, for example _____

(b) I learnt new things about illustrating books:

all of the time most of the time some of the time not often never

If so, for example _____

(c) I learnt new things about computer programmes:

all of the time most of the time some of the time not often never

If so, for example _____

(d) I learnt new things about writing picture books:

all of the time most of the time some of the time not often never

If so, for example _____

2 Overall, I thought that the workshop was:

very exciting

mostly exciting

enjoyable some of the time

not that enjoyable

completely boring.

3 The best part of the workshop for me was:

The worst part of the workshop for me was:

4 I found the following difficult to do during the workshop:

5 Another comment I would like to make is:

Thank you for your help.

Teacher Observation Sheet

Please informally observe each student for ten minutes at some time during the day, talking with them about what they are doing, the degree of “on task” behaviour you observe, the degree of interest that they show and the extent to which the tasks set are suitable/useful/pleasurable for this particular student.

Name of Student _____

Actual Task being undertaken during the Observation:

Time Begins:

Time Ends:

**Positive Behaviours/Attitudes
and Learning**

**Negative Behaviours/Attitudes
and Learning**

Other Comment

(Please see overleaf)

Workshop participants have the last say...

Kids create magic with technology

Ten children from five Christchurch schools unleashed their creativity at the Lab's three-dimensional (3D) computer modelling workshop.

Children between the ages of 10 and 14 attended the week-long workshop in September, held in conjunction with Ultralab South, a Christchurch-based e-learning research centre.

Working in pairs, the children learnt to create their own 3D content for the Lab's eyeMagic project using 'Anim8or', a very simple yet extensive 3D modelling tool.

eyeMagic is a collaborative project between noted New Zealand children's author and illustrator Gavin Bishop and the HIT Lab NZ. It involves transforming one of Mr Bishop's picture books 'Giant Jimmy Jones' into 3D animated content.

Without viewing Mr Bishop's drawings, each group was required to create a 3D scene, based on the text from one of the pages of the book. Throughout the week the children learnt a huge range of skills such as storytelling, sketching, creating storyboards and 3D modelling.

HIT Lab intern and workshop tutor Claudia Nelles says she was overwhelmed by the creativity and the quality of work produced at the workshop.

"We decided not to let the kids view Gavin's illustrations because we wanted them to come up with original ideas. I was

blown away by their creativity. Within five days they managed to produce the most amazing results. Everyone who has seen the finished products have been absolutely amazed by their work," says Ms Nelles.

Children interested in continuing to advance their 3D modelling skills were given copies of Anim8or to take home.

John McKenzie, Head of the Centre for Children's Literature at Christchurch College of Education, taught the children about some basic elements of design and the difference between gimmick and value with paper engineering and picture books.

"I think we are at the edge of a new wave in storytelling with eyeMagic. The idea of reader viewers entering into the text and engaging interactively with characters and/or events suggests wonderful possibilities for the future," says Mr McKenzie.

Mr McKenzie, his colleague Dr. Darnell and a small group of teachers are currently compiling the results from their observations of the children working with eyeMagic. They are trying to determine the effectiveness of the workshop in advancing children's learning experiences.

On the final day of the workshop each of the 3D scenes were placed into the eyeMagic technology. Parents and teachers were invited to view the children's work and celebrate their achievements.



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eyeMagic workshop — Group one

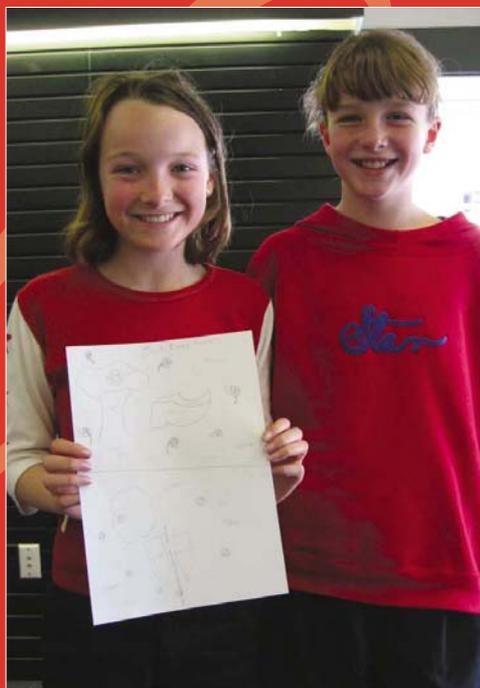
Ellen Rykers (age 11)
Emma Frapwell (age 10)

Thorrington School

Ellen and Emma worked on the cover page of Giant Jimmy Jones book. They decided to make two big shoes to symbolize the Giant. The two smaller shoes in the scene signify the little girl, and the flowers and trees signify that Giant Jimmy Jones lives amongst nature

Emma described the workshop as 'great fun' and Ellen said the workshop was 'very exciting'.

"At the start I found the computer programme difficult. But all it needed was a little practise. eyeMagic is a wonderful idea and it makes reading more enjoyable. It could also help people with reading problems" said Ellen.



'great fun'
'very exciting'



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eyeMagic workshop — Group two

Braiden McGregor (age 10)
Georgia Agnew (age 11)

Sockburn School

Braiden and Georgia worked on page one of the Giant Jimmy Jones book. They created 3D computer models to represent the following text:

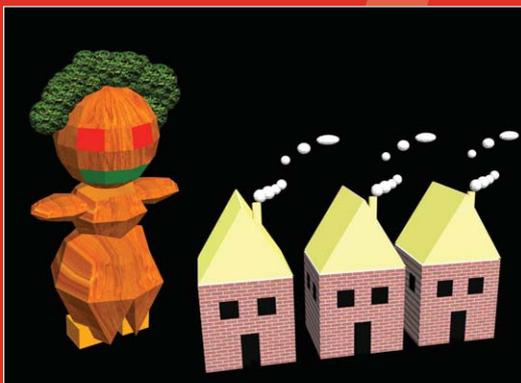
*Jimmy Jones was a giant.
He lived in the mountains and slept in a valley for his bed.
The clouds were his blankets and the lake was his bath.*

Since creating a human-like figure for the Giant was too advanced, Braiden and Georgia decided to create a large tree to symbolise the giant. The villagers were represented by smaller trees and each tree was specified as either a female or a male.

“It was real fun and I'd love to do it again. Learning the 3D modelling programme was so great,” said Braiden.

Georgia said she thought the workshop was great and the eyeMagic technology was a wonderful idea.

“It can be used by anyone, even people who have trouble reading and writing,” she said.



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eyeMagic workshop — Group three

Sean Hamill (age 14)
Jessica Leckle (age 13)

Lincoln High School

Sean and Jess modelled the second page of Gavin Bishop's Giant Jimmy Jones story.

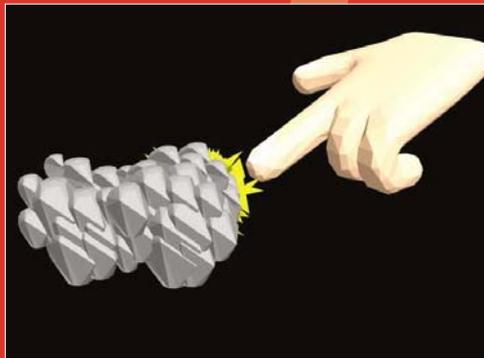
They had to create 3D computer models to illustrate the following text:

*Everyone in the village loved him.
He shaded them from the sun when it was hot.
He brought them rain when it was too dry.
But when it was time for a picnic he pushed away the clouds.*

Sean and Jess made models of a picnic blanket, and a cloud with a sun behind it. The cloud had a big 'giant-like' hand pushing the cloud away to reveal the sun.

Sean thought the workshop was a really great idea and said workshops like eyeMagic should happen more often.

Jess said "It was so cool. I would definitely be interested in doing it again."



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eyeMagic workshop — Group four

Racheal Joilin (age 11)
Joanna da Costa (age 11)

Burnside Primary School

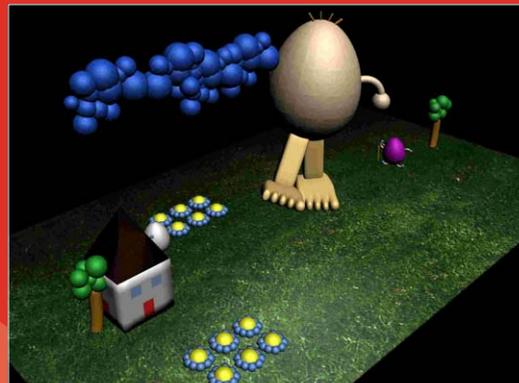
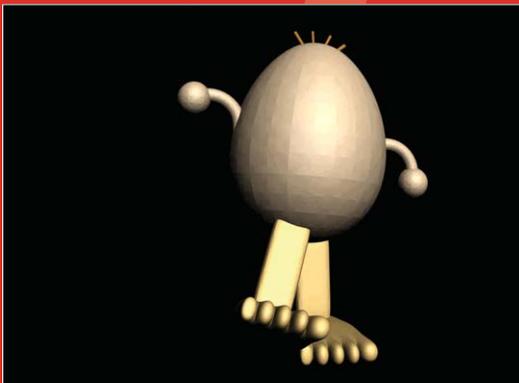
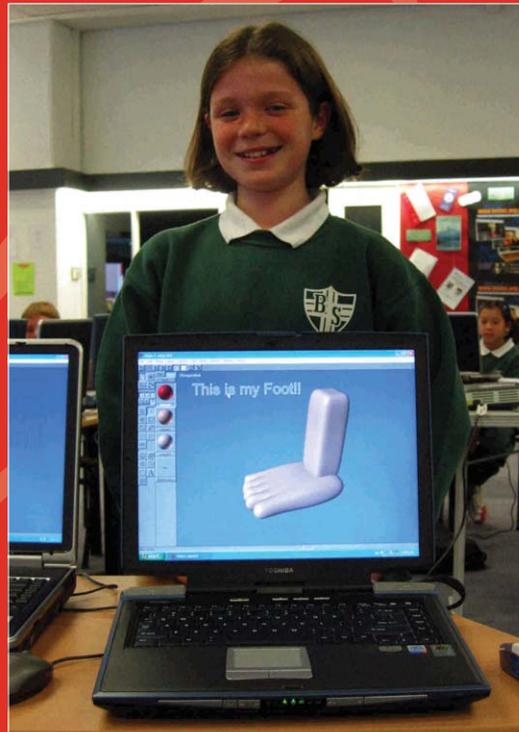
The two girls worked on the fourth page of Gavin Bishop's story. Racheal and Joanna made 3D computer models to convey the following text:

*The villagers looked at one another.
"Where can Giant Jimmy Jones get some shoes that are big enough?" they asked.
"Perhaps the carpenters could build him some giant wooden ones," suggested an old woman.*

In their scene they showed the carpenters, an old granny and Giant Jimmy Jones as egg figures. The carpenters are holding planks of wood, the granny has a walking stick and the giant has bare feet.

"The workshop was a fantastic experience and I loved working here. It would be a great pleasure to come back again," said Joanna

Racheal said she loved the eyeMagic technology. "It's such a good idea because you could look all around the models on its pages."



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eyeMagic workshop — Group five

Jude Reid (age 14)
Helen Stanbridge (age 12)

Unlimited Paenga Tawhiti

Jude and Helen worked on the fifth page of the Giant Jimmy Jones book. They created 3D computer models for the following text:

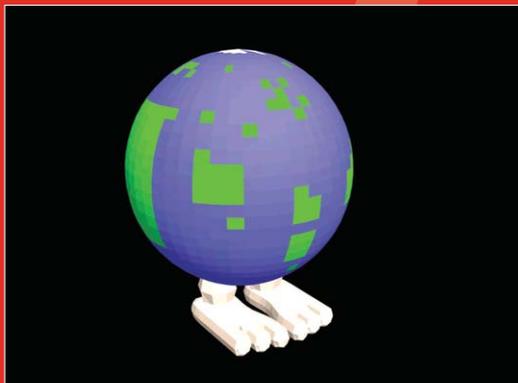
"Or perhaps the tailors could sew him some giant woollen shoes," suggested a villager.

Jude and Helen decided to portray the villagers as bubbles with black shoes on their feet. They made the body of Giant Jimmy Jones a globe to illustrate his desire to walk around the world.

Jude and Helen wanted to emphasise that Giant Jimmy Jones needed some shoes, so they showed him in the North Pole. They made three-dimensional models of snow-capped mountains put ice on the ground and had a sign saying "North Pole" to ensure people were aware of Giant Jimmy Jones' location.

Both Jude and Helen found the workshop very challenging yet rewarding.

"This kind of 3D book is really fun, especially since the content is animated," said Jude.



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