Pop Up Play

Final Research Report

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De Montfort University Research Team

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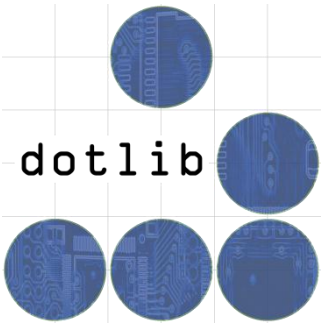
Pop Up Play is a collaborative project between De Montfort University[1], The Spark Arts for Children[2], and Dotlib Ltd[3].



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[1] http://www.dmu.ac.uk/about-dmu/academic-staff/art-design-humanities/craig-vear/craig-vear.aspx
[2] http://thesparkarts.co.uk/
[3] http://lukewoodbury.co.uk/

Mellor School and Three Ways School Testing

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1. Background

Aims and Objectives of Project[4]

De Montfort University, together with The Spark Arts for Children and Dotlib Ltd will create an immersive learning environment for children using a mixed reality system. This will enable an investigation into how augmented and virtual reality can be used as a tool to engage young minds in creative play within immersive technology.

The project will take images relating to museum exhibits, theatrical productions, children's books or curriculum topics and using the *Pop Up Play* system, project them into a space. Video cameras and motion-tracking will then place the participants and their avatars into these projected worlds for creative play and open-ended learning.

The system will be delivered in carefully managed workshop activities and will be supported by a creative-cognition framework which is based on Creative Opportunity Group Scheme (COGS)[5] theory and embodiment-cognition. In addition, a media library of case studies, help videos, instructions and diagrams and usability-tested scenarios will be supplied to enhance appeal and use. The project will also feature a first stage symposium, a final stage symposium, and tester workshops.

Pop Up Play will investigate how mixed-reality can be used as a tool to engage young minds in creative play within immersive technology, providing a mechanism for investment and authorship that can enhance and decode meaning within the digital natives culture, leading to an enhancement in communication skills.

Pop Up Play will include a fully working software environment, with appropriate Graphical User Interface (GUI) and functionality, tested across a range of arts and education providers and across different durations. This will result in the final package including a fit-for-purpose creative framework which will enable other arts organisations to judge, assess, and develop their projects with ease. This will be fully supported by a media library of examples and help videos, instructions, diagrams and usability-tested scenarios. Furthermore, the hardware designs will be based on pervasive technologies that are found in schools, libraries and arts organisations. *Pop Up Play* has potential to be used across a broad range of arts organisations, and across a wide range of technical abilities. The supported media library seeks to assuage technophobia, and to augment current practice.

[4] Original Proposal, Dr Craig Vear

[5] Sage, R. (2000). COGS: Communication Opportunity Group Scheme. University of Leicester.

Context[6]

Pop Up Play focuses on three forms of innovation:

> **1)** The system utilises technology readily available in the home, classroom, and library, such as, laptops, home gaming and webcams. Our bespoke software application will consolidate these into an accessible, fit-for-purpose system providing ease of use for a range of users.
>
> **2)** The system will be packaged together with a full support programme that includes a robust creative-cognition framework developed using performance, cognitive and educational theory (specifically Creative Opportunity Group Scheme - COGS). Furthermore, a range of case studies will be supplied to enhance appeal and use, and it will be supplied as open-source, with the support of an online community.
>
> **3)** *Pop Up Play's* creative-cognition framework will facilitate an acute experience for the participants beyond a casual engagement. Occurring in libraries, museums, arts festivals, schools it will "transport" the target audience into the worlds within books/exhibits/themes. This experiential perception of being 'inside' these worlds is a mirror of what happens when the imagination is 'inside' a book when read, for example. This first person experience of 'being', and the explorative play thus overcomes hurdles of passive, non-challenging engagement with mass media culture. 'We need to know how to facilitate communication to support the academic and social performance of all' (Sage, 2000[7]). *Pop Up Play* will augment current strategies of engagement to maximize communication skills in the digital society, benefiting "art as learning" by bridging home/gaming technology with immersive play.

2. Methodology

Research Design

The research will use action-research methods from two different perspectives: in-vitro (outside looking in) and in-vivo (inside looking out). These methods have been

[6] Original Proposal, Dr Craig Vear

[7] Sage, R. (2000). COGS: Communication Opportunity Group Scheme. University of Leicester.

chosen in order to gain knowledge through action, and are concerned with the nature of the action as a thread of investigation leading to new knowledge that has operational significance for the field. As such, this method will test the *Pop Up Play* system and the creative-cognition framework, whilst testing the transformational affect upon its users.

Sample

The sample consisted of two schools from our stakeholder-research partners: Mellor Community Primary School, Leicester; and Three Ways Special School, Bath. Both schools are briefly introduced below.

Mellor Community Primary School, Leicester

Mellor Community is a large Primary School providing for over 500 pupils. According to Ofsted (2014)[8]:

- The school is larger than the average-sized primary school.
- The majority of pupils are Indian, with other pupils from a wide range of backgrounds.
- The proportion of pupils who speak English as an additional language is over four times that seen nationally.

Mellor School is proud of its close community links and extended school provision. Believing in an active community, enriched by a diversity of cultures the School's Mission Statement is: 'Excellence through creativity and enjoyment' and the School's Vision Statement is: 'Enabling learners to take control of their own learning'[9].

Three Ways Special School, Bath

Three Ways School is an Academy Trust, operating as a generic Community Special School. The school provides for 176 children with a wide range of Special Educational Needs. According to Ofsted (2010)[10]:

- Three Ways is an All-through Community Special School with pupils ranging from 3-to-19 years of age.
- A large majority of pupils have complex needs that include learning difficulties, ranging from moderate to profound and multiple learning difficulties, with additional needs relating to autistic spectrum disorders, sensory or physical disabilities.

[8] http://www.ofsted.gov.uk/inspection-reports/find-inspection-report/provider/ELS/120073
[9] http://www.mellor.leicester.sch.uk/?p=home/headteacher.htm
[10] http://www.ofsted.gov.uk/inspection-reports/find-inspection-report/provider/ELS/135069

Three Ways School is a Specialist School for Physical and Sensory. It is also a School of Creativity. The school has a positive ethos where mutual respect and understanding towards all members of the school and the community are encouraged. The Three Ways community has high expectations, by ensuring opportunities of access they strive for 'achievement for all'[11].

Participants

8 children in each school were chosen by their teachers and school practitioners to participate in the research project – 16 children in total. In Mellor School participants were chosen from across Year 4 classes, pupils were aged between 8 and 9 years of age for the duration of this phase of the project. There was an equal gender split of 4 boys and 4 girls. Each of the children chose pseudonyms as below:

Participant	Gender
Logan	Male
Gerard	Male
Johnny	Male
Jake	Male
Roxy	Female
Penny	Female
Jess	Female
Rosie	Female

Table 1: Participants, Mellor School

One mixed-age class in Three Ways School participated in the research project which consisted of 5 boys and 3 girls. The children are currently in the process of choosing their pseudonyms so for the purposes of this report they are known by their initials.

Participant	Gender	Age
J1	Male	11
K	Male	11
H	Male	10
J2	Male	10
N	Male	10
T	Female	10
M	Female	10
K	Female	8

Table 2: Participants, Three Ways School

[11] http://www.threeways.bathnes.sch.uk/about-three-ways

Pop Up Play sessions were co-led by the school's facilitators who were specially trained in communication development and play theory.

It is anticipated that a second group of participants will be chosen for the longevity test. Case studies are also planned for the summer of 2014 which will have different participants.

Ethics

Ethics were negotiated between all parties and agreed with the University of De Montfort Research Committee and adhere to the *Ethical Guidelines for Educational Researchers* (BERA, 2011)[12]. The procedures included issuing a plain language statement and written parental consent form to all participants informing them of the aims and anticipated outcomes of the research. The right to abstain or withdraw from the project at any time was upheld. Both raw and analysed data material was participant anonymised and stored in a secure project-specific data system.

3. Process

The Sessions

6 weekly visits were made to each school in order to offer the children an opportunity to engage in *Pop Up Play* sessions[13]. Sessions varied in length and on average lasted between 45 and 90 minutes. Teachers and practitioners at Three Ways School felt that 45 minutes was the maximum length of time that their pupils would be able to remain focussed and engaged so this was respected.

A variety of media themes and workshops were provided for the children each week, (see Table 3 on the next page). The pedagogy of the creative practitioner also varied throughout and across each session and this is discussed further in the findings section.

[12] http://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011

[13] No session in week 4 at Three Ways.

Week	Mellor School	Three Ways School
1	War Horse Exploring fields and flying birds	War Horse Exploring fields and flying birds
2	War Horse Getting Joey back in the stable	War Horse Finding Joey in the scary stables
3	War Horse Exploring the trenches	War Horse Exploring Rose's house
4	War Horse Messenger birds	No session -
5	The City, Underwater, Space Paper play	Alice in Wonderland Being in the story
6	Exploring Gaming Shoe box worlds	Tea Parties Shoe box worlds

Table 3: *Pop Up Play* Sessions, Media Themes and Workshops

After each play session pupils were given the opportunity to feedback their thoughts and feelings to the team. In Mellor School this was arranged as an informal discussion group which sometimes included making drawings and diagrams, and writing notes. In Three Ways School the children fed back their thoughts to a class practitioner who was taking part in the sessions in role as a character called Rose. All feedback was documented – voices were recorded and photographs taken of drawings, diagrams, and written notes.

When the children had left the room, the *Pop Up Play* team, school teachers and practitioners had a session de-brief which was also recorded.

Data Collection Methods

Data was collected by the following methods:

- Pre and post-tests: Sage COGS (both sites), Goodman's Strengths and Difficulties Measure (Mellor) and Thrive Assessment (Three Ways)[14].

- Video film footage: Capturing action and narrative (two cameras). Camera one was directed at the group of participants (in action players and side-line observers). Camera two was directed at the screen.

[14] Thrive data set incomplete due to time constraints.

- Pupil and practitioner feedback.

- Still photographs.

Data Analysis Procedure

The initial testing phase of the research focused on analysis of the pre and post-test data and video film footage. Pupil and practitioner feedback was primarily used to inform weekly planning and assisted in the development and uses of the technical equipment. Still photographs complemented the other data sets and were used to disseminate findings and informed discussions at the *Pop Up Play* Think Tank (July, 2014).

Pre and post-tests

Sage COGS (both sites), Goodman's Strengths and Weaknesses Measure (Mellor) and Thrive Assessment[15] (Three Ways). Test scores were input into Excel to enable quantitative comparative analysis over time.

Video film footage

Video action and narrative analysis included inductive and deductive qualitative methods. Inductive: videos were scanned for chunks of data which contained "critical incidents" i.e. first indications showed that something meaningful was taking place which required deeper investigation; these chunks were termed "episodes". Deductive analysis: episodes were searched for direct evidence of COGS Communication Framework and Embodiment Cognition Framework.

Creative Frameworks: Embodiment cognition and communication taxonomies

Table 4 on the next page shows the frameworks used to inform the deductive analysis procedure.

[15] Data set excluded.

	Communications Taxonomy (Prof. Rosemary Sage)	Embodiment cognition Taxonomy
Initial engagement | | | | | | | | | | | | | Deeper immersion	Record – produce ideas	Imitation – Performs as demonstrated
	Recite – other ideas	Remembering - Awareness of sensory stimulus, relate cues, performs as demonstrated
	Refer – compare ideas	Manipulation of stimulus from agency - Requires making predictions about behaviour
	Replay – sequence ideas in time	Applying precision from stimulus – Require the formation of objective perspective
	Recount – explain ideas – why? How?	Analysing/ articulating/ problem solving - Think logically about abstract propositions and test hypotheses systematically
	Report – introduce, describe, discuss ideas	Naturalisation - Take a given structure and adapt/ develop/ change/ improve it
	Relate – setting, events, actions, results, reactions	Creativity - Improvisation and free-form play

Table 4: Embodiment Cognition and Communication Taxonomies

Rigour

The project team sought to maintain quality and trustworthiness in terms of credibility and dependability by triangulating findings. The team upheld protocols and procedures making each stage of the project transparent by sharing weekly insights and findings via a blog. Cross-reference between blogs validate that the data is an accurate and true reflection of the facts and narratives as presented to the researchers.

4. Analysis of Findings from Process

Creative Frameworks: Embodiment Cognition and Communication Taxonomies, Initial Global Findings

The global findings across the first three weeks of the project are shown below in Tables 5 and 6. The global findings are representative of what happened overall throughout the sessions, i.e. screen and non-screen, embodied and non-embodied activities. The tables below indicate a simple presence or absence of each feature for the two groups of participants, it is not indicative of strength or manifestation of each feature, nor for any individual child.

Embodiment	Week 1 M	Week 1 TW	Week 2 M	Week 2 TW	Week 3 M	Week 3 TW
Imitation	√	√	√	√	√	√
Remembering	√	√	√	√	√	√
Manipulation	√	√	√	√	√	√
Precision from stimulus	√	X	√	√	√	√
Analysing/ articulating/ problem solving	X	X	√	√	√	√
Naturalisation	X	X	√	X	X	√
Creativity	√	√	√	√	√	√

Table 5: Embodiment Analysis

COGS	Week 1 M	Week 1 TW	Week 2 M	Week 2 TW	Week 3 M	Week 3 TW
Record	√	√	√	√	√	√
Recite	√	√	√	√	√	√
Refer	√	X	√	X	√	√
Replay	√	X	√	X	√	√
Recount	√	X	√	X	√	√
Report	√	X	√	X	√	√
Relate	√	√	√	√	√	√

Table 6: COGS Analysis

Analysing Features of the Frameworks

Embodiment cognition

'Imitation' (performs as demonstrated) and 'remembering' (awareness of sensory stimulus, relate cues, performs as demonstrated) – These parts of embodiment seem to be very closely aligned. In both schools and across all weeks these features of embodiment were found to be strongly manifest. The challenge going forward will be to distinguish separate modes of repeating and think about what is copied language or mirrored behaviour, and who initiated or instigated the idea.

'Manipulation of stimulus from agency' (making predictions about behaviour) – The evidence gathered surrounding manipulation seems to be very closely aligned with 'analysing/articulating/problem solving' (thinking logically about abstract propositions and test hypotheses systematically). And also appears to sit well with the COGS

elements of ‘report’ ‘recount’ and ‘refer’ all of which require explanation, comparison, and discussion. In Week 1 at Three Ways (TW) LM[16] noted that ‘precision from stimulus’ and ‘analysing/articulating/problem solving’ were not evidenced and yet ‘manipulation’ was found. On reflection LM thought that this was because they are too closely aligned and that it was difficult to unpick the behaviours manifest, in later weeks when the children were clearly given tasks and provocations to problem solve this became clearer and easier to distinguish.

‘Precision from stimulus’ (the formation of objective perspective) – LM noted that this was absent from Week 1 in (TW). LM suggested reviewing this footage again when there was a clearer understanding of the concept. LM also thought that this concept relates to the COGS element of ‘relate’ (setting, events, actions, results, reactions). These elements combined with ‘precision from stimulus’ seem to indicate the embodiment and communication of fact, i.e. acting or talking in a certain fixed or prescribed way.

‘Naturalisation’ (take a given structure and adapt/develop/change/improve it) and ‘creativity’ (improvisation and free form play) seem to be closely aligned. Interestingly LM noted that ‘naturalisation’ was absent from both sites for Weeks 1 and 2 but ‘creativity’ was present in both. LM recalled in her reflections at the time pondering if free-play, going off on a tangent, or changing the story-line was naturalisation. Having seen Girl T in TW School use the fire on her skirt to breathe out of her mouth (Week 3) she believed this to be embodied naturalisation, but recognised it is also creativity (acting ‘as if’). Same with Mellor School (M), Johnny adopted the identity of the drunk in the trenches (acting ‘as if’).

Overall it is very difficult to draw any conclusions from the above. Clearly the challenge now going forward is to offer the children more opportunity to become fully embodied. Perhaps then we will have a clearer picture as to what the above means in terms of either accepting that many of the parts of the framework overlap, or discovering that they are indeed clearly distinct and separate from each other.

COGS communication

‘Record’ (produce ideas) – LM questioned if all communications ideas? ‘Record’ was found in both sites throughout the first three weeks of the project. LM suggests that going forward it would be helpful to try and distinguish what is producing an innovative idea as separate from stating a known fact. Stating a known fact seems to align with ‘applying precision from stimulus’ in the embodiment framework which requires the formation of objective perspective, and also potentially overlaps with ‘relate’ in COGS in which setting, events, actions, results, and reactions are merged.

[16] Dr Linda McConnon

‘Recite’ (repeating) – This is an interesting concept and again as above in the case of ‘record’ was evidenced every week in both sites. It may be interesting here to align ‘recite’ with ‘imitation’ and ‘remembering’ from the embodiment framework as both include performing and remembering as demonstrated. As with ‘record’ it may be helpful here to distinguish separate modes of repeating and think about what is copied language or mirrored behaviour, and who initiated/instigated the idea.

‘Refer’ (compare ideas) – This concept seems to be closely aligned with ‘report’ (introduce, describe, discuss ideas) and could also be a part of ‘recount’ (explain ideas – why? how?). Taking this further they could also potentially be aligned with ‘manipulation’ and ‘analysing/articulating/problem solving’ from the embodiment framework. In TW it was not until Week 3 that ‘refer’ was manifest, for these children this included elements of referencing and comparing individual subjective interpretations, and did not include evaluating in terms of a discussion of ideas. For M children there was a shift from Weeks 1-to-3 in terms of the amount of times ideas were compared, interestingly it was the last session (3) in which the children played freely that they started to compare ideas more strongly than in previous weeks, this shift included moving from simply rejecting - to- contrasting -to- challenging.

‘Replay’ (sequence ideas in time) – This feature was not found at all in TW during screen time and was only manifest on one occasion after the last session (3) when Boy N was giving feedback to Rose (character) during which he made up a story. In M School sequencing ideas was a strong feature throughout as children communicated their ideas in the form of short story-lines or scenarios and then acted these out.

‘Recount’ (explain ideas, why? how?) – As the above suggests ‘recount’ is very closely aligned to ‘refer’ and ‘report’. Again it is not until Week 3 that we see this manifest in TW, however this was in the briefest of conversations which were expanded to include elements of further explanation and rationale, this was a very weak feature. In M School ‘recount’ was manifest weakly in Weeks 1 and 2 and only moderately in Week 3. It seems that with both sets of participants ‘recount’ is manifest as elucidating plans and seems to lack deeper explanation of ideas.

‘Report’ (introduce, describe, discuss ideas) – As aligned above with ‘recount’ and ‘refer’ the children in TW did not manifest this until Week 3 and again as with the other related concepts the manifestation was incredibly brief and can only be suggested as the start of what ‘report’ fully incorporates, thus again this is a very weak feature. For M children there was an observable shift from Weeks 1 and 2 where this was weak to Week 3 where this was moderate. It would seem that the children were able to introduce their ideas and describe them to the creative practitioner, but discussion was lacking.

‘Relate’ (settings, events, actions, results and reactions) – In both schools children constantly made links to their own knowledge and experience banks and drew from

these to engage in live play. In M School children clearly made links to what they knew and considered to be in context, whereas in TW School this was more relaxed and creativity was found to be manifest to a greater degree.

Overall there was a global shift evidenced between Weeks 1-to-3 which occurred in both schools. Elements of the COGS framework became more visible and manifest to a greater degree in Mellor School and children at Three Ways started to expand their communications. In Mellor School this could be attributed to a pedagogical shift from structured play (Weeks 1 and 2) to a free play session at Week 3, however such a shift cannot be attributed to any change in pedagogical practice at Three Ways as the Week 3 session was essentially the same as the previous 2 weeks. This leads to an indication that over the 3 weeks the children became comfortable and competent agents of using the *Pop Up Play* system.

Refining of Frameworks

Coding and categorising embodiment continued to be a difficult task over the course of the testing stage of the project (Weeks 3-to-6) as many of the features of the framework were found to have overlapping elements. Furthermore the children were afforded only a few opportunities to become something else in the screen, (i.e. alphas) which limited the opportunity to assess the impact of being 'fully embodied'.

Throughout the six weeks of communications analysis it was also found that many of the features of the COGS framework were overlapping and thus the research team refined the frameworks to three 'levels of embodiment' (mirror, surrogate, and hyper) and 'zones of communication' (generation, adoption, and discussion) as shown in Figures 1 and 2 on the following page.

The new refined embodiment and communication frameworks are defined as:

- **Mirror:** reflection; engagement
- **Surrogate:** proxy; engrossment
- **Hyper:** dimensional; immersion

- **Generation:** exploring possibilities; producing ideas
- **Adoption:** using other's words, actions, ideas; making links
- **Discussion:** cross-comparing; explaining and rationalising; challenging

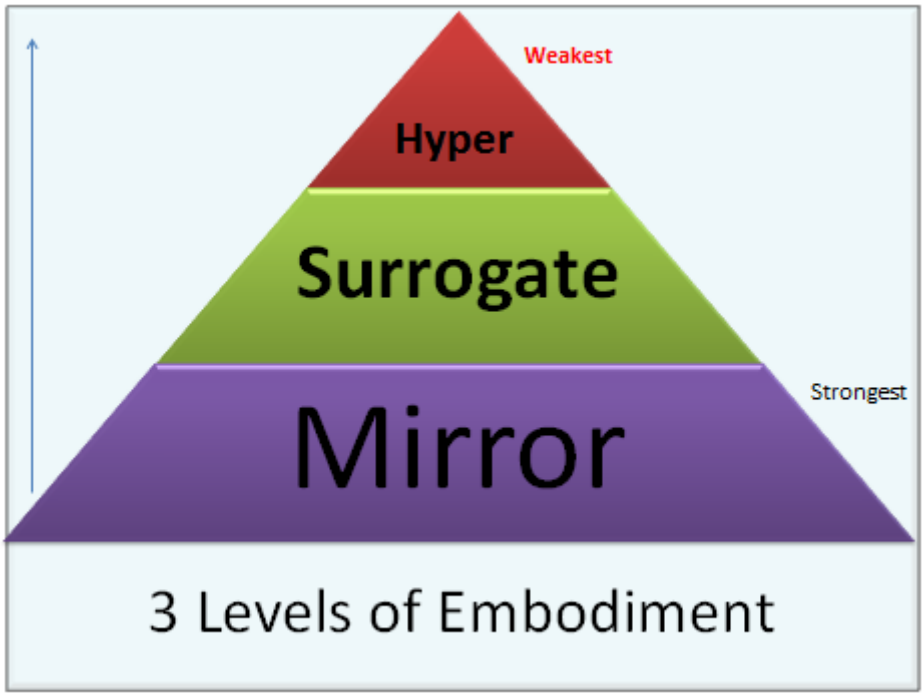

Figure 1: 3 Levels of Embodiment

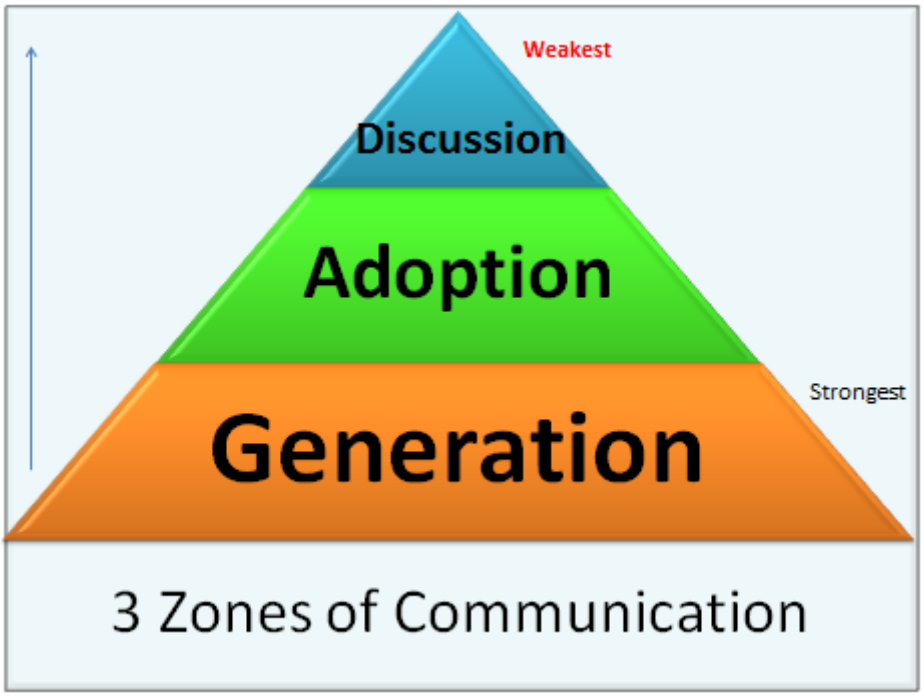

Figure 2: 3 Zones of Communication

Comparing and Contrasting Embodiment and Communication

Re-analysis of the testing period data (Weeks 1-to-6) found that there was no correlation between the levels of embodiment and zones of communication manifest.

However as Figures 1 and 2 demonstrate, the hyper level of embodiment and the discussion zone of communication are the weakest features of the refined frameworks manifest across all 6 weeks of the project testing period. When examining both of these features it is clear that they require the intervention of the creative practitioner – children cannot change themselves into an alpha (hyper immersion) and the features of discussion (cross-comparing; explaining and rationalising; and challenging) encompass collaboration which is emergent, i.e. two people bounce ideas (verbal and non-verbal) off each other in order to progress thinking and action forward. This has not been evidenced as a sustained feature of play to date in this project when children are engaged peer-to-peer collaboration.

The Role of the Creative Practitioner

Analysis of the pedagogical stances adopted by the creative practitioner revealed that over the course of the six weeks testing period Dr Linda McConnon found that 6 main roles were manifest: Actor, Narrator, Orchestrator, Demonstrator, Facilitator, and Co-constructor (see Table 7 on the next page).

Several notes of interest are highlighted from the analysis:

- At times it was difficult to distinguish who was the 'creative practitioner'. The roles above seemed to be shared between the person 'front of house' (in face to face contact with the participants) and the person 'behind the scenes' (controlling the technology).
- Sometimes players placed an 'over reliance' on the technology to play for them and did not use the creative practitioner to full effect in order to seek out other possibilities.
- Analysis of the results of the Embodiment and Communication data show that the roles of Actor, Orchestrator, and Narrator impact on possibilities and are less effective than the roles of Demonstrator, Facilitator, and Co-constructor.

Role	Pedagogy
Actor	• Sets the scene • Engages with character from text/book/idea • Asks for understanding of text/book/idea
Narrator	• Reads from script/book • Describes/verbalises what is happening • Checks responses, clarifies and repeats
Orchestrator	• Leads the storyline • Controls scenes or play • Sets up and administers “tricks”
Demonstrator	• Shows affordances of technology • Opens possibilities and choices through guidance • Signals the rules and goals
Facilitator	• Mediates between children and/or technology controller • Makes it possible – comes up with alternatives including props and materials • Manages the dynamics in the setting
Co-constructor	• Play maker as puppeteer - uses voices, sounds, and small world toys • Technology controller – attaches objects, changes appearance (alphas) • Meaning maker – asks questions, poses problems, and presents challenges

Table 7: Creative Practitioner Roles and Associated Pedagogy

Examination of the 4 defining traits of a game: ‘goal, rules, voluntary participation, and feedback system’ (McGonigal)[17] indicate that it is the ‘sustained feedback responses’ which the player gets from either the system, their peers, or the creative

[17] McGonigal, J. (2011). Reality is broken. *Jonathan Cape, London*.

practitioner which is critical to richer engagement and communication, and deeper immersion.

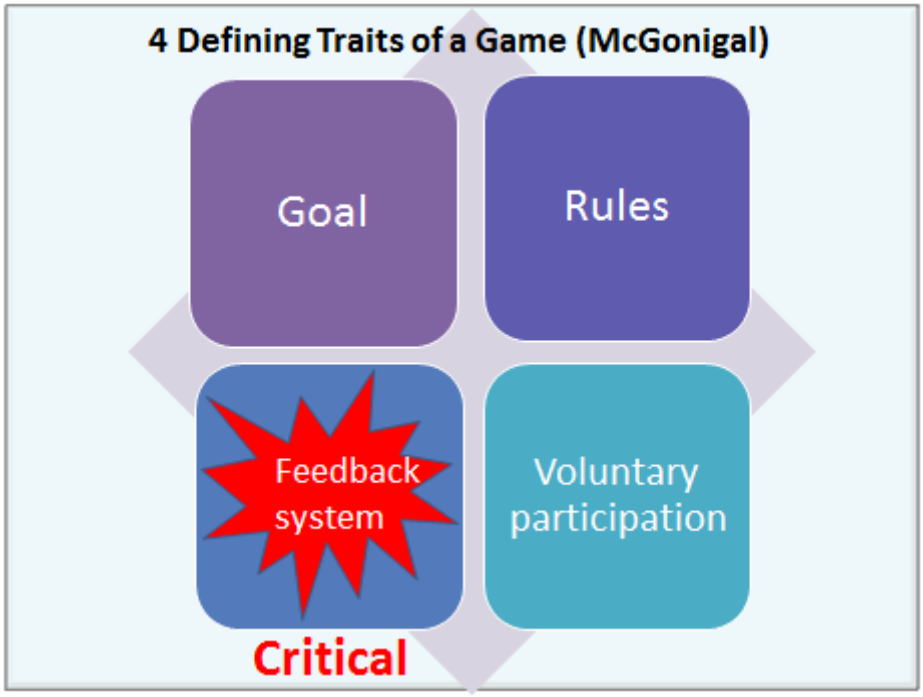

Figure 3: The 4 Defining Traits of a Game

Measuring Impact: COGS Pre-Test and Post-Test Data

Pre-tests were carried out on all participants in both schools, however only 6 out of 8 participants took part in the post-tests at Mellor School. The results of the analysis below (Figure 4) have excluded the data from the two participants who were unable to fully participate in the tests.

The results from Mellor School show that:

- **Overall participant's communication increased**
- **Pre and post-test content scores increased by 21.5%**
- **Pre and post-test convention scores increased by 35.6%**

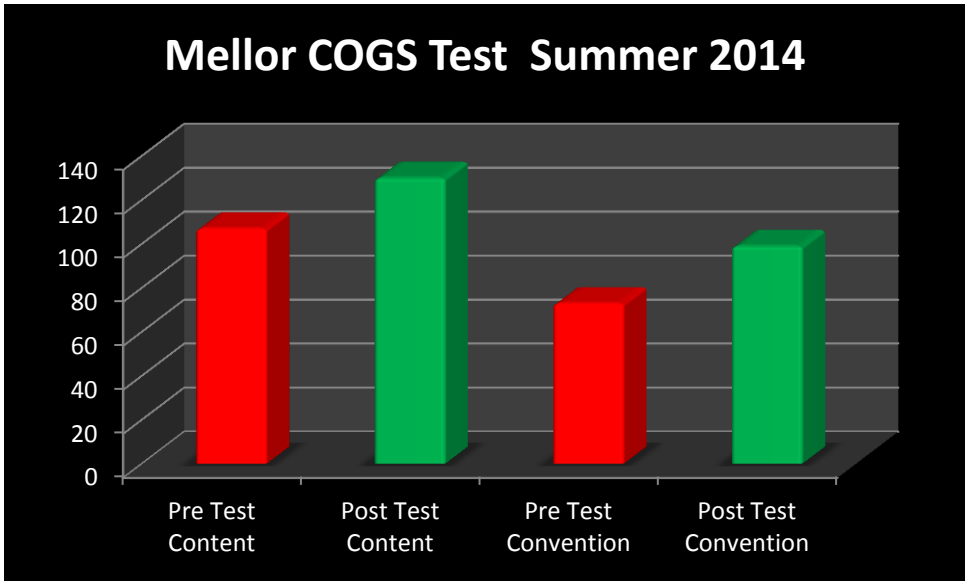

Figure 4: Mellor School COGS Test Results

Figure 5 shows the results of the pre and post-tests for all 8 participants at Three Ways School.

The results from Three Ways School show that:

- **Overall participant's communication decreased**
- **Pre and post-test content scores decreased by -15.4%**
- **Pre and post-test convention scores decreased by -12.5%**

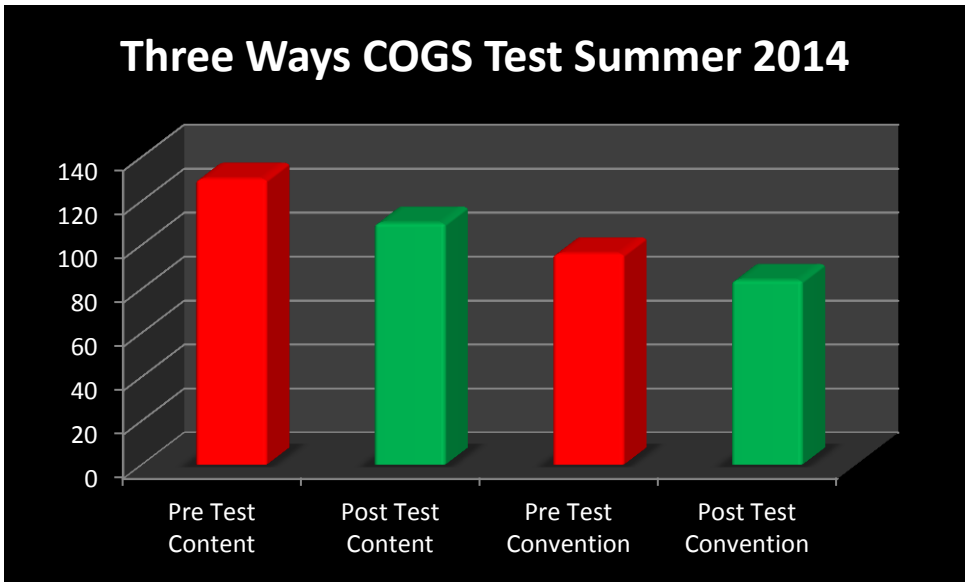

Figure 5: Three Ways School COGS Test Results

The comparative results between schools are shown in Figure 6. The results show that:

- **Overall Mellor School had a score differential of 49 points. This meant than on average children's communication increased by 8.2 points.**
- **Overall Three Ways School had a score differential of -32 points. This meant than on average children's communication decreased by -4 points.**

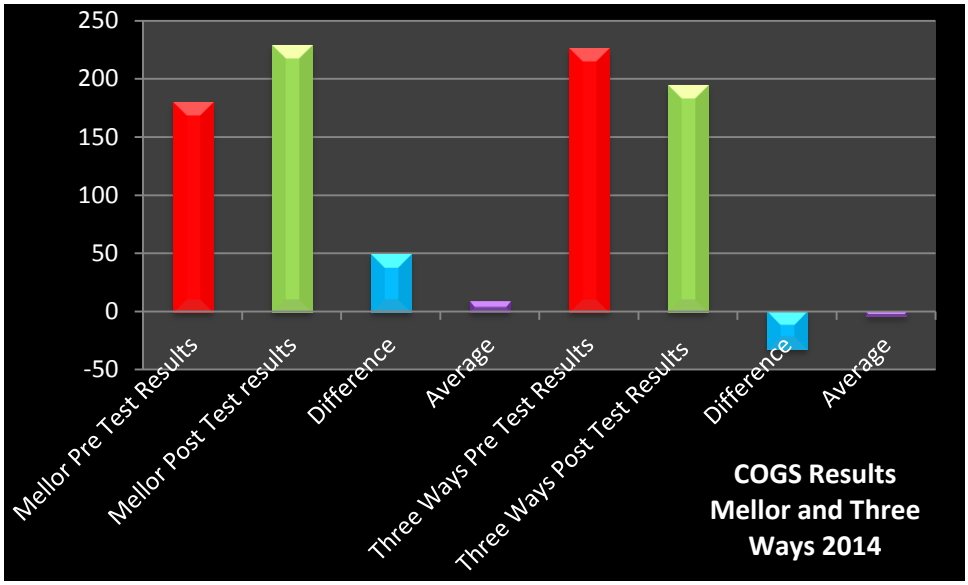

Figure 6: Comparison of COGS Test Results

Goodman's Strengths and Difficulties Measure

Pre-test Results

Table 8 on the following page shows the pre-test results for Mellor pupils.

Participant	Gender	Emotional	Conduct	Hyperactivity	Peer Problems	Pro-Social
Logan	Male	√	**D**	**D**	√	**D**
Gerard	Male	√	√	√	√	√
Johnny	Male	√	√	√	√	√
Jake	Male	√	√	√	√	√
Roxy	Female	√	**B**	√	√	√
Penny	Female	√	**B**	√	**D**	**D**
Jess	Female	**D**	√	√	√	**D**
Rosie	Female	√	√	√	√	√

√= No issues

B= Borderline

D= Difficulties

Table 8: Strengths and Difficulties Pre-Test Results

Post-test Results

Table 9 shows the post-test results for Mellor pupils. Items in red indicate changes.

Participant	Gender	Emotional	Conduct	Hyperactivity	Peer Problems	Pro-Social
Logan	Male	√	**D**	**D**	√	**D**
Gerard	Male	√	√	√	√	√
Johnny	Male	√	√	√	√	√
Jake	Male	√	√	√	√	√
Roxy	Female	√	√	√	√	√
Penny	Female	√	**B**	√	**D**	**D**
Jess	Female	√	√	√	√	**D**
Rosie	Female	√	√	√	√	√

Post-test changes indicated in red

√= No issues

B= Borderline

D= Difficulties

Table 9: Strengths and Difficulties Post-Test Results

Table 9 shows that the teachers reported positive changes in both Roxy and Jess's behaviours.

These changes are examined more deeply and are shown below in Table 10:

Child	Behaviour	Pre-test	Post-test
Roxy	Considerate of other people's feelings	Somewhat true	Certainly true
Roxy	Generally obedient, usually does what adults request	Somewhat true	Certainly true
Roxy	Thinks things out before acting	Somewhat true	Certainly true
Jess	Shares readily with other children	Somewhat true	Certainly true
Jess	Often unhappy, downhearted or tearful	Certainly true	Somewhat true
Jess	Nervous or clingy in new situations, easily loses confidence	Somewhat true	Not true
Jess	Often lies or cheats	Somewhat true	Not true

Table 10: Breakdown of Post-Test Results

5. Evaluation of Project[18]

[18] Selection of presentation slides from *Pop Up Play* Think Tank (July, 2014)

Children tell us they like…

- Seeing themselves on screen
- Creating their own worlds
- Using realistic media, scenes and sounds

Educators tell us…

- They are trying to understand what Pop-Up-Play is
- There is a tension between free play and goal driven outcomes
- Set tasks never work out as planned in Pop-Up-Play

Dr Vear offered the practitioners a new way of thinking about the synergy between technology, facilitation and mixed reality based on his research in, and teaching of Digital Performance. This involved shifting a single element (such as role, background, activity, challenge, rule, aim, question etc.) every 3 minutes or so. Dr Vear had observed that within 3 minutes the participants had reached the extent of their ludic play within a given scenario, and – like a computer game – expected it (or the game design) to shift and challenge them further. This simple re-appraisal in the shift of the role of facilitation towards an „acceptance" philosophy led by participant engagement was an attempt to articulate the co-operative relationship between gamer and game, within the here-and-now of digital creative play. At this point, we started to consider Pop-up-Play as a conceptualized game, and that each point of participation (micro and macro) were parts of the wholeness of a game. And that our game-makers activities needed to be understood from its defining traits of Aims, Rules, Feedback and Willing Participation (McGonigal).

6. Evaluation of Research Methods

Pre and post-tests: The initial testing period has highlighted some potential challenges when using the COGS assessments. First indications showed that Mellor pupils increased their communication skills over the course of six weeks, however according to the COGS results Three Ways pupils decreased their communication skills.

The data provided to the research team was re-analysed and it was found that environmental factors potentially played a part in the differences between data sets in both schools. Timing and place of interview, pace of interview, and interviewer technique was found to vary across all interview data sets.

Some standardisation is required for consistency of further testing:

- **One person to act as interviewer for both pre and post-tests**
- **Children to be interviewed in a quiet place at a calm period of the day**
- **Children should be given enough time to give as many answers as they wish**

Goodman's and Thrive: It is understandable that both schools should wish to use their own strengths and difficulties measures that they are familiar with. Unfortunately due to time constraints the Thrive data set was not possible to complete at Three Ways.

Video: In both sites two video cameras on small tripods were set up, one facing the screen, and one facing the group and players to record the sessions. In both sites the scope of the camera proved to be tricky. This was resolved by moving the groups of children around to enable full capture of the interactions between the observers and players. Flicking back and forth between screen and group shots when analysing the data helped track children who were very close to the screen and out of shot of one or other of the cameras.

Voice: During the sessions the video cameras were capturing voice and action, having reviewed the footage, at times it was difficult to hear what was being said, this was due to the following:

- **Background noise (too many people speaking at once, or music from the play system louder than quiet children's voices)**
- **Quiet moments between children (whispering into each other's ears) or between the creative practitioner and the children, where voices are matched to encourage communication (speaking softly and quietly, or whispering)**

For future testing, if there is to be a focus on the dynamics of narratives it may be necessary for the creative practitioner to wear a microphone, not to amplify their voice during the sessions, but to record moments of quiet conversations which the video cameras are not capable of picking up.

The reflective sessions: These were recorded loud and clear – there were no issues to report with regard to the quality of sound.

Photographic image: At times it was quite difficult to capture the children's actions on still camera. At Mellor, the space was very tight and there was a physical barrier dividing the room in half. In essence this meant that the images were either side-on close ups or images of screen action and heads only. This was resolved with re-positioning and the removal of the room divider.

Lighting was also an issue and the children were very excited (jumping around) which meant the camera couldn't make up its mind which mode to be in and a lot of images were not clear or the moment had been missed. This was resolved by changing the settings and shutter speed.

The potential uses of image data: For research purposes (analysis and dissemination) it was found that the images captured were fit for purpose, however for marketing or promotional uses, the review of the quality of the files was found to be unsuitable. This was resolved by The Spark investing in a professional photographer to document some of the sessions.

7. Evaluation of Analytic Process for Further Investigation

Throughout this first stage of testing *Pop Up Play* it was found that the COGS Communication Framework and Embodiment Cognition Framework needed to be revised and refined due to many overlapping features. The new Embodiment Cognition Framework now has 3 levels instead of 6, and the Communication Framework also now has three zones instead of 6. The new frameworks will continue to inform analysis for the case studies and longevity tests.

We have discovered that *Pop Up Play* is a mixture of realities and multiple perspectives and investigations triangulating the correlation between pedagogy, communication, and embodiment will continue for the case studies and longevity tests.

Expanding Explorations

In order to expand explorations the following concepts will also be investigated: Micro and Macro; Player Involvement Model; and Communication General Attainment Profile.

Micro and Macro

Calleja (2011)[19] refers to Macro as the 'factors that shape the player's opinion and disposition toward the game that derive from thoughts, plans, feelings, and expectations both prior to and following the game experience. Examples: 'close-knit community, the formation of strategies and plans that could be tried in up-coming sessions, interest in continuing to unravel a game narrative or exploring a newly discovered part of the game world' (p:39). Micro is understood as the 'broader motivations that attract players to games to the moment-to-moment engagement of game-play' (p:40); in other words their attention.

Micro and Macro helps us in moving forward in our conceptual ways of understanding:

- **Screen play**
- **Observer play**
- **Communal play**

Player Involvement Model

Calleja also discusses the complexity of embodiment and incorporation using the following criteria: Kinaesthetic; Spatial; Shared; Narrative; Affective; and Ludic and describes them as dimensions. He also understands them from a macro and a micro perspective.

- Kinaesthetic - all modes of avatar/media control e.g. the foreground image, the background, the alphas (this relates to the taxonomy on embodiment hierarchy)
- Spatial - spatial control, navigation, engagement: how the process is internalized and perceived and then represented in the mixed reality
- Shared - player awareness, relationships and interaction with other agents (human, embodied avatar, background texture)

[19] Calleja, G. (2011). *In-game: from immersion to incorporation*. MIT Press.

- Narrative - engagement with the stories which have been written into the game and those that emerge from the player's interaction
- Affective - emotional engagement and development, understanding and rationalising
- Ludic - engagement with the choices that are in the game: the game design and mechanics and their ethical/moral perceptions etc

The Player Involvement Model helps us in moving forward in our conceptual ways of understanding:

- **Human manifestation of game code**
  (Dimensions of above need revising and refining)

Communication General Attainment Profile

Sage's Communication Opportunity Group Scheme (COGS) General Attainment Profile (GAP) has 6 identifiable features:

- Personal qualities
- Social qualities
- Decision making
- Communication
- Performance
- Numeracy/information technology

GAP helps us in moving forward in our conceptual ways of understanding:

- **Full immersion**
- **Participatory immersion**
- **Spectator immersion**
  (Features of above need revising and refining)

As the research moves into the next phase the challenge will be to revise and refine these complex concepts for testing and validation.

Library and Museum Art Gallery Testing

Contents

8. Aims and Objectives of the Case Studies

De Montfort University, together with The Spark Arts for Children and Dotlib Ltd has created an immersive learning environment for children using a mixed reality system. This has enabled an investigation into how augmented and virtual reality can be used as a tool to engage young minds in creative play within immersive technology. The system has been named *Pop Up Play* (PUP).

In the first phase of testing PUP "worlds" the project used images relating to children's literature (War Horse and Alice in Wonderland); children also created their own worlds with images and artefacts and explored environments using shoe boxes and paper play (the city, underwater, space, and tea parties). Video cameras and motion-tracking placed participants and their avatars into these projected worlds for creative play and open-ended learning.

Managed workshop activities helped build the team's understanding of the creative-cognition framework which is based on Creative Opportunity Group Scheme (COGS)[20] theory and embodiment-cognition. Both theoretical frameworks were revised and refined during the initial testing phase and pre and post-test data revealed the potentiality of increased communication and the positive effects on co-operative and collaborative behaviours along with increased emotional resilience through working with PUP. In addition, the role of the creative practitioner was found to be crucial in engaging and encouraging explorations of narrative self and sustaining play through interactive and immersive gaming techniques.

Pop Up Play includes a fully working software environment, with appropriate Graphical User Interface (GUI) and functionality, tested in both mainstream and special schools during the first phase of explorations. In order to further examine PUP across a range of providers this second phase of testing concentrated on the impact of PUP on arts and cultural organisations.

Arts practitioners were briefed on managing the dynamics of the setting through rotating facilitation approximately every three minutes and were informed that the most successful sessions were found to incorporate demonstrating, co-constructing, and meaning making.

The research team wanted to find out more about the different types of roles, behaviours and social dynamics child participants manifest during the sessions with arts practitioners and this became the foci of the research for the second phase of testing. This report details two in-depth case studies which follow the tracking of individual children's learning journeys in PUP.

[20] Sage, R. (2000). COGS: Communication Opportunity Group Scheme. University of Leicester.

9. Methodology

Research Design

The overall research design incorporates action-research methods from two different perspectives: in-vitro (outside looking in) and in-vivo (inside looking out). These methods have been chosen in order to gain knowledge through action, and are concerned with the nature of the action as a thread of investigation leading to new knowledge that has operational significance for the field. As such, this method will test the *Pop Up Play* system and the creative-cognition framework, whilst testing the transformational affect upon its users.

Sample

The sample for this phase of testing consisted of two partners: Braunstone Library at the BRITE Centre, Leicester; and New Walk Museum and Art Gallery, Leicester. Both partners are briefly introduced below.

Braunstone Library[21] forms part of the The BRITE Centre in Leicester which also includes an IT suite, community rooms and spaces, children's play and care facilities, a function hall, customer services, adult learning facilities and a café. As part of the summer reading challenge in Leicester Libraries, selected children participating in 'Mythical Maze' workshops were invited to join *Pop Up Play* for an afternoon of imaginative explorations.

New Walk Museum and Art Gallery[22] is Leicester's original museum and has wide ranging collections and displays spanning the natural and cultural world. A family friendly day-out of explorations includes: Ancient Egypt, Dinosaurs, Wild Space, World Arts and a gallery for the under 5s, The Den and a Victorian Art Gallery featuring a fine art collection. Throughout the summer the museum offered a range of workshops for families. Children were invited to attend a digital *Pop Up Play* session in a dedicated gallery space in the museum.

Participants

Eight children in total (boys and girls) participated in the library workshop (Day One); they ranged in age from 6-to-10 years. Five boys participated in the museum

[21] http://www.leicester.gov.uk/your-council-services/education-lifelong-learning/leicesterlibraries-home-page/locations/braunstone-library-at-the-brite-centre/
[22] http://www.leicester.gov.uk/your-council-services/lc/leicester-city-museums/museums/nwm-art-gallery/

workshop (Day Two) they ranged in age from 4-to-8 years. Two eight year old boys were chosen as focus participants, one from each workshop. Child H in the library and Child F in the museum. It was anticipated that the team would follow one boy and one girl, however a focus boy was selected on Day One and only boys attended the workshop on Day Two[23].

Two experienced creative practitioners in post as artist in residence at the research sites led the workshops (one in each workshop).

Ethics

Ethics were negotiated between all parties and agreed with the University of De Montfort Research Committee and adhere to the *Ethical Guidelines for Educational Researchers* (BERA, 2011)[24]. The procedures included issuing a plain language statement and written parental consent form to all participants informing them of the aims and anticipated outcomes of the research. The right to abstain or withdraw from the project at any time was upheld. Both raw and analysed data material was participant anonymised and stored in a secure project-specific data system.

10. Process

The Workshop Sessions

The two live play sessions differed in length; the library session was 53 minutes and the museum art gallery 66 minutes.

Adel Al-Salloum Director of The Spark Arts for Children briefed practitioners prior to the sessions with the recommendations from Dr Vear (see page 22). Both sessions were extremely fast paced and children were presented with a vast range of visual images, media themes, and gaming provocations. The session at the library was planned by Jayne Williams as the practitioner (see Appendix 1) and the session at the museum was led by Hugo Worthy, his session was unplanned, fluid and organic, and emergently responsive to the children's play as manifest.

[23] Three girls did initially attend the workshop, but their guardian on the day could not give ethical clearance 'in loco parentis' for video and photographs to be taken so they decided to withdraw from the workshop. The team respected this decision in accordance with their right to do so.

[24] http://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011

After each workshop pupils were given the opportunity to feedback their thoughts and feelings to the team. This was arranged as an informal 'circle time' discussion group.

All feedback was documented via voice recorder. When the children had left the workshop, the *Pop Up Play* team and practitioners had a session de-brief which was also recorded.

Data Collection Methods

Data was collected by the following methods:

- Live play naturalistic observations.
- Video film footage: Capturing action and narrative (three cameras). Camera one was directed at the group of participants (in action players and side-line observers). Camera two was directed at the screen. Camera three was a hand held device closely following the two chosen focus participants only.
- Pupil and practitioner feedback.
- Still photographs.

Data Analysis Procedure

During live play Dr Craig Vear inductively conducted naturalistic observations which generated a potential taxonomy of roles. Post session Dr Linda McConnon worked both deductively and inductively with the recorded video data searching for direct evidence of Dr Vear's taxonomy and any other anomalies. Dr McConnon also searched for evidence of individual, collaborative, and creative dynamics[25].

The coding of roles and relationships was documented over time throughout the session and digitally mapped[26]. Quantitative data in terms of time spent in each creative dynamic was input into Excel to enable quantitative comparative analysis between case study participants.

[25] Craft, A., McConnon, L., and Matthews, A. (2012). Child-initiated play and professional creativity: Enabling four-year-olds' possibility thinking, Thinking Skills and Creativity, Volume 7: Issue 1, 48-61.

[26] Acknowledging digital-mapping.co.uk for creating the learning journey maps: http://www.digital-mapping.co.uk/about.html

Participant and practitioner feedback, along with still photographs complemented the other data sets and were used to disseminate findings and inform discussions at the *Pop Up Play* Symposium One (September, 2014).

Rigour

The project team sought to maintain quality and trustworthiness in terms of credibility and dependability by triangulating findings working both inductively and deductively. The team upheld protocols and procedures making each stage of the project transparent by sharing insights and findings which were validated or indeed challenged by other team members.

11. The Case Studies

Case Study 1: Child H at the BRITE Centre Library

H = 8 year old male participant

Luke = Technology developer

Jayne = Creative practitioner

Adel = Spark arts

****

Child H enters the room, he walks around and looks at screen and instantly recognises some parts of the technology, **"hey X-Box 360!"** he shouts.

Luke switches on the screen and H sees himself, he starts to dance and pull funny faces. Luke suggests going in the screen two at a time and Jayne chooses H and his peer C (boy). H indicates to C that he can go into the play area by using hand gestures but C does not respond. Jayne suggests that H starts and he runs into the play space and starts jumping around.

Jayne asks the observers to make crunching sounds and suggests that H reacts to the sounds by moving across the leaves at an appropriate time. Jayne pairs up H with L (boy) from the side-lines and asks the pair to work together making crunch sounds and movements in time.

H approaches the screen and starts to play out his own ideas by exploring his physical movements and visual screen reactions. Luke makes it rain and H covers his head and falls on the floor.

Jayne invites L into the screen and H moves to the back of the room, still in live play he continues to look at himself in the screen but does not say anything, nor does he interact with his peers.

H stands at the back of the room and starts to watch the other players.

Luke changes the screen to an underwater scene and H says **"I want to be underwater!"** H takes a few tentative steps forward even though Jayne has asked for some other players and he says **"it's a distant surfer."** He makes forward movements and says **"I'm a scuba diver", "a shark."** H invites himself further into the play space, kneeling down he moves forward and uses his hands as a shark's mouth.

H moves towards the other players in the screen pretending to eat them. He looks at them 'in person' rather than at the screen.

H rolls on the floor, he gets up and finds a chair on the side of the room which he takes into the play space; he leans across it and starts swimming in the screen. H moves his chair into various positions; he carries out his own play and does not interact with his peers. Jayne calls for a player swap.

H stands to the side of the screen and Jayne encourages him to **"come behind the line and have some ideas."** H observes and shouts **"he's a shark!"** He joins in with Jayne and his peers making scary music sounds from 'jaws' and claps his hands.

Jayne re-groups and changes the game to that of 'avoiding being eaten by the camera'. H sits down on the floor towards the back of the room and observes the new play as it unfolds. Jayne explains the rules of the game and asks for volunteers. H puts his hand up. Jayne also asks for iPad helpers and H puts his hand up again and is chosen to sit alongside Luke.

H sits on the floor alongside Luke and his peer (girl) whilst Luke explains a function on the iPad. The play starts and the girl controls the iPad whilst H observes the screen play, he visually takes note of the re-scaling. H flicks his gaze and attention back and forth to the screen and the iPad controls. **"They are teeny"** he observes.

Suddenly H jumps into the screen and wiggles his bottom, and then he sits back down.

He moves out of the screen and repositions himself alongside the girl controlling the iPad. He watches the play and can be seen patiently waiting for a turn.

The girl leaves and H moves in to take control of the iPad. Luke hands the iPad over and asks H if he knows what to do? H says **"yes"** even though he has not been directly shown! H starts controlling the play from the iPad.

"I made you teeny!" he says. Jayne plays some music and H resizes the players and moves them around on the screen. He makes them so small they disappear.

Jayne stops the music and Luke suggests they put some sound effects on. Luke takes the iPad from H and he shouts **"we are going to put some sound effects on!"** Luke hands the iPad back to H and he continues to play moving and re-sizing. **"Do you want to bring him back H?"** asks Jayne as she realizes that H has made the payers completely disappear. H makes the screen disappear and Luke steps in to offer some guidance. H continues manipulating the iPad controls and changes his peers to alphas (leopard print). Jayne plays some more music and H continues re-sizing shouting **"he's teeny!"**

Jayne changes the game to 'mythical maze'. H hands back the iPad. Jayne re-groups and all the children sit behind the line and she asks for volunteers. H raises his hand. K (boy) is chosen to enter the maze and H watches. He observes **"you are already in the centre."** He continues to offer the players advice **"this way a bit, that way, yeah." "Ah she gave you a boost"** he says noting that the iPad is also controlling the player's movements through the maze. Then the players swap.

H gets some small world plastic play toys and peg puppets from the side table, he takes them in his hand and sits on a chair in the corner of the room. H seems disinterested with what is happening on the screen choosing instead to amuse himself with the puppets and toys, he does occasionally and very briefly look up but does not interact or contribute to the group.

Jayne invites H into the screen to have a go in the maze; he jumps up and enters the space. H starts to jump up and down and walk back and forth like an Egyptian. H stands still as his peer moves him around the screen; he shouts **"hey I'm over here, how come?"**

Jayne changes the game to 'where's Wally?', **"I know that"** says H. He sits back down on his chair in the corner of the room and picks up the toys again.

H is back up in the screen exploring the 'Wally' scene. Jayne says there are too many players and chooses two to stay in. H returns to his chair.

H looks up now and again, but for the majority of time he plays with the toys and keeps his head down.

H is chosen by Adel to hide in the scene. He jumps up. The technology team decide it is better to hide one at a time so H returns to his seat.

H looks up now and again, but for the majority of time is playing with the toys and is looking down at his lap.

H is back in the screen for his go as Adel said he was next. He chooses his hiding place and tells Luke where to place him. He wants to make it even more difficult by ducking down and curling up in a ball, but he is asked not to do this as the aim of the game is to keep still. H has to be encouraged several times to sit up as he is making it too difficult.

Jayne re-groups and changes the play to explore the puppet creations (alpha). H sits back down on the chair and watches the screen.

Jayne invites H to narrate a story 'the day in the life of G (girl) Monster' as she acts it out in the screen.

> **"Ah I really wish I could go outside but my parents won't let me, I just wanna go home now and go to bed forever, now I want to go on an adventure in the jungle, I meet my best friend, but they turn into stone, then she fainted, the one thing to save her is the dragon scale."**

H continues to sit on the chair. He plays with the toys once again. H looks up now and again. Jayne looks for narrators, but there are no takers, H suggests singing a song and starts 'Old Macdonald' which turns into an improvised made up song and tune. H remains seated until the end of the session.

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Children's Perspectives

During the plenary children engaged in meaningful dialogue with the team and three main themes emerged: description, evaluation, and desires. Children described what had happened, they offered their evaluations of the session, and discussed desires of what they would like to happen for future players.

Descriptions included:

> *"You can be in different places without leaving."*
>
> *"There is a tablet, then someone stands there and they can move left and right, but the person with the tablet can also move them around and change their size."*

"You get eaten by a fish and the person with the tablet makes you so small it looks like you have been eaten by the fish."

Children's Voices

Evaluations featured positive aspects of gaming, affirmation of self, and changing perspectives in live play:

"I loved it when we got to hide."

"I loved it when we were in the maze, the firewall; it made me feel like arghh!"

"I like seeing myself – your actual self!"

"My favourite bit was when I was the monster because you get to be someone that you have never been before."

Children's Voices

Being "in" mixed reality featured strongly as a future desire for the children at The Brite Centre:

"You could choose props and things to hide behind, likes trees and forest."

"You could go in the flames where the devil lives."

"Go to the end of Minecraft."

"Go to chess, play chess as a piece."

"I would like it to be a dragon's cave."

Children's Voices

Case Study 2: Child F at New Walk Museum and Art Gallery

F = 8 year old male participant

Luke = Technology developer

Hugo = Creative practitioner

***

Child F is sat on the floor with the other participants. Hugo explains a bit about the system – **"you can be as big or as little as you want to be…"** The boys mention **"Minecraft."** Hugo goes on to outline the session **–"making boards, jumping about etc."** Hugo gives Luke the countdown to **"switch the magic on."**

Luke switches on the visualizer and all the boys surge forward and start jumping up and down in the screen. F plays with the other boys by interacting physically with them, touching their heads and arms etc. F runs to the back of the room and the others follow **"into the black hole!"** he says (noticing that he has disappeared off screen when he goes to the back of the room). F crawls along the floor towards the front of the screen and another boy copies his actions. Two other boys join in the same actions.

F waves his hand in front of the video camera which is capturing data, wondering if this is where the visualizer is that is capturing his movements on screen – it is not and he moves away.

Hugo draws the boys back and asks them to stand in a line and wants to know who can touch a red line (as seen on screen). F raises his hand. Hugo asks the boys to touch the green line and again F raises his arm to touch it. Luke changes the size of the boys and they all start to run about excitedly. F moves towards the front and starts to make climbing motions with his legs. Hugo sets a line in tape on the floor setting out a space that should not be entered as it is too close to the screen. The boys approach it. Then Hugo takes control of the iPad and asks them to make a line at the back of the room, and then they all run forward when told to 'jumping into the screen'.

F starts to walk around the back of the room looking at his surroundings, touching the artefacts, models and sculptures and looking at the lighting etc.

F is soon back in to live play running forward and skidding on the floor to a stop in front of the screen. Two other boys start to copy the exact same movements and actions. One other boy starts to be a zombie and F copies him.

One boy stands at the front and the others stand behind him in a line and they start flapping their arms around creating one body with lots of arms. They make bird noises.

Hugo encourages the boys to move together to make one large alpha animal out of their body shapes. F takes a few steps away towards the back of the room so that he can observe from afar.

Hugo invites F back in and he stand in front of the screen waving his arms up and down.

Hugo suggests that the boys choose a wooden sculpture to bring in to the space. F looks for a suitable shape. He chooses one and places it in shot of the screen; each of the other boys chose their own sculpture and they place it in front of the screen.

The screen goes blank as Hugo switches off the visualizer. He gives the boys paper and pens and they get to work on the floor making 'super-heroes' 'aliens' and 'animals'. F works with great care and detail when drawing his picture. This activity continues for a prolonged period of time.

Hugo starts to tape the pictures to the wooden sculptures.

F stops drawing to see what is happening next.

F returns to his drawing.

F stands up with his drawing. Hugo tapes it to the wooden sculpture and the visualizer is turned back on. F stands next to his drawing. F walks across the row of 'sculptures'.

F stands behind his sculpture and watches as the screen scenes and lighting colours change. He is off screen.

F picks up his sculpture and moves it in line with the other boys' pieces. He stands to the side watching the others in silence. He is off screen.

Hugo approaches F with a hand held web cam and F starts to pretend hit himself on the head.

F stands by his piece of art again, he is off screen.

F notices that another boy has the iPad and is controlling the scenes. F moves across the floor and positions himself next to the boy with the iPad. **"Let me have a go"** says F. F watches – flicking his gaze back and forth between the screen and the boy with the iPad. **"Turn off the raining!"** says F.

Hugo asks the boys to move to the side and F leaves the boy with the iPad to do so. F sits on the side and watches. **"Make us tiny and jump"** he says.

Hugo asks F to step up and take a go at jumping. **"Where am I?"** he asks looking at the screen. Hugo directs F so that he can be seen. Suddenly all of the boys are in the screen. Hugo directs the others to sit back down. F jumps.

F goes back to the side. He watches the others.

F gets a marker pen and starts adding to his sculpture picture again. Every now and again he takes a brief look at the screen.

F leaves his picture to look at what is happening with the person controlling the iPad.

F starts to place his fingers on the iPad screen and moves the controllers whilst another boy is holding it. The iPad changes hands and F takes over.

F changes the players to alphas (gold dust). Luke changes the screen to a maze. Two, then three other boys sit either side of F watching and offering suggestions: **“Do a tornado F!”**

F lets another boy take over the iPad controls. Hugo draws the session to a close. The boys have a final ‘go’ in the screen taking a bow in front of their artworks.

***

Children’s Perspectives

During the plenary children were afforded the opportunity to express their thoughts and feelings about *Pop Up Play* with the team. Similar themes emerged as with the Brite Centre participants, that of: description, evaluation, and desires. Children described what had happened, they offered their evaluations of the session, and discussed desires of what they would like to happen for future players. However the children at New Walk Museum and Art Gallery also evaluated the system, and use of the iPad controls. They were also open and honest and vocalised what they didn’t like.

Descriptions included:

> *“You had all the people on your head and you slapped them!”*
>
> *“Everyone stamped on me!”*
>
> **Children’s Voices**

Evaluations featured positive and negative aspects of the control system and play dynamics, creation and affirmation of artistic product, and visual aspects of live play:

> *“Easy to use.”*
>
> *“Really hard.”*
>
> *“It was harder than a video game coz I didn’t know how to do anything like rainstorms.”*
>
> *“In the middle - I never got shown anything.”*
>
> *“I didn’t like sitting down!”*

“The mushroom screen was a boring screen.”

“All the pictures, I liked messing it around and making the rainstorms and making you teeny so you drown, drown in a puddle!”

“I like drawing.”

“I liked all of it.”

“I like seeing my drawing on the screen.”

“I like the bit where we made the sculptures, seeing it in the screen, I pushed it forward and it came out of the white and appeared.”

“I liked drawing my animals, the lion, the elephant, and the zebra.”

“I liked it when we had the camera on and I ate everyone, it was funny.”

Children’s Voices

Creating and “being inside” visual imagery, and aspects of cause and effect gaming featured strongly as a future desire for the children at New walk Museum and Art Gallery:

“Create things like make pictures out of wire and paper, and stickers and like glitter.”

“I would like different backgrounds…inside a rocket.”

“Inside a movie.”

“A zombie eating your brain.”

“Minecraft.”

“More technology, like you can make people blow up on the screen that would be cool!”

“Give people light sabres!”

Children’s Voices

12. Analysis of Findings

Taxonomy of Roles

Table 11 documents the potential taxonomy of roles manifest in mixed reality play which was found during initial inductive observations of live naturalistic play. The taxonomy was used to inform the deductive-inductive analysis procedure which was later revised and refined (see Figure 7 on the following page).

Role	Description
Facilitator	S/he is the master code. A manifestation of the developer. The author embedded in the code but here manifested in real time. The Game as human. The overarching design, ludic, play, story, action, imagination trajectory puppet master.
Technologists	Players with the techie controlling bits, probably just the iPad operators, they choose what we see and how we see it in the screen. They learn by exploring. They pass expertise on through peer to peer learning and shoulder watching. They 1) imitate, then 2) master obstacles, then 3) create freely.
Constructors	These are our game designers. They create worlds, and obstacles using 3D toys and 2D drawings. They operate as a team some with pens, others with cameras. They offer suggestions and solutions to some of the problems the code and the others manifest. Together they develop deeper ideas through collaborative endeavours.
Players	Actively playing within the screen: our Lara Croft, our image of self, our mirrored me, our avatar, the digital puppet. They need rules and feedback from facilitator and directors, constructors (the 4 defining traits of a game - Goal, rules, feedback, and voluptuary participation). Through the trajectory of these 4 they develop deeper embodiment from mirror, surrogate to hyper. They are 'inside' the core of the game dimension that is set up by us all, and need the most help.
Directors	Hunt in packs and are the committee that brings forth the 4 defining traits. There is a pecking order of participant, helper, co-author and director. This is the most dangerous eddy to have and needs to be kept fluid and continuously refreshed with ripe coders from the Observers and players. Technologists and Constructors also contribute but from their own perspective.
Observers	Our quiet saviours, they plot and think; they form macro communities of embodied engagement; they manifest the new ideas and are a vital source of refreshment for our facilitator. They start quiet, then they plot with neighbours (isolated too long they should be encouraged to chatter, to form 'friendships' together in the collective chat rooms), then they start to become distant directors. WATCH THESE! They are vital mutations in the code.

Table 11: Potential Taxonomy of Roles in Mixed Reality Play

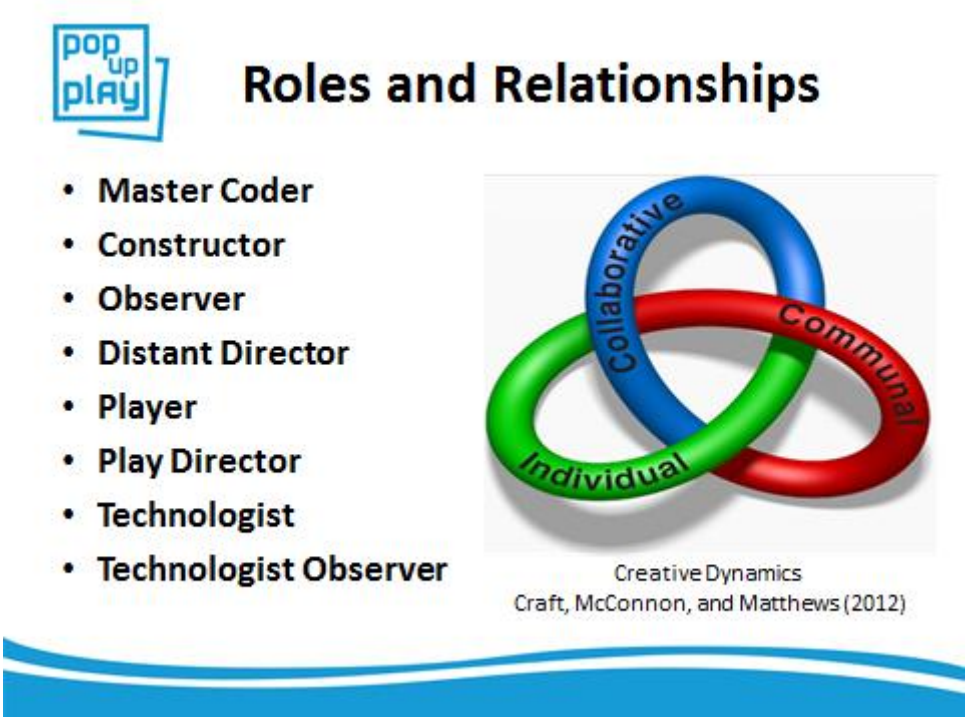


Figure 7: Revised and Refined Taxonomy of Roles and Relationships in Mixed Reality Play

In the second round of triangulated deductive-inductive analysis the role of Master Coder replaced the previous role of Facilitator as it was felt that children acting as game designers were not "facilitating" as a practitioner would. Observers were found as both silent and vocal. A vocal Observer was found to be more aligned with the role of Distant Director, e.g. an observer offering suggestions to players involved in live action. A second type of player was also found in this second round of analysis, that of Play Director. Play Directors were more likely to take an agentic stance and play out their own child initiated imaginative ideas rather than taking on and acting out other's ideas either from the Distant Directors or Master Coder. The role of Technologist Observer was found as being distinct from Observer. A Technologist Observer specifically placed themselves at the side of the Technologist in order to learn by shadowing and watching their movements, behaviours, and actions.

Frequency of Roles and Time Engaged in Creative Dynamics

Figure 8 below shows that the roles of observer and player were more frequently manifest for Child H. Play director, master coder, distant director, technologist observer and technologist were all moderately manifest. Child H did not at any time engage in the role of constructor. Throughout this session art materials were not available as the children had already made their props and puppets prior to the team's arrival, however Child H could have engaged in a construction role by using the cameras.

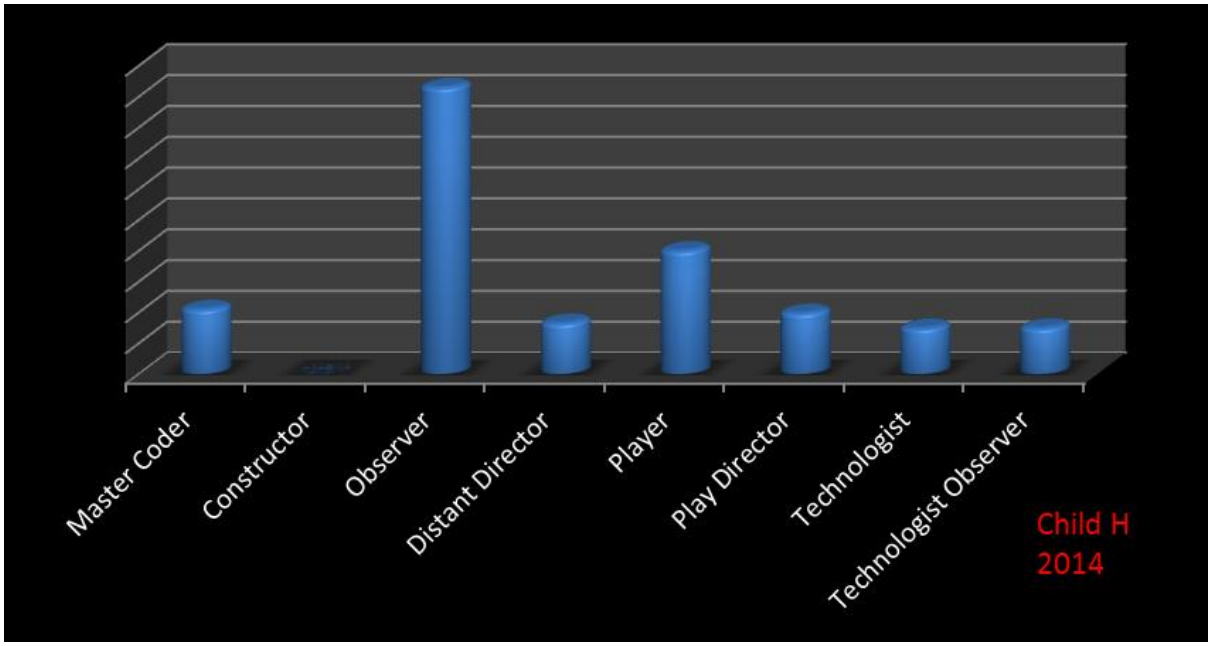


Figure 8: Child H Frequency of Roles

Figure 9 on the following page demonstrates that throughout the session he engaged in individual, collaborative, and communal creative dynamics. He engaged in activity alone, he had quiet moments, and at times ignored his peers. He also worked in direct collaborative partnerships with others and enjoyed being part of an active community to sustain the play and move thinking and action forward.

The pie chart shows that Child H spent 21% of his time in individual activity, 51% in collaborative activity, and 28% in communal activity. This demonstrates that for 79% of the time Child H was engaged in either a collaborative or communal creative dynamic.

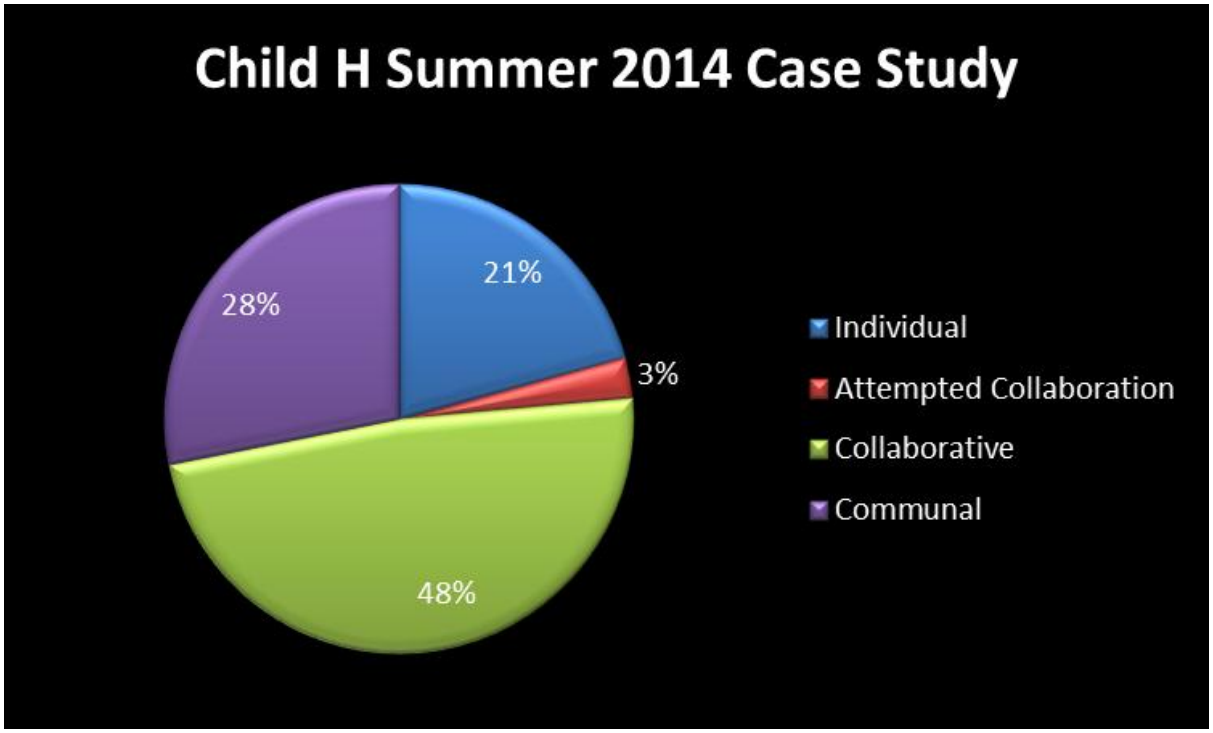


Figure 9: Child H Percentage of Time Engaged in Creative Dynamics

Figure 10 below shows that Child F manifests the roles of constructor, player, and observer most frequently in his session. Play director, distant director, technologist observer and technologist were all moderately manifested. Child F did not at any time engage in the role of master coder.

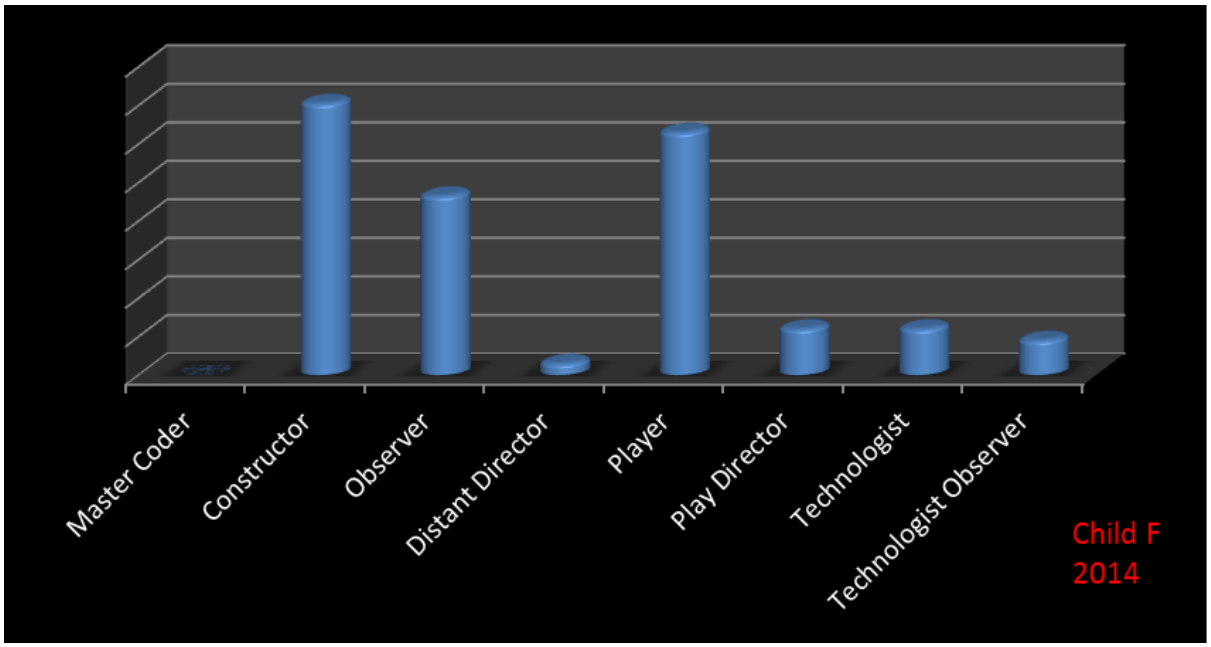


Figure 10: Child F Frequency of Roles

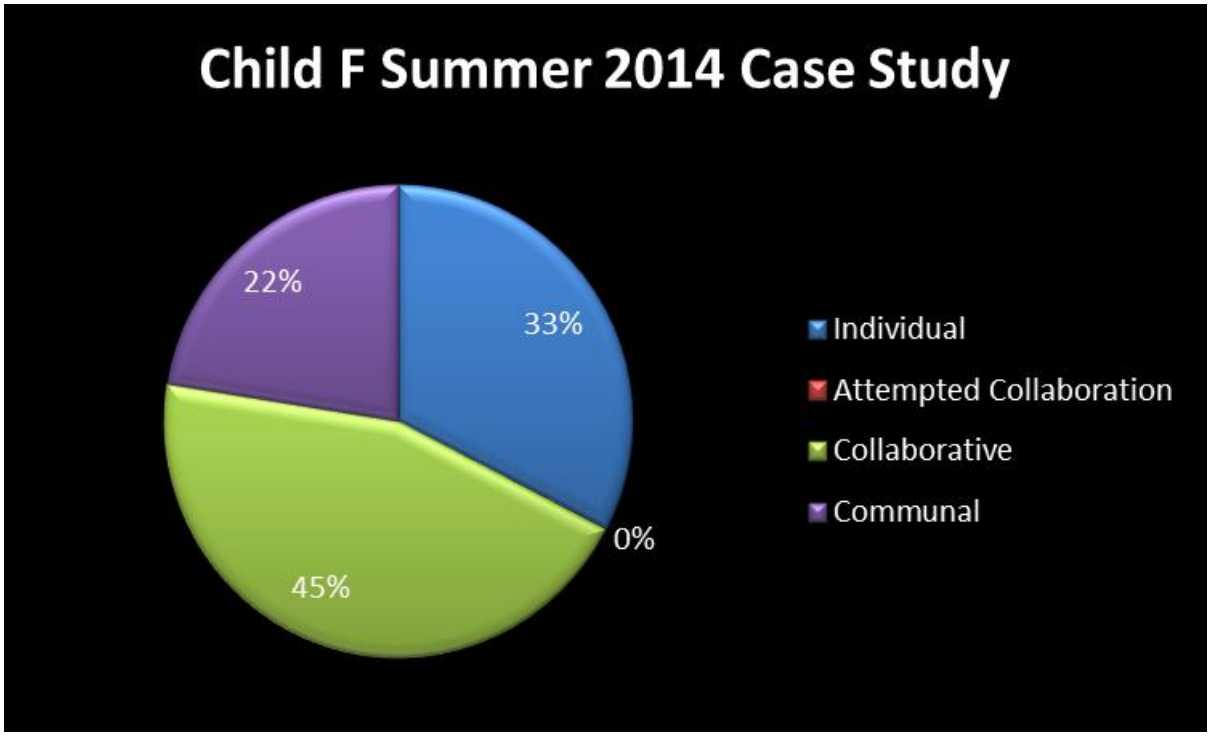


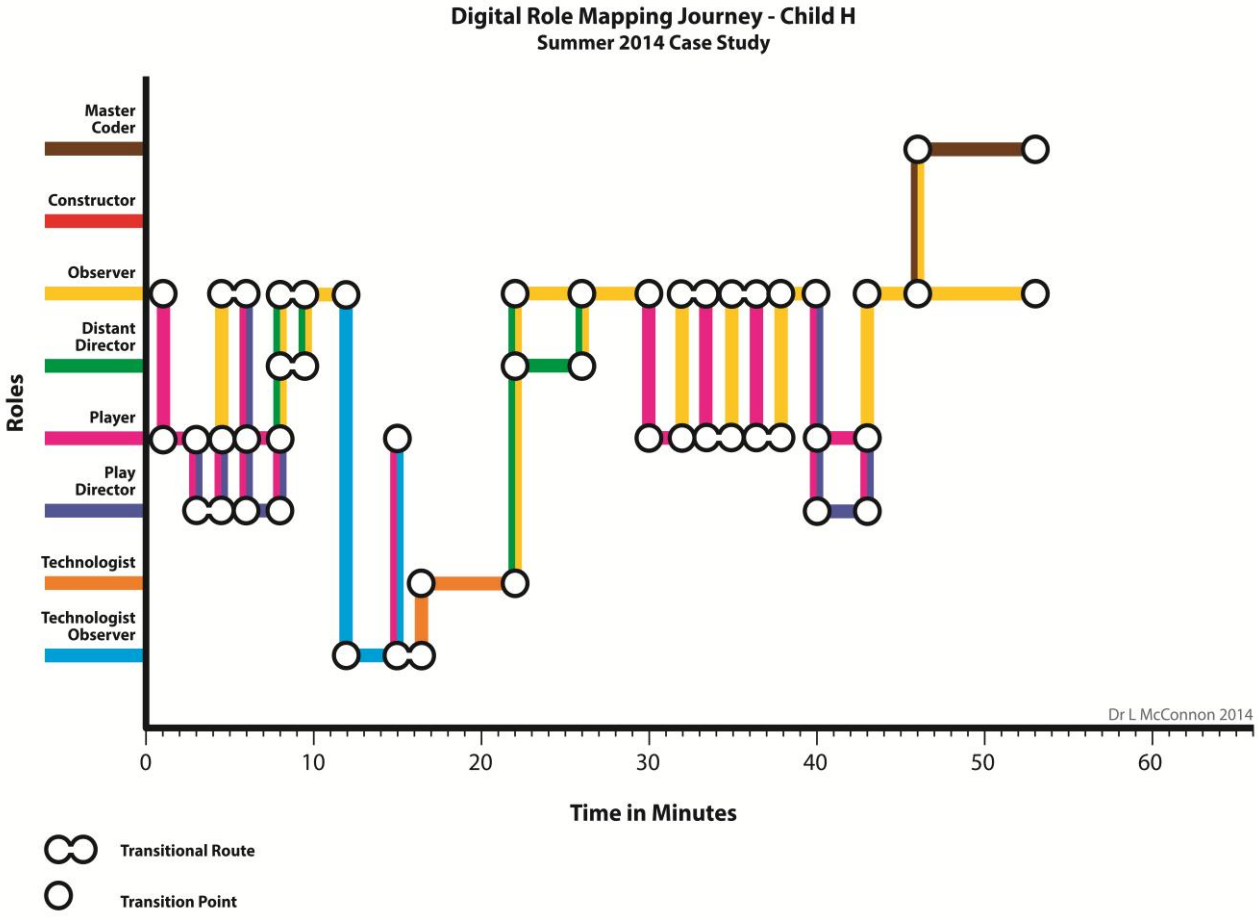
Figure 11: Child F Percentage of Time Engaged in Creative Dynamics

Figure 11 above demonstrates that throughout Child F's session he too engaged in individual, collaborative, and communal creative dynamics. Unlike Child H his individual dynamics were mainly concerned with the making of his artwork to place in the screen for further exploration and play, whereas Child H was quiet and at times ignored his peers. Child F also worked in direct collaborative partnerships with others and enjoyed being part of an active community to sustain the play and move thinking and action forward.

The pie chart shows that Child F spent 33% of his time in individual activity, 45% in collaborative activity, and 22% in communal activity. This demonstrates that for 67% of the time Child F was engaged in either a collaborative or communal creative dynamic.

Digital Role Mapping

In order to further understand the impact of the different roles and length of time engaged in each dynamic visual maps were created following the flow of movements and journeys taken throughout the session for each child. See Figures 12 and 13 on the following pages.



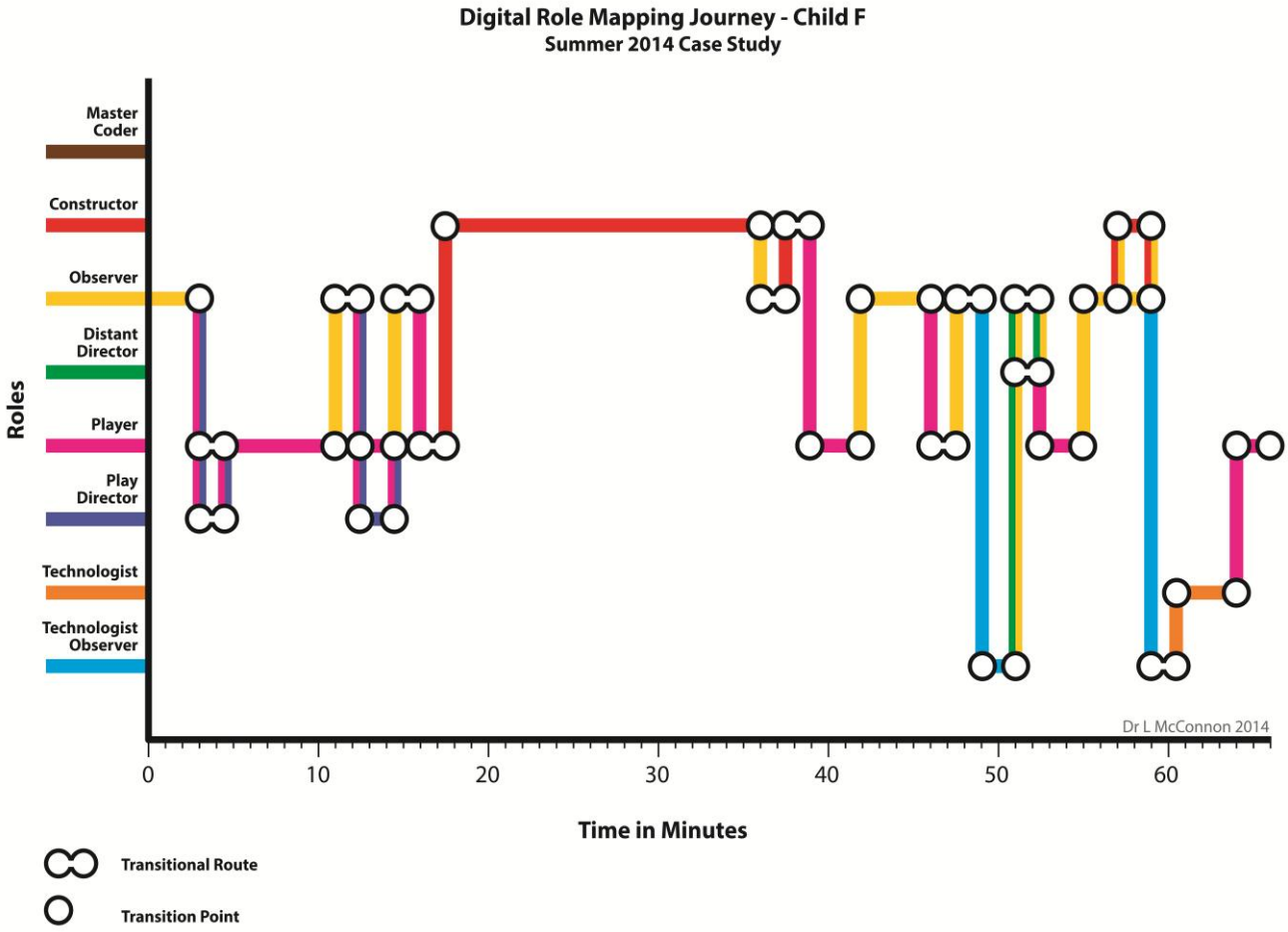
Created by digital-mapping.co.uk ltd used with permission

Figure 12: Digital Role Mapping Child H

Figure 12 (the digital journey map above) shows several key points of interest. Towards the beginning of the session (minutes 0 to 10) and just over half way (minutes 30 to 40) Child H's movements seemed quite erratic. Roles and tasks were being changed quite frequently and the tempo of play was quite pacey.

Child H did have a few sustained episodes in role, e.g. the observer (yellow line) and master coder (brown line) and technologist (orange line). He also took on some dual roles, these are depicted as split coloured lines. The roles of player and play director were closely aligned, as was being an observer and a distant director.

Interestingly Child H took on the role of being the technologist observer before he was the technologist himself. This is depicted in the light blue line preceding the orange line.



Created by digital-mapping.co.uk ltd used with permission

Figure 13: Digital Role Mapping Child F

Figure 13 (the digital journey map above for Child F) also shows several key points of interest and interestingly shares some similarities with Child H's journey.

There are also some erratic movement where Child F seems to flit back and forth between roles. Again this was due to the practitioner changing screens, roles and tasks quite quickly in order to keep the pace of the play fast, exciting, and engaging.

Again Child F did have a few sustained episodes in role, e.g. the constructor (red line) and player (pink line), observer (yellow line) and technologist (orange line). He also took on some dual roles, these are depicted as split coloured lines. The roles of player and play director were closely aligned, as was being an observer and a distant director, the same as Child H.

Interestingly both boys took on the role of being the technologist observer before becoming the technologist. This is depicted in the light blue line preceding the orange line.

13. Evaluation

Post Session Evaluative Reflections

After each session the team reflected with the creative practitioners (Jayne and Hugo) in both partner settings in order to make evaluations. Several themes were found across both partners: planning, active live play, roles manifest, managing the dynamics, impact, and challenges.

Planning

Jayne (Brite Centre Library) reflected on her plans (see Appendix 1). She noted that she had planned extensively and perhaps felt that it was too much; however Luke found the planning helpful as this enabled him to create the media required in advance and thus he was prepared for what was coming at what point.

> *"I wanted to create a workshop to try lots of different things out."*
>
> *"I planned more than I possibly needed to."*
>
> **Jayne**
>
> *"The plan was really helpful, I had media for each activity, sometimes it's difficult to know what the practitioner wants."*
>
> **Luke**

The team reflected and agreed that it was the right balance of structure and freedom and that each activity revealed a new thing.

In contrast Hugo did not plan his session in advance and wanted to see what would happen when he facilitated explorations through "the toolkit." He also felt that the support of Luke was essential.

> *"I had no sense of how it was going to work and how the kids would respond."*
>
> *"I found it really exciting, I didn't know how it would work as a play tool, but it does, it is quite a physical tool."*
>
> *"I needed your help; I wouldn't have felt confident on my own."*
>
> **Hugo**

The team reflected and agreed that the session felt natural and that there was enough control by the facilitator and players which resulted in "loose physical play."

Active live play

Jayne kindly furnished the team with an account of how she felt each of the key activities had played out in her session: The monster puppet, Where's Wally? and the maze.

> **The monster puppet** was a huge success. Seeing the monster that the group created on paper the day before, now on screen, provoked an excitement in everyone and eagerness to 'become' the on screen character. It was interesting to see the children exploring this character both physically on screen over differing backgrounds, but also off screen as narrators, navigating the characters 'day in a life of'. Interestingly, everyone narrated in the third person apart from one boy who narrated in the first person. The gamer was still able to respond. Adel pointed out that the monster puppet operator could have also physically led the action for the narrator to build a story upon, which is a great idea. There are infinite possibilities with this puppet technology, exploring self, character, and scenario and so on. A vital component to exploratory gaming.
>
> **Where's Wally** worked tremendously well too. When the children chose where to hide themselves in the screen and were assisted in positioning to best blend in. This time developed intrigue and excitement within the 'guesser' waiting outside. The unique team created by everyone in the room knowing where the gamer is hidden on screen, and working together to not give away any clues. Then the oddity of the 'guesser' entering the room, seeing the person in reality in the space, yet searching for them in augmented reality on the screen. A slight movement or a cheeky wave served as a clue to where they were placed. The search, clues and indeed revelation when finding them, was enjoyed by all, not just the players. This is a game that engages everyone on all different levels and can sustain this engagement beyond 3 minutes.
>
> **The maze** activity surprised me how engaging this was. I thought once you'd watched two people navigate their way through, with player on screen and player on iPad working together, having seen a clear route through, interest would decrease. However, players seemed to want to go through the maze themselves and one child said it made it more exciting when we suggested that the walls were made of fire, adding an extra element of jeopardy within the navigation.

In Hugo's session there was a great focus on 'visual exploration' than game play.

> *"I like the visual environment this creates."*
>
> *"The relationship between different images, the sculptures – all of them were interested in the visual exploration."*
>
> *"The main visual trick was scale; they were completely fascinated with that."*
>
> **Hugo**

Roles manifest

Throughout the reflections there were several points in which roles were discussed. Interestingly this was before the research team had shared their initial findings.

> *"The room went silent, everyone was watching what was happening."*
>
> *"Those moments were quite interesting,"*
>
> *"Most of the others looked at the screen; he looked at the iPad a lot more."*
>
> *"There were lots of different moments, playing in the screen, watching the others, giving ideas to peers, being silent."*
>
> *"Some children are happy to be in the room but don't want to participate but they are happy watching."*
>
> *"You did invite those children to do the different roles."*
>
> *"Being an observer is just as powerful as being in it."*
>
> **Team Reflections**

In the museum art gallery the role manifest when playing with the iPad was a key theme for reflection:

> *"The children worked it out for themselves."*

“They didn’t seem to find it very hard to use, they just wanted to know how to use it.”

“They needed to get out of certain parameters and they didn’t know how to do it.”

Team Reflections

Managing the dynamics

Managing the dynamics featured as a very strong theme emerging from the session at The Brite Centre Library. Jayne noted in her reflections that the dynamics were difficult at times, however stated that: “Children were desperate to get back in” and “Behaviours were a lot more positive.”

> Only one participant was resistant to appear on screen. This particular child participates on the periphery in other activity, often preferring to watch others take part. This behaviour wasn't out of character and she became an active supporter from the fringes, offering verbal encouragement to those inside the game.
>
> One participant struggled with some of the 'gaming' concepts and consequences. His particular engagement of the technology was interesting as he has ASD. He struggled with the concept of changed perspective, his small monster appearing large on screen; however once he'd grasped his co-ordination he enjoyed the task. He became frustrated when his sister was appointed the role of iPad operator where she could assist the gamer in moving across the screen to avoid being eaten by the clothes peg monster. His sister working against him was incomprehensible for this boy and he became quite stressed. When the rules were explained again he wanted everyone's attention so that he could tell them it wasn't fair and when he failed to gather said attention, he became increasingly upset and stressed. This is usual behaviour when any game of cause and effect is introduced. This boy usually opts out and reads a book until the game is complete however he desperately didn't want to exit this experience and re-entered with a renewed attitude. This was a huge leap in the way this child interacts in team games and although he was still frustrated, he was accepting of the rules, which is a notable shift in response to any other game.

A particular boy who participated usually manipulates games to invite the most attention upon himself, even at the risk of his own popularity. This boy's interaction with the technology was interesting. When handed the iPad he quickly found a way to manipulate the game by making the gamer extraordinary small, almost eradicating them from the screen, then making the background almost disappear too, so he had successful brought the attention of the whole room upon himself - usual behaviour. The unusual part of this was the change when he decided, after a very short time, that he would re-connect the gamer and the screen in order for everyone to engage. He would usually storm out of an activity or cry loudly in the corner, displaying other ways of drawing attention, however here, he didn't allow his behaviour to escalate to that level (an unusually mature decision) and managed to stay in the game after a slight experiment of situation manipulation. This was an impressive change in behaviour which I do not believe is attributed to just the 'new' aspect of the activity. This boy could play with the technology on his own, probably for hours on end however he made the decision to engage as a team member, a decision which I think was taken because the technology was intriguing and compelling enough for the desire to engage with everyone equally. He was aware that he could only engage as a team player rather than the central character and modified his reactionary behaviour in order to do so.

The girls interactions were often polite, allowing others to engage before them, appear on screen more, however when describing the workshop to parents and siblings at the end, they had the same excitement in their description, as the boys had displayed in the game.

The younger child, aged 6, struggled to grasp the concept of changing perspectives, possibly due to a less developed hand to eye co-ordination. He seemed to enjoy learning and didn't appear to feel frustrated if he couldn't grasp a task straight away, he was patient and committed to mastering a technique.

In the museum art gallery session Hugo noted that when managing the dynamics you have to be equitable: "once you let one have a turn you have to let them all have a turn."

Impact

The notion of impact surfaced in the reflections. The team at the Brite Centre Library discussed the impact that the creative practitioner had on children's abilities to engage with different aspects of PUP:

> *"There were key moments where you had to turn it round for him because otherwise he would have sat there for much longer."*
>
> *"You helped him re-engage."*
>
> *"He is desperate to do every role, you were aware to bring him back in at different times."*
>
> **Team Reflections**

In the museum and art gallery reflections, Hugo felt that a major indicator of impact was when the children started to engage with their surroundings and naturally became inquisitive about the gallery collections. The team also agree that:

> *"It was significant that they engaged with the collection."*
>
> *"There is something in this that helps you better engage with the collection."*
>
> *"When children engage in high energy play without a direct focus they would be more likely to go off and engage with a collection."*
>
> **Hugo and Team Reflections**

Challenges

Both creative practitioners felt that they had been challenged by PUP. Jayne felt that she had thought really deeply about the potential possibilities of the system and reflected that:

> It was a challenge to develop a workshop plan of games that would only work through this technology. If a game could be carried outside of the augmented reality then the experiment would become redundant.
>
> None of the tasks were wholly possible without this unique technology and there lies the success of responding to such new possibilities. Rather than trying to re-create activity which is

tried and tested outside of the augmented reality, we strived to submerge creative ideas inside the technology to develop something fresh and unique.

Hugo's commented that his challenge occurred mid-session and was totally unexpected:

> *"The drawing drew them away from the digital; I didn't see that coming it was unexpected."*

He also noted the impact on group dynamics:

> *"The challenge for the toolkit is with larger groups of children."*

He then started to consider his own role and new practice possibilities in respect of the challenge he faced:

> *"It would be interesting to explore it as a drop in session, create something next door and bring it through and it becomes digital."*
>
> *"It would also be interesting to see how long children could play on their own without facilitation."*
>
> **Hugo**

14. Further Investigation

Expanding Explorations: Think Tank[27] Evaluations and Discussions

The following extracts are taken from the recorded minutes and are not necessarily arranged in the same running order as took place on the day.

Reporting on the case studies and Symposium One

The team delivered presentations on the following aspects of the project: research, creative practice, and technology.

[27] Wednesday 1st October 2014. Attendees: Adel Al-Salloum, Luke Woodbury, Dr Craig Vear, Dr Linda McConnon, Karen Hammond, Adrian Wills, Will Buckingham, and Ben Edwards (via skype).

a) Research – CV + LM

- Background (what we know so far)
- Mixed reality (what it is and what is its potential)
- Roles and trajectories results (visual mapping of time and movements)
- Impact on practice (fundamental changes)
- Impact on participant (multiple possibilities)
- Development going forward (what do we want to reinforce, what else do we want to find out? – roles, relationships, engagement?)

b) Creative Practice – AAS

- Cultural background (locality, participants, themes)
- Reinforce role of the practitioner (type and influence on participant's activity)

c) Technology – LW

- The digital puppet (developments and usability)
- User testing of controls (new role for children)
- Use of iPad and camera work (letting the practitioner take control)

Think Tank comments, questions, and evaluations were recorded as follows:

What has come out of it?

- Better informed position to explain complexities of MR
- Greater fun, enjoyment, and learning for participants
- Increased play and communication opportunities for participants
- Variety of roles can be adopted

What is it saying about this form of play?

- Multiple possibilities and a space with potential for divergent use
- Greater autonomy for meaning making
- Toolbox, or toolkit for play and investigation
- Flexibility, cardboard box analogy

Is the terminology or framing accessible?

- Master coder may not be understood by everyone
- Gives impression of gaming
- Community of users needs to be developed

What is the unique selling point?

- Realistic stimulation
- Affirmation of self
- Embodiment as alphas

Are schools the right place for PUP?

KH suggested that it was as:

- PUP's open ended-ness is its strength
- Creativity and imagination are key to engagement with PUP
- PUP is a space where children can be the protagonists of their own learning

Would the Library be interested in PUP?

AW said yes because:

- It could be used as a direct engagement tool
- The use of drama for promoting narrative, language, and enthusiastic readers of literature
- Outcomes could be measured by numbers of children attending and returning

What can the screen possibly do?

- Enhancement tool
- Added dimension
- Concrete to abstract
- Overcome trauma by desensitisation

Other comments and suggestions to fully realise the potential of PUP included:

- Sophisticated technology

- Tool bank
- Children could be the new generation of game designers
- Perspective taking, strangeness of bodily experiences
- Dramatic play
- Seeing self through own eyes
- Retelling stories
- Create own narrative
- Understand narrative meaning
- Play, discover small and large worlds
- Leave day to day reasoning
- Symbolic play
- Therapeutic work
- Services, workshops, add ons
- Can be used by creative practitioner, arts teacher
- Framework to explore own ideas
- Develop creative communication

LW demonstrated the usability of lights, puppets, sounds, images etc. The team then discussed:

- The use of text v images
- Drop down menus
- Dynamic screens
- Advanced and basic modes of operation
- Android v iPad
- New app design, developing, costing
- Using PUP fonts and colours

Thinking about the next steps – long and short term

Long term

The team discussed several strategies for:

- Delivering the product (open and free sourcing)
- Developing the business model (broader range of activities)
- Legacy (community of users)

All attendees agreed that the product in its final form (March 2015) should be released with accompanying research to demonstrate:

- What we have done
- Where we have got to
- How PUP can be used
- Some examples of potential uses and best practice
- That PUP can live on through a user community

Short term

The Think Tank discussed at length proposals for researching with the following partners:

a) Three Ways School
b) Mellor School
c) Embrace
d) Freelance experimenters and bloggers

Ben Edwards suggested that Three Ways continue as a research partner with the following considerations:

- COGS may not be an appropriate measure
- Three Ways is a different landscape
- A different way of framing practice, progress and outcomes needs to be adopted
- Lucy as practitioner

Questions were raised over the definition of a “learning check system”. KH suggested that Mellor also continue as a research partner and spoke about ways in which COGS could be incorporated into a “challenge, create, and present” series of workshops using the stage 2 COGS learning check system.

Embrace were also highlighted as a potential partner to explore inclusive practice with arts based practitioners.

The Think Tank discussed the merits of all proposals and came to the conclusion that:

- Two case studies were possible in the time frame
- That the case studies should be aligned with the arts
- That the focus remains on discovering a deeper understanding of what best practice looks like

Agreed actions

Action 1: It was agreed that LW will make amendments to GUI as recommended including the use of tabs, drop down menus, continuing with a solid and simple useable app with the intention of developing a more bespoke app in future with dynamic screens and images.

Action 2: Three Ways and Embrace as research partners in WP7. AAS to co-ordinate. The notion of the “learning check system” is to be re-visited.

Action 3: BE, LH, LW, LM to meet to discuss the above and formulate a plan of action for a series of PUP sessions. LH to be given up to date briefing and training of new elements of PUP system and recent digital creative practitioner insights.

Action 4: CV and LM to meet to discuss research proposals.

Evaluating and Amending the Methodology

Data collection

In terms of data methods, the system of collecting multiple perspectives via video film, still photographs, and voice recordings seems to be working very well. The level of data captured is extensive and extremely rich in nature which provides a fulfilling and fruitful research experience and subsequent detailed reporting of findings.

The vast majority of data is qualitative in nature. A simple questionnaire with a Likert Scale measurement tool could provide an additional strand of quantitative figures if appropriate.

Data analysis

The system of inductive and deductive analysis appears to be working well proving a useful system for refining and re-working frameworks and taxonomies. Triangulation via multiple methods and researcher-to-researcher validation and team verification is also continuing to work well.

If required simple quantitative analysis can continue to be conducted using Excel, this includes percentages of time and frequency of roles.

Data presentation

The use of graphs, mapping, and models is working well to disseminate findings, and feedback from partners and delegates at Symposium One was positive. The still photographs also generated a lot of interest and were a helpful visual aid to explain concepts.

Frameworks

To date the frameworks used for cross referencing and validation of data are: learning communication (COGS) and embodiment cognition. Several conversations have taken place to further discuss the framing and defining of an appropriate ‘learning check system’ including left and right brain thinking.

The left brain: logical, analytical, and objective

The left-side of the brain is considered to be adept at tasks that involve logic, language and analytical thinking. The left-brain is often described as being better at:

- Language
- Logic
- Critical thinking
- Numbers
- Reasoning

The right brain: intuitive, thoughtful, and subjective

According to the left-brain, right-brain dominance theory, the right side of the brain is best at expressive and creative tasks. Some of the abilities that are popularly associated with the right side of the brain include:

- Recognizing faces
- Expressing emotions
- Music
- Reading emotions
- Colour
- Images
- Intuition
- Creativity

The learning check system

The learning check system debate consisted of questioning if PUP's focus was aligned with "COGS" type activity as described above (left hand), moving beyond the generation and adoption of ideas towards a more objective discussion of ideas as we noted which may or may not occur in activities which involve some kind of documentation and meta-cognitive reflection.

Refer – compare ideas

Recount – explain ideas – why? how?

Report – introduce, describe, discuss ideas

Alternatively should the learning check system be aligned with creative thinking (right hand) – image, emotion, and expression? Or something else which is particular to each setting and organisation, e.g. their own way of documenting data and interrogating impact, results, and success?

Our partners at Three Ways School Bath expressed an interest in using PUP to explore the potential benefits of raising levels of attainment in speaking and listening skills. In order to accomplish this task Ben Edwards (school PUP practitioner) suggested that we use the 'bsquared' measure as a cross reference tool.

Overall Three Ways aims in using PUP focus on their work on speaking and listening opportunities interwoven with some therapeutic approaches being trailed as part of their move towards supporting pupils with gaps in their emotional development over time.

Embrace Arts will confirm their focus on 19/11/2014 when meeting with the PUP team.

Potential "end users"

Dr Vear suggested that in order to define the creativity framework the team must understand the range of end users. Table 12 documents a potential list of prototypes in order to help understand a range of practitioner needs. The list has been constructed in order to demonstrate skills and outlooks in the following areas:

- Practice based experience of theatre / dramatic / creative arts workshop leading
- Openness to digital transformations
- Adopts an existing method for learning engagement

The list is not to be interpreted as "stereotypical" it is an indicative tool to help develop an understanding of a broad range of practice so that the team can effectively address "knowledge gaps" when writing and producing best practice guidance documents.

Potential Prototype	Practice Based Experience	Openness to digital transformations	Adopts an existing method
Creative arts practitioner	Is highly experienced in managing and delivering creative workshops	Is very open to new ideas and digital transformations	Has existing and extensive strategies and methods of good practice
School teacher	Not experienced in delivering creative workshops	Is open to the use of new technology and digital transformations depending on understanding	Is potentially restricted in methods due to Ofsted expectations
Recent drama graduate	Has little experience in delivering and managing creative workshops	Is very open to new technology and digital performance	Has no / few methods to draw on in practice
Additional needs workshop leader	Is highly experienced in managing and delivering workshops for ANL	Is open to the use of new technology and digital transformations	Adopts and uses exemplary methods of managing dynamics
Librarian	Has little experience running creative workshops	Could potentially be technophobic, or sceptical of unknown digital territory	May have narrow methods of assessment

Table 12: Potential Prototypes of End Users

WP7 Design: Research and Data Collection Activities

Objectives

In addition to our partner's aims, the following objectives were set by Dr Craig Vear:

Research

- R1 – Refine / validate practitioner roles
- R2 – Refine / validate participant typology and taxonomy
- R3 – Define learning check system (left hand brain … refer? relate? refine? etc?)

Technical

- T1 – Windows transfer – debug in wild – lock down development
- T2 – Output recording solution
- T3 – Develop media instructions

Practice

- P1 – Bank of best practice, variety of situations
- P2 – SEN specific best practice

Research questions

Five research questions (RQ) were subsequently formulated as follows in Table 13:

RQ	Exploring and Examining	Outcome
1	How do participants engage in mixed reality *Pop Up Play*?	**= typology of roles**
2	How deeply do participants immerse in mixed reality roles?	**= taxonomy of roles**
3	How does the practitioner in-action see this taxonomy manifest?	**= appropriate dimensional hierarchy**
4	What does the practitioner do to facilitate the learning / play experience?	**= best practice digital pedagogy**
5	What is the experience of mixed reality *Pop Up Play* from a child's perspective?	**= audience engagement and authentic evaluations**

Table 13: WP7 Research Questions

Participants

In this final phase of workshop testing, the PUP team is working with: Three Ways School, Bath, and Embrace Arts, Leicester.

In Three Ways one whole class is participating in the project.

The class is comprised of a group of 13 children, and it is a mixed MLD (moderate learning difficulties) group who are cognitively quite able and are also motivated to engage with tech. The group are the Dormice, and Alison is their class teacher. Ben Edwards will take a lead on session delivery.

The sessions will run with smaller groups of 7 and 6 children per group. This will split the class up with the rationale to be able to really focus in on progress made and to maximise the potential for roles to emerge both in session and over time.

Embrace will confirm participants on 19/11/2014 at a scheduled PDD (professional development day).

Process

Three Ways School have kindly committed to a 6 week run of PUP workshops which will take place each Thursday. The workshops will be running from 6/11/2014 to 11/12/2014[28].

The sessions will run from 1:30-to-2:30 pm.

During the sessions data will be collected by the following methods:

- Naturalistic observations
- Video – mobile and fixed
- Still photographs – iPad and camera

Post session data will be documented as follows:

- Reflective discussions – voice recorded

Time will be allocated for discussion with the children, either in between changing over the groups (in the middle section) or at the end. Discussions will centre around the images captured on the iPad. In addition children will be given the opportunity to take part in documenting their experiences by drawing.

The PUP team will also de-brief with the school practitioner team after each session.

Embrace Arts have kindly committed to an intensive programme of workshops which will run over a three day period. The workshops have been scheduled to take place on the 3rd, 4th, and 5th of December.

[28] LW to collect data 3/12/2014 as LM in Leicester collecting data.

It is envisaged that data collection activities at Embrace will take the same format and process as Three Ways.

Analytical tools and frameworks

In Three Ways speaking and listening progress will be measured using the 'bsquared' levels for each individual child's levels of attainment. This will feed into RQ1: How do participants engage in mixed reality *Pop Up Play*?

Embrace Arts will confirm if they wish to use any existing frameworks at the PDD on 19/11/2014.

With regard to exploring RQs 1-to-5 the following document was drafted by Adel Al-Salloum and Dr Craig Vear.

Notes on Creative Practice – October 2014

The principles of play within the *Pop Up Play* system

The Creative Facilitator assumers a number of different roles:

Demonstrator:

- Introducing the technology
- Offering guidance
- Introducing rules and/or a goal

Facilitator:

- Mediates between children and or technology provider
- Technology controller
- Makes it possible - provides alternatives including props and materials
- Inspires or Instructs a shift in the dynamics in the setting

Co-constructor:

- Play maker as puppeteer
- Sounds and small world toys
- Changes the appearance (alphas)
- Meaning maker – asks questions poses problems presents challenges
- Shifting engagement

Drawing on 'Gaming' theory the facilitator uses:

- GOALS – the specific outcome players will work to achieve
- RULES – placing limitations on how players can achieve goals

- VOLUNTARY PARTICIPATION – everyone who is playing the game and willingly accepts the goal, rules and the feedback
- FEEDBACK **–** tells the players how close they are to achieving the goal

Sustained feedback and responses from the system, their peers and the creative practitioner is critical for richer engagement and communication and deeper immersion.

Considering these facilitation strategies within the different **dimensions** of play:

- **Kinesthetic** - all modes of avatar/media CONTROL e.g. the foreground image, the background, the alphas
- **Spatial** - spatial control, navigation, how the process is internalized and perceived and then represented in the mixed reality
- **Shared** - player awareness, relationships and interaction with other agents (human, embodied avatar, background texture)
- **Narrative** - engagement with the stories that have been written into the game and those that emerge from the player's interaction
- **Affective** - emotional engagement and development, understanding and rationalizing
- **Ludic** - engagement with the choices that are in the game – the game design and mechanics AND their perceptions

Observations on Extended Play

Play is both *active* and *spec-active*:

> **Active Play** - Micro the broader motivations that attract players to games to the moment-to-moment engagement of game-play.
>
> **Spec-Active** - Macro - the factors that shape the player's opinion and disposition toward the game that derive from thoughts, plans, feelings, and expectations both prior to and following the game experience.

In facilitating play a single shift in a single reality introduced quick paced transformations. Each of these *shifts* are designed to introduce a major shift in the *play-game* or *game-play*, and were a combination of small additions to game rules or major implication by changing a backdrop- and therefore the whole "world".

Illustrating a route through the process of extended play would be cyclical, shifting one of the following every 2-4 minutes.

- narrative
- game rules/ aims
- micro : macro priority of focus
- background/ alpha images
- operator

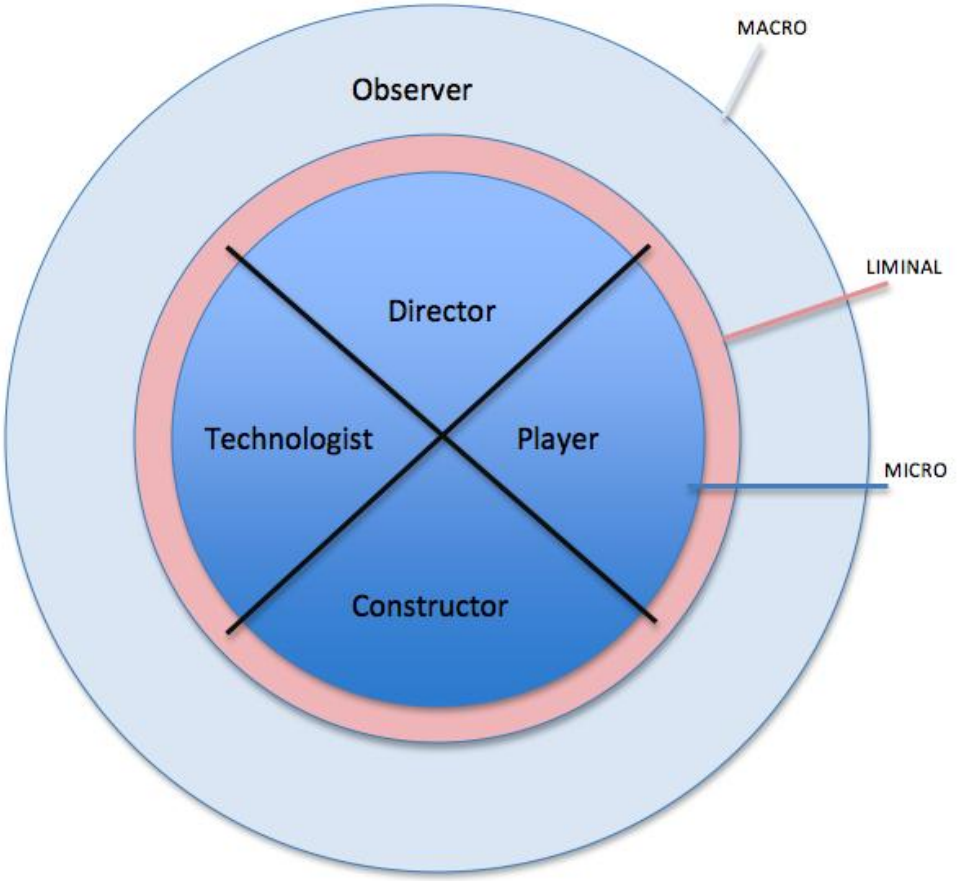
The iterative process of moving from moment to moment creating visual momentum and spectacle satisfies and engages the player in extended play. Each shift presents a meaningful next question or situation, and enables improvisation with the *in the moment play*. The facilitator uses all of the realities and all the dimensions to work with.

The role of the participant – GAME MAKER

- **Facilitator** - s/he is the master code. The author embedded in the code manifested in real time. The *Game* as human. The overarching design, ludic, play, story, action, imagination trajectory puppet master.
- **Technologists** - taking control of the technology; the iPad and or web cam operators, they choose what we see and how we see it in the screen. They learn by exploring. They pass expertise on through peer to peer learning and shoulder watching. They 1) imitate, then 2) master obstacles, and then 3) create freely.
- **Constructors** - these are our game designers. They create worlds, and obstacles. Using 3D toys and 2D drawings, they operate as a team some with pens, others with cameras. They offer suggestions and solutions to some of the problems. Together they develop deeper ideas through collaborative endeavours.
- **Players** - actively playing within the screen: our Lara Croft, our image of self, our mirrored me, our avatar, the digital puppet. They need rules and feedback from the facilitator and directors, constructors (the 4 defining traits of a game – goal, rules, feedback, and voluptuary participation). Through the trajectory of these 4 they develop deeper embodiment from mirror, surrogate to hyper. They are 'inside' the core of the game dimension that is set up by us all, and need the most help.
- **Directors** - There is a pecking order of participant, helper, co-author and director. This needs to be kept fluid and continuously refreshed with ripe coders from the observers and players. Technologists and constructors also contribute but from their own perspective.
- **Observers** - our quiet saviours, they plot and think; they form macro communities of embodied engagement; they manifest the new ideas and are a vital source of refreshment for our facilitator. They start quiet, then they plot with neighbours, they

start to become distant directors. WATCH THESE! They are vital mutations in the code.

Participant role inter-relationships



Considerations across the next phase of Case Studies:

To involve the students as '**game makers'** not gamers testing and validating the roles

To question:

a. Do the sessions need to be free play? How does this support learning outcomes?
b. Can communications be defined across these multi-dimensional roles as:
    - **Generation:** exploring possibilities; producing ideas
    - **Adoption:** using other worlds, actions, ideas; making links
    - **Discussion:** cross-comparing; explaining and rationalising; challenging
c. What other possibilities are there for seeing/ checking/ understanding learning within these multi-dimension roles and inter-relationships?

Adel Al-Salloum, Dr Craig Vear October 2014

Appendices

Appendix 1: Planning for the session at the The Brite Centre Library

6 children aged 8 – 10 years, with one sibling aged 6

- Welcome
- Introduction to everyone outside of the room, explain roles and responsibilities
- No right or wrong – accept and build - experiment with all ideas
- Appoint children as experts
- Enter the room

Free play

- Exploring, dancing, being a fish, Medusa snake head? Just as we did on the Development day, as an initial quick introduction to the technology

First responses – ideas

Try out ideas

Avoid being eaten

- One child on camera with clothes peg creatures
- One child on screen swimming away from the creature
- One child on iPad supporting screen child to not get eaten
- Spectactors can SWAP after 1 min

Introduce the Mythical Maze

- Maze on screen
- One child's image on screen, One on iPad, One directing/navigating
- 3 Spectator children solving the maze as a team
- Timed
- Spectactors can stop the action after 3 minutes and swap at that place in the maze

Reflections

Monster screen puppet

- Character based exploration of Girl G's 'Shut up. Be quiet' Monster
- Manipulation of puppet on screen
- Spectactors asking character questions (hot seating)
- Explore a 'day in the life of' narrative
- One Narrator
- One iPad operator
- One on camera creating different landscapes

Toy friends and plasticine pals

- Monster character above encounters different characters
- Narrator 'day in a life of' which monster manipulator responds to
- Monster has two sides to its personality? Naughty and Nice (Jekyll and Hyde)

Where's Wally

- One child exits room while other children work as a team to hide themselves amongst the crowd in the screen (if multiples can be made small via the iPad)
- Child re-enters and has one minute to find everyone on the screen
- Screen kids challenge is to stay still but can move if they want to give the guesser a clue
- Timed
- This can be introduced via Monster puppet first

Additional ideas

- Wordplay
- Two children spell out words on camera, with a gap for a missing letter
- Three on screen, make the missing letter with their bodies, as a team

Thoughts and Suggestions

End

Three Ways School and Embrace Arts Testing

Contents

15. Aims and Objectives

De Montfort University, together with The Spark Arts for Children and Dotlib Ltd has created an immersive learning environment for children using a mixed reality system. This has enabled an investigation into how augmented and virtual reality can be used as a tool to engage young minds in creative play within immersive technology. The system has been named *Pop Up Play* (PUP).

In the first phase of testing PUP "worlds" the project used images relating to children's literature (War Horse and Alice in Wonderland); children also created their own worlds with images and artefacts and explored environments using shoe boxes and paper play (the city, underwater, space, and tea parties). Video cameras and motion-tracking placed participants and their avatars into these projected worlds for creative play and open-ended learning.

Managed workshop activities helped build the team's understanding of the creative-cognition framework which is based on Creative Opportunity Group Scheme (COGS)[29] theory and embodiment-cognition. Both theoretical frameworks were revised and refined during the initial testing phase and pre and post-test data revealed the potentiality of increased communication and the positive effects on co-operative and collaborative behaviours along with increased emotional resilience through working with PUP. In addition, the role of the creative practitioner was found to be crucial in engaging and encouraging explorations of narrative self and sustaining play through interactive and immersive gaming techniques.

In the second phase of testing the team worked in partnership with colleagues at the Brite Centre Library, Leicester and New Walk Museum and Art Gallery, Leicester. Arts practitioners were briefed on managing the dynamics of the setting through rotating facilitation approximately every three minutes and were informed that the most successful sessions were found to incorporate demonstrating, co-constructing, and meaning making. The focus of the second phase of testing was to hone in on the types of roles manifest when engaging in PUP and closely examine how participants adopted these roles by tracking their behaviours and movements throughout the sessions.

In this third phase of testing *Pop Up Play* in 2014 the research team focused on exploring more deeply the types of roles manifest, the dynamics of the session, facilitation, and children's perspectives. 5 main research questions were formulated; see Table 14 on the following page.

[29] Sage, R. (2000). COGS: Communication Opportunity Group Scheme. University of Leicester.

RQ	Exploring and Examining	Outcome
1	How do participants engage in mixed reality *Pop Up Play*?	**= typology of roles**
2	How deeply do participants immerse in mixed reality roles?	**= taxonomy of roles**
3	How does the practitioner in-action see this taxonomy manifest?	**= appropriate dimensional hierarchy**
4	What does the practitioner do to facilitate the learning / play experience?	**= best practice digital pedagogy**
5	What is the experience of mixed reality *Pop Up Play* from a child's perspective?	**= audience engagement and authentic evaluations**

Table 14: WP7 Research Questions

16. Methodology

Research Design

The overall research design incorporates action-research methods from two different perspectives: in-vitro (outside looking in) and in-vivo (inside looking out). These methods have been chosen in order to gain knowledge through action, and are concerned with the nature of the action as a thread of investigation leading to new knowledge that has operational significance for the field. As such, this method will test the *Pop Up Play* system and the creative-cognition framework, whilst testing the transformational affect upon its users.

Sample

The sample for this phase of testing consisted of two partners: Three Ways School, Bath (already established as a research partner in PUP) and Embrace Arts, Leicester. As a new partner Embrace Arts is briefly introduced below.

Embrace Arts[30] is the University of Leicester's multi-use inclusive arts centre, with a history of promotion and encouragement of engagement in the arts by people with disabilities. Open to all, its award-winning building houses a 120-seater performance area, three studios, and an exhibition gallery. It has a diverse programme of

[30]http://www2.le.ac.uk/hosted/embracearts/about/about-us

performance and learning activity throughout the year, covering a wide range of art forms, primarily classical music, jazz, dance, comedy, theatre, live art, children's theatre, spoken word and visual arts. It is located 10 minutes' walk from the city centre on Lancaster Road, at the edge of the main University of Leicester campus.

Participants

One whole class of children with mixed MLD learning difficulties participated at Three Ways School, Bath. Thirteen children in total participated. Ben took the lead and decided to reduce the group size to seven and six children per group. By splitting the class up it was anticipated that we could really focus in on progress made and maximise the potential for roles to emerge both in session and over time.

Eight children in total (boys and girls) of mixed ages participated in the Embrace workshops. All of the children are all home educated.

Ben Edwards, Assistant Head Teacher, Primary Manager and experienced creative practitioner led the workshops in Three Ways School supported by Luke, a creative technologist from Dotlib Ltd. Marianne Pape, Education and Outreach Officer led the workshops at Embrace Arts supported by Asha Blatherwick, a creative technologist from Dotlib Ltd.

Ethics

Ethics were negotiated between all parties and agreed with the University of De Montfort Research Committee and adhere to the *Ethical Guidelines for Educational Researchers* (BERA, 2011)[31]. The procedures included issuing a plain language statement and written parental consent form to all participants informing them of the aims and anticipated outcomes of the research. The right to abstain or withdraw from the project at any time was upheld. Both raw and analysed data material was participant anonymised and stored in a secure project-specific data system.

[31] http://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011

17. Process

The Workshop Sessions

Six weekly sessions took place at Three Ways School, Bath. Sessions were planned in advance by Ben. Two workshops took place on each day, Group 1 and Group 2 (class split) and lasted for approximately 45 to 60 minutes each.

Pop Up Play had a three day residency at Embrace Arts, Leicester. Children were actively engaged for the full three days from 9 am to 3 pm each day.

After each workshop (or day) pupils were given the opportunity to feedback their thoughts and feelings to the team. This was arranged as 'circle time' discussion groups. Discussions at Three Ways were informal and did not follow a set format, whereas the Embrace participants were asked the same questions each day about their enjoyment, the technology and the roles.

All feedback was documented via voice recorder. When the children had left the workshop, the *Pop Up Play* team and practitioners had a session de-brief which was also recorded.

Data Collection Methods

Data was collected by the following methods:

- Live play naturalistic observations.
- Video film footage: Capturing action and narrative (two cameras). Camera one was directed at the group of participants (in action players and side-line observers). Camera two was directed at the screen.
- Pupil and practitioner feedback.
- Still photographs.
- Parental questionnaires (Three Ways School, Bath).

Data Analysis Procedure

In phase two of testing, during live play Dr Craig Vear inductively conducted naturalistic observations which generated a potential taxonomy of roles. Post session Dr Linda McConnon worked both deductively and inductively with the recorded video data searching for direct evidence of Dr Vear's taxonomy and any other anomalies. The same coding of roles and relationship analysis was applied to this phase of testing at Three Ways School, Bath.

The nurturing and supporting role of the facilitator was examined by thematic analysis. At Three Ways each weekly session was explored for new emergent pedagogical features.

Participant feedback was also transcribed and analysed for themes (Three Ways and Embrace Arts).

Participant and practitioner feedback, along with still photographs and parental questionnaires complemented the other data sets and were used to disseminate findings and inform discussions at *Pop Up Play* Symposium Two (February, 2015).

Rigour

The project team sought to maintain quality and trustworthiness in terms of credibility and dependability by triangulating findings working both inductively and deductively. The team upheld protocols and procedures making each stage of the project transparent by sharing insights and findings which were validated or indeed challenged by other team members.

18. Three Ways

PUP Week 1 Three Ways 06/11/2014

RQ1: How do participants engage in mixed reality *Pop Up Play*?

Group 1

As soon as the screen is switched on a beach scene appears, pupils run forward and start jumping around and pulling faces.

Some are fascinated by seeing themselves and move carefully around the space looking at themselves from different angles and perspectives, both up close and far away. In particular (K) boy.

Two boys start play fighting and become so absorbed in this they do not look at the screen at all.

The girl in the group starts to join in the pushing and then turned this into a hula dance. “I’m in Hawaii” she says. “Have you seen my dolphin dive?” one boy says as he skids along the floor on his belly.

When the scene changes to the deck of the ship all the children run forward again and start acting as if they were pirates, pretending they have swords and fighting.

In amongst the children fighting, one boy (K) stands close to the visualizer, only his torso is visible on screen, he stands still taking in the mirror image of his body. Other children move him out of the way so that they can see themselves as his image takes up most of the screen.

When K boy and K girl go up she points to a ship and says “I can see another ship” but he says “you are in the way” because all he wants to do is see himself. “I’m a giant” he says as he moves forward and his image takes over the entire screen.

When a beard appears on screen K girl touches it with her finger on screen as if you would a white board. When the beard moves around, she tries to position herself so that it looks like she has a beard on her face. She does the same when a hat appears and tries to move so that it is on her head.

Boy N played in screen with his teaching support assistant. He took an egg timer which and said “I’m going to place it on the deck.” He bent down and placed the object on the floor, but it could not be seen on screen as it was too low. N realised this and did it several times looking for the same result. Several children shout out ideas and N played them out.

Two boys R and J get up they start play fighting again and do not look at what is happening on the screen at all even when a rat appears and starts running all over them they do not notice. Someone from the side shouts “there’s a mouse” and the boys start to kick it.

Luke makes the boys fly across to another ship. They appear much smaller and start dancing around. All the other children jump up to enjoy being smaller.

K girl says “make me fall into the sea.”

K boy stands in front of the screen again.

Children get dressed in pirate clothes and Luke changes the screen to a dessert island and places a treasure chest on it. K boy approaches the screen and Luke

makes the chest move along the beach, K tries to interact with the chest by scratching his fingers on the screen, following it with his hands and fingers as it moves.

In their pirate clothes children start to play fight. They are encouraged to sit down on the beach (Skull Island). K boy looks at the screen, he takes a deep breath and moves his body forward, he realises he head disappears under water.

K keeps running up to the screen and grabbing people sat on the beach.

Ben tells the story of burying the treasure and finding a skeleton on the beach.

Luke brings the skeleton to life and Ben demonstrates how it works.

K boy goes up to play with the skeleton, he appears next to it. He starts moving his arms, swaying from left to right, and then he runs at the screen. He splats the skeleton and it freezes. He does this time and time again. Session plenary.

Group 2

Boy M and Girl K are invited to go in the screen, a beach appears. Both children start moving back and forth, pulling faces, disappearing off screen left and right.

Boys B and H go in next, H uses a frame to move around, he looks at himself as he does this. B jumps up and down and enjoys putting his back to the screen and looking over his shoulder. B shouts “enguard” and holds up a pretend sword.

Boys J and C are next, they run forward and like all the others they start jumping up and down. Luke changes the scene to the ship and both boys shout “I’m on the ship!” “Enguard” is yelled again and the boys start shouting at each other “get off my ship!” “no you get off my ship!”

J looks at the screen with care; he holds out his arm and points his finger away from the screen so that it looks like it is pointing straight at the other ship. He says “the ship over there is yours!” The ship fight continues.

Luke sends the boys over to the other ship, as he moves them across, everyone makes an “ooo” noise.

“Send me back to my ship” says J. (I think he was hoping C would stay on the other ship).

Luke changes the scene to the island and Miss C (TA) and girl L Get up to play. They pretend to swim in the sea by moving their arms and splash by stamping their feet.

Miss C pretends to dig in the sand and a treasure chest appears. Both players pretend to fight over the treasure chest by pulling it and Luke moves it in between them both.

Boy M takes the player position and Luke makes the skeleton alpha appear alongside him. M moves his body to control the skeleton. A girl screams. M moves off screen and the skeleton freezes.

Boy B takes the player and some other children ask “can I have a turn?” B dances around and waves.

Girl K takes the player position. She moves like an Egyptian doing a sand dance, she then does the splits. K steps back off screen and she disappears but the skeleton stays in situ a freezes. K asks the observers “which way shall I do it?”

Boy C has a go next. He plays with perspective moving very close to the screen, making the skeleton really large.

Boy H is chosen next. “What is that skeleton doing?” he says, he notices that the skeleton is moving, but he is not moving his legs.

Girl L is next, she does the splits and moves around on her hands and knees watching how the skeleton reacts. She raises her arms and jumps around.

Boy J is last up. He moves off camera noticing that the skeleton freezes at certain points. He also moves really close noticing the skeleton becomes bunched up and pixelated. “It’s broken” he says.

Ben tells the story of losing his treasure and asks his crew how they would feel if this happened to them. Children come out with words such as angry, sad, and disappointed.

Luke changes the screen to underwater, the children move around looking for treasure and a treasure chest appeared. Plenary.

Mirroring, perspective taking, reaction to action and repeating were key embodiment features.

Generating and adopting ideas were key COGS features.

Role Evidenced	Participant	Example
Master Coder (Game Maker)	K (boy) R (boy) K (boy)	When embodied as the skeleton K kept running up to screen until he splatted the skeleton with his body and it froze. He did this several times over checking the same result happened each time. R kicks the rat each time it appears. K tries grabbing objects.
Constructor	-	-
Observer	All K girl Boy Girl Boy	Side-line seats watching live in-action play. “You look like a cat!” “He’s got a beard” “You are swimming in the sea” “the skeleton is your best friend”
Distant Director	K boy Boy Boy	“Can you disappear?” “make it extra extra extra funny” “lie down”
Player	All	All children took turns to play either alone or in pairs. Who played and when they played was managed by the practitioner (Ben). At times some children found it difficult to resist jumping up and into the screen when it wasn’t their go, particularly if there was a change of scene or something new and exciting was happening. N (boy) acted out other’s ideas. K (girl) was the only one to ask the observers what she should do next.

Play Director	All	Free play was manifest most frequently. Children acted out their own internalised play ideas.
Technologist	-	-
Technologist Observer	-	-

Table 15: Mixed Reality Roles Week 1

RQ2: How deeply do participants immerse in mixed reality roles?

In these two sessions the roles of constructor and technologist/technologist observer were not evidenced as they were not facilitated. The team discussed the possibility of allowing for these roles to manifest in the following weeks.

In terms of a hierarchy the following is proposed:

Player

Game Maker or (Master Coder)

Play Director

All are closely aligned.

For these children Player (being in the screen) involved active and imaginative live play. Players could either play out their own ideas or take on board and adopt ideas from the side-line observers.

Being a game maker involved making the rules of play which were not spoken such as splatting the skeleton, bashing or kicking the rat etc.

A Play Director was more likely to initiate and act out and bring to life their own internalised ideas to life in live play rather than that of the observers.

Observer

Distant Director

These roles are closely aligned.

Both roles included side-line seats watching and observing live in-action play. Comments like: “You look like a cat!” and “He’s got a beard” were merely

observations. Whereas “Can you disappear?” and “Make it extra extra extra funny” and “Lie down” were direct instructions, i.e. being a distant director to the players.

RQ3: How does the practitioner in-action see this taxonomy manifest?

> ***“I love giving them the opportunity to work those roles out that is the most powerful vehicle for helping them to learn about developing power and identity. For some children they are not at the power and identity stage, they are still at the being stage in terms of learning about their impact on their immediate surroundings. They need it to be modelled for them.”***
>
> ***“Some children would quite happily be the director for the entire project (B and M) some would happily sit back and let that happen (J).***
>
> ***Ben Edwards***

Further reflective discussion planned 13/11/2014

RQ4: What does the practitioner do to facilitate the learning/play experience?

Feature or Stance Adopted	Facilitation	Impact
Smaller groups	The aim was to work on sustained focus and attention, engagement and turn taking. To see how pairs of children respond to it. Managing dynamics was key to both sessions.	*“J has some underdeveloped play skills, he is quite egocentric, he can play side by side, but not in a reciprocal way, and to see him interacting with C was really exciting.”* Ben
Acting in role (Captain Woodworm)	Dressing up as a pirate, collecting the children from class in character with an oil lamp. Singing pirate songs. Using pirate language and character voice.	All children bought into the concept and understood the theme of pirates. Children were able to make connections with the knowledge bank they have of the theme. They joined in with the singing and using pirate voices.

Contract signing (real world)	Children were asked to sign a pirate contract with a quill and ink. Captain Woodworm welcomed the children aboard. He promised to keep them safe and signed his own name.	There was an atmosphere of a shared working experience and being comrades together. Children became prepared to work collaboratively, and were give the cue they were ready to get started.
Introduce people and materials	Ben explained who was in the room. Explained taking turns with speaking and listening. How to get attention by using thumbs up. That they were going to us the computer to look at pictures and find new ways of working with the computer. Make some good ideas and have a think about what was liked and what they had done so that they could share their thoughts with their friends.	Children were able to feel calm and supported. Any "unsafe" anxieties due to seeing PUP for the first time were alleviated. *"I don't think anyone was fearful today. I think every child left here today thinking that they succeeded. I think they learned about the system and their relationship with it."* Ben
Free play exploration (digital)	Also see Ben's comment below. A lot of the children enjoyed mirroring. Attaching objects seemed to be a problem. Some, but not all enjoyed the skeleton alpha puppet. Standing back, allowing time and space was a key feature. Stepping forward happened when: children needed to be reminded about their behaviour, the dynamics and roles needed changing. Ben also told stories to introduce concepts such as the dancing skeleton and modelled and demonstrated how it worked.	*"To see children with emotional blocks moving and exploring freely in a space in front of all their peers, and in an unfamiliar environment, with unfamiliar adults is great."* *"The children were a bit hyperkinetic this week. As the weeks go on and they will become more settled that may offer more opportunity for attaching objects to them."* Ben

Free play exploration (real world)	*"I Didn't have anything in mind apart from rough structure and an outline, I was interested and looking forward to seeing how the children responded imaginatively in a different environment."* Ben Children dressed up as pirates.	*"There was too much distraction - props they were holding, clothes they were wearing."* *"If we are looking to do child led storytelling, we need to strip back props, perhaps the focus should be the technology."* Ben
Reflective discussion	Children were given the opportunity to speak freely and express their views of PUP. Digital photos were taken on the iPad but these were not used during the sessions as time was tight. In live play questions were asked to prompt conversation such as: where do you think you have found yourselves shipmates? What can you see?	Children tended to recall the last thing they did. Discussion throughout the session was not evidenced. *"There is the potential for developing imaginative play, developing language, speaking and listening activities, storytelling narratives."* Ben
Consistency	Elements to remain each week are: Being in character. Collecting children from class. Reference to the contract. Keep singing at start, singing at end. Keep consistent objects of reference, i.e. lamp.	*"Historically these types of things have worked really well in allowing children to feel safe, and it gives them cues as to what is happening."* Ben

Table 16: Creative Practitioner Facilitation Week 1

Team points of reflection

Other benefits and potential impact

- Exploring perspectives. Splatting skeleton. Not seen that before.
- In terms of playing more imaginatively, this will be a great tool for developing that.

- The visual kind of brings the inside to the outside; it helps make it a shared experience.
- The children loved it, anything that gets kids moving, anything that gets kids talking, and inspires fresh ideas and imaginative play is a worthwhile activity in school.
- Motivate. If it's instant brilliant.
- Not just a creative arts tool, but also addressing speech and language needs.
- I think anything that gets children excited enough to get up and have a go is a good thing.
- It focuses them in.
- Usually a group activity would last 20 minutes. This went well beyond that.
- Investigations into multisensory learning.

Transformations of practice

- Change practice to address language needs but also to explore capabilities of the system.
- Burst and Pause. Burst stuff is the technology. The pause stuff is regrouping for focus and discussion etc.
- Structuring the roles. There may be a case for looking what the children's needs are then assigning roles that way.
- For the next session I will have all their speaking and listening targets and will be using them to address specific issues.
- Thinking about having a consistent narrative that we add to each week…what happens next?
- Create a tented area, split into groups, make a storyboard, the others act it out.
- Children playing with the iPad, we could consider that.
- Come up with a story, 6 slides, making own pictures.

RQ5: What is the experience of mixed reality *Pop Up Play* from a child's perspective?

All of the children said that they had enjoyed the sessions. Some described it as "cool!" The skeleton alpha featured strongly in the discussions, both by the children who had played with/or as the skeleton, and those who had been observers:

"The skeleton, I wanted to dance with the skeleton."

"I kept on slamming the skeleton."

"My favourite bit was with the skeleton, it was really fun."

"Skeleton!"

Other children spoke about the physical and social nature of their play.

"My favourite bit was sliding through the floor, watching myself do it."

"Playing in the room with R."

The children spoke about location and the associated pirate themes they enjoyed which held an element of excitement, skill and gaming.

"Skull Island!"

"I liked looking for treasure."

"Finding the treasure under the sea!"

"The treasure and the skeleton."

The children also projected themselves into future PUP sessions by voicing their wishes and desires which most interestingly held elements of mixing realities.

"I want to do buried treasure chest around the thing, get lots and lots of chocolate coins and share it with all the poor people."

"I would like to dress up like this and play on the pirate ship."

"I would like to bring a picture and put it on the computer."

"I want to go on the pirate ship outside."

Children's Voices

PUP Week 2 Three Ways 13/11/2014

RQ1: How do participants engage in mixed reality *Pop Up Play*?

Group 1

Children enter to a dockyard scene.

Roll call – Captain Woodworm.

The session outlined. Welcome song, set sail, storms, look for treasure, mangos.

Song.

Sounds playing – seagulls etc.

Children asked to think about how they would be feeling about to get on board the ship. Children given emoticon sheets to aid thinking.

“Excited”

“Happy”

“Embarrassed, them soldiers have guns and things.”

“Surprised”

“Excited”

N goes in the screen he says “I want the dinosaurs to come.” When asked N says he is “happy.” He carries out some repeatable actions from last week, walking back and forth, and placing the egg timer on the floor so that it disappears.

K (boy) stands and looks at himself.

K (girl) gets made really small by Luke as she is embarrassed. He places her towards the top of the ship on a high mast. She waves her arms from side to side and then raises them above her head “make me climb up” she says as she pretends to climb. Luke raises her image to the top of the mast as she does the climbing action.

“Make her jump into the water” shouts a boy from the side.

R takes his turn. “R go for a swim in the sea.” R asks Luke to make him really small. He points to where he wants to be placed in the sea and once there he pretends to start swimming. “A shark!”

The children get into their costumes.

“Are we in the kitchen in the boat?” asks N.

Captain Woodworm builds excitement, he asks Luke to take them to sea. A Moving image of being on deck appears, creaking boards and water sounds are playing.

K (boy) and K (girl) go on deck. KB stands still and looks at himself whilst KG pretends that she is being pushed and moved around by the swell of the sea. KG tries to keep her balance. All of a sudden KB lunges forward splatting his image on the screen. This is what he did last week; he does this several times again.

KG gets a candle from the table, she uses it as a cup and acts as if she is a pirate swigging drink. KG gives KB the egg timer and says “pretend this is a cup and you drink” she taps cheers on his ‘cup’ and says “arrr.” KB stands still.

A hat appears on screen and Luke attaches it to KB, he moves around trying to dodge the hat. From the side-lines ideas are coming for “sea monsters and sharks.”

KG holds out her arm and asks for a parrot. KB tries to touch the parrot.

N enters the screen with his TA. N stands still as Luke attaches different beards to him. N then repeats previous actions by placing the egg timer on the floor so that it disappears.

N goes over to Luke to see what he is doing on the computer and iPad.

All the children sit down on the floor. The Captain sets the scene for a storm, Luke starts the rain. Captain hands out instruments to make rain sounds. Wood blocks, drums, rain shakers.

The waves increase and it gets dark. As the children bang and shake their instruments the noise level increases. K girl, N and B stand up and pretend they are trying to keep their balance.

Abandon ship.

Children are asked to close their eyes and swim for their lives. An underwater scene appears.

N jumps up “a shark is going to eat me!”

“Make him humongous” someone shouts from the side-lines. “A whale shark.”

N walks back and forth disappearing and re-appearing on screen.

K boy enters the screen; he stands still and looks at himself. Luke attaches a fish to his arm and then makes him disappear. K stands still and looks at the screen. He tentatively moves to the right and the fish moves. “That fish is controlling him” says someone from the side. K moves again and so does the fish, he jumps and so does the fish. He stands still again and does not say anything. K looks slightly uncomfortable.

K girl takes a turn, she does a hula dance and sings “under the sea” she turns to her peers and says “it’s from the little mermaid.” Luke makes K disappear. “I don’t want to be ate by a fish” says B.

B and R go up together. Captain asks the other children to think of giving directions. Luke puts the boys in a bubble. R tries to burst the bubble by hitting and kicking it. R pretends to swim away by pushing himself along the floor away from the screen. R and B pretend fight each other.

K (girl) says “when they punch the bubble can you make it burst?”

R starts to hit the fish and says “can you put blood on that?”

The scene changes to the tropical island. “the dancing skeleton” someone shouts from the side. Captain asks the children to think about what they would want to take with them.

N: “telescope”

K: “telescope”

J: “drink”

R: “toilet”

B: “hamster”

Captain models running away from a rat on the screen. He then hands out some mango to smell and taste.

Captain asks Luke to change the screen to find the treasure under the sea.

B puts the eye mask on and Luke hides the treasure chest. He finds the treasure. Luke suggests one of the children K (boy) hides the treasure. Luke shows him how to use the iPad. K (girl) finds the treasure.

Plenary.

Group 2

Children enter to a dockyard scene.

Captain makes promises – sets out what’s happening/can be expected.

Singing song.

Seagull noises – children’s asked to explore senses, what they can see, smell, how they are feeling?

“Seagulls” “I can smell fruit” “I smell some treasure…far far away” “I can hear seagulls” “I can see a big gun, if people are bad I might have to shoot them” “I can see more pirates” “there’s a flag…England” “there’s another boat.”

L takes a turn in screen at Captain’s invite. Captain narrates what he can see; he suggests climbing to the top of the mast. L moves her arms and Luke moves her up the mast.

C and J take a turn. C immediately adopts a role and says “this is my ship” J puts his finger up and says “no this is my ship” “I’m the captain says C, “I’m Doctor Who and I travel through space and time” says J “well I’m Captain Blackbeard and you can’t come on my ship says C folding his arms. Both boys stand and look at their mirror image.

Luke makes a beard appear and the boys move their faces to try the beard on.

“Come on mate let’s get going” says C “arrr” “now you got the beard” says J “I don’t want a beard!”

Luke makes a parrot appear. C holds out a bent arm and J touches the screen, then he holds out his hand. “I’m holding the parrot” says J.

H and K (girl) go on the ship. Luke makes them small and places them on the mast. “Let’s go up” he says to K and K starts jumping around. When asked what they can see from up there, H says “the naughty pirates.”

B and M take a turn and the scene changes to the deck. Other children are getting their costumes on. The boys repeat the behaviours from last week, walking back and forth from side to side. B asks to go in the sea and Luke makes them smaller. Both boys pretend to swim then they start play fighting as if they had swords. Captain joins in and starts swimming.

J says he is going inside the ship, he stands up and walks towards the back of the room, looking at the screen, he sees that he disappears as if he has gone inside the door of the ship.

All the children sit on the floor (deck). The Captain sets the scene for a storm, Luke starts the rain. Captain hands out instruments to make rain sounds. Wood blocks, drums, rain shakers. The waves increase and it gets dark. The children sit and look at themselves.

K opens her mouth as if to catch the rain. “Everyone get inside” says J.

The children bang their instruments excitedly and start shouting. “Abandon ship!” shouts Captain.

Captain starts swimming in the underwater scene. J takes a deep breath as he imagines he is swimming underwater. All the children imagine they are swimming underwater moving their arms.

Captain choses someone to get him a fish as he is feeling peckish. Boy J catches a fish, when asked what the fish is called he replies “I don’t know” over and over again.

K tries to catch a fish she claps her hands. “Look down” shouts B. “Stop moving” she shouts.

The scene changes to the island. C takes a turn he pretends to dig by moving his arms. Captain hands around some tropical fruit (mango) he says it attracts the rats. Luke makes a rat appear.

Children are asked to think what they would take on the island.

B: “a mango to feed the rat like now”

M: “treasure”

J: “I don’t know” “my dog and a cheetah to keep me company and gold”

K: “a dog”

L: “suitcase with clothes”

C: “jewels and treasure and stuff and elephants”

H: “a suitcase with K in it” “a key and lock it tight”

Find the treasure underwater.

J gets the blindfold put on. He finds the treasure. He chose two children, one to hide, one to find.

K hides the treasure. Luke shows her how to use the iPad. H finds the treasure.

J then hides the treasure, Luke shows him how to use the iPad (bigger and smaller) and M finds it. J makes it quite difficult. Everyone helps M find the treasure by shouting hot and cold.

Plenary.

Initial thoughts:

Mirroring, repeating, perspective taking reaction to action were key embodiment features – same as last week.

Generating ideas was much stronger this week, and adopting ideas. Discussion dynamics were evidenced as question and answer, not reciprocal.

Role Evidenced	Participant	Example
Master Coder (Game Maker)	K (boy) R All (but not child initiated)	K lunges forward splatting his image on the screen (repeatable game in-action). He also plays dodge the hat. R tries to burst the bubble by hitting and kicking it. Where's Wally type game hiding treasure to find.
Constructor	All	Music makers. Using instruments to create the sounds of a storm. Dramatic performers? Acting "as if" is this distinct from playing a game?
Observer	All	Side-line seats watching live in-action play. Some are silent, some are verbal saying what they can see (descriptive not directive).
Distant Director	Some	Lots of the children were shouting out ideas for action this week compared to last.
Player	All	All children took turns to play either alone or in pairs. Who played and when they played was managed by the practitioner (Ben).
Play Director	All	Free play was manifest most frequently. Children acted out their own internalised play ideas.
Technologist	J K (girl) K (boy)	Luke shows/coaches the children how to change sizes and move things around. Direct instruction rather than learning through observation.
Technologist Observer	N	N approached Luke at the technology desk to ask about what he could see on the iPad and the computer; he was interested that they had the same display.

Table 17: Mixed Reality Roles Week 2

RQ2: How deeply do participants immerse in mixed reality roles?

In these two sessions all previous roles were evidenced to some degree. However the role of constructor and player needs to be further picked apart.

In terms of a hierarchy:

Player

Game Maker or (Master Coder)

Play Director

All are closely aligned.

For these children Player (being in the screen) involved active and imaginative live play. Players could either play out their own ideas or take on board and adopt ideas from the side-line observers.

Being a game maker involved making the rules of play which were not spoken such as splatting the skeleton (previous week seen again this week as splatting the self), bashing or kicking the rat etc (bubble this week).

A Play Director was more likely to initiate and act out and bring to life their own internalised ideas to life in live play rather than that of the observers (such as climbing the mast).

However this week the children acted out more self-initiated as if roles (being dramatic performers) and also made music through generating sounds. As a team we felt that these roles were aligned with being constructors.

Constructor

Music Maker

Dramatic Performer – needs further unpicking. Is this distinct from playing?

All children were observers in various roles.

Observer silent

Observer vocal – saying what they see (Describer)

Observer vocal - Distant Director

These roles are closely aligned.

All roles included side-line seats watching and observing live in-action play.

Technologist was manifest when the children hid the treasure and only one boy (N) was interested in the workings of the computer and iPad **(Technologist Observer).**

RQ3: How does the practitioner in-action see this taxonomy manifest?

Ben Edwards

- Constructor role, the music making could also be a constructive role.

> ***"It's about bringing an idea into form; arguably the dramatic elements are also constructive as that is about bringing a feeling into movement."***

- There was a lot more acting in role this week, play narratives, i.e. the two boys arguing about who was the captain of the ship.

> ***"That was remarkable for those two youngsters that was exceptional actually in my experiences to date with J and C. they were immediately in role and what that means to me is there is potential for working through drama to reach children. For the best part of the morning C has been out of class, he is sometimes very hard to reach. To see him engage fully in that session and to be relaxed in front of all his peers to play symbolically, both isolated and reciprocally is really significant."***

- Leaving the knowledge space and entering an imaginative space.

> ***"The big difficulty with this type of workshop that we face is that for our children to truly tap into their imagination, this way of working has to be modelled and repeated. We may have to do the same thing over and over, but in a more condensed version so that they have the familiarity and repetition and it's when they become relaxed they can assume those roles."***

- Observer sees (silent), observer sees and reacts (says what sees, describes), observer sees and reacts (directs)

> ***"There was more directing, I did try and model it a little bit, but there was some spontaneous stuff."***

- Hierarchy?

> ***"It seems like you are looking for a value judgment to be placed on a particular role that a child assumes, within some settings that is an appropriate thing to do, but as a school there are so many different learning styles here that what we do is embrace the children's strengths, we will address weaknesses as well, but we will not be looking for the same things from everyone, it's about celebrating the differences."***
>
> ***"It's like there could be a linear model of progression, but for our children they never develop like that. It's always interesting when you try and apply a model to an SEN population."***

- Two camps – the players and the observers.
- Game makers, acting out own ideas, acting out other ideas.
- Where does the actor/performer role fit in?
- Is one role more valuable than the other?

> ***LW "I don't think it matters as long as there is something of each. You might not see any of those roles in some classes."***
>
> ***"For me it comes back to this word – purpose. If the purpose is to just be encouraging free flow play then it doesn't need a director, it just needs people who are comfortable enough, safe and relaxed to explore their own inner dimensions and be self-expressive and responsive to other players. If you are looking for writers then yes you probably do want lots of directors, but for our purpose of speaking and listening, maybe we need a different hierarchy?"***

RQ4: What does the practitioner do to facilitate the learning/play experience?

In addition to last week:

Feature or Stance Adopted	Facilitation	Impact
Verbal communication of generated ideas and feelings	Use emoticon sheet to discuss feelings things to look forward to, fears and hopes. Continued questioning during live play.	J was struggling with verbalising imaginative ideas. His perspective taking is excellent, but he struggled with generating imaginative ideas, a lot of his answers were "I don't know." *"I think he hasn't had enough of his ideas validated. This workshop allows for time and space to explore and return." (Ben)*
Music makers/composers	Children use instruments to create a storm-scape and record their composition to play back.	This was a powerful tool to get all children engaged and active. *"It's about bringing an idea into form; arguably the dramatic elements are also constructive as that is about bringing a feeling into movement." (Ben)*
Game makers	Where's Wally type game to hide treasure for their friends to find.	Enjoyed by all. J especially enjoyed being in charge of the iPad. *"One of his targets is to develop skills of playing with his friends. He is exploring power and identity. It was a nice way in for him to start exploring those types of things." (Ben)*
Taking part – active participant modelling	Having a go, showing how it's done. Talking about what can be seen, what could be the possibilities?	*"There was more directing, I did try and model it a little bit, but there was some spontaneous stuff." (Ben)*

Table 18: Creative Practitioner Facilitation Week 2

Team points of reflection

Interesting aspects

- Boy K and Boy J interested in perspectives.

K stood still watching mirror image, moving slowly, he appeared unnerved when he disappeared and it was just the fish on screen.

Some children said “I don’t want to be eaten by the fish!”

Benefit or impact

- Repeating same as last week.

“This week the children explored more.”

“From a speaking and listening point of view and turn taking, it gave me a really strong structure. The children were really motivated today.” “There are loads of things in the speaking and listening targets that have come up today.” (Ben)

Future transformations

- Develop social discourse skills.
- Get drama therapist involved.
- Incorporate familiar places, scenes, backdrops, local area.
- Time travel device on ship.
- Looking for responses.
- Incorporate the children’s ideas next week.
- Drawing based images to explore.
- Dark room tent.
- Web cam.
- Week 6 perform something. Invite parents. Let them tell their story.
- Develop content.
- Parental feedback.

RQ5: What is the experience of mixed reality *Pop Up Play* from a child’s perspective?

Some children reported that their favourite bit included dramatic elements:

"The storm, I liked the lightning and thunder that was my favourite bit."

"The storm, I thought the boat was shaking. It was raining."

"The ship sinking, and finding the treasure and hiding it. Doing the noise and the waves were big."

Other children said that their favourite bit was when they were actively playing a game:

"I like it when I found the treasure. I like wearing the blindfold and spinning around."

"Mine was the treasure hunt because it was quite hard to find."

"Mine was the treasure hunt; I like digging, making a big hole."

Some mentioned the power of play and the technology:

"I like controlling it."

"I got X-Box 360."

Once again the physical and social nature of play was spoken about by the children:

"I like the ocean, swimming. I liked it when I kicked B."

"We could do a pretend punch."

"I liked it when we were fighting and it was coming up on that -beating up the fish."

The sense of smell and taste featured very strongly amongst the children's favourite parts of PUP:

"The mango bit because it was so sweet."

"The mango because it was tasty and sweet."

"The mango."

"The mango. I like the taste."

"My favourite bit, the goodest goodest part was the beach because C fed the rat mango."

Food also featured as a future wish; interestingly this was mixed with an aspect of gaming as a reward:

"Find the chocolate."

"Hunt the magnums."

Children also said that if they could go anywhere in PUP that their favourite scenes would be from familiar places and settings:

"I'd go to my brother's house down in Bournemouth coz I ain't seen him in ages."

"I would like to go to the beach."

"I would like to go to the cinema to watch movies."

"To Westfield."

"To the bus stop."

Children's Voices

PUP Week 3 Three Ways 20/11/2014

RQ1: How do participants engage in mixed reality *Pop Up Play*?

Group 1

Children enter to dockyard scene. Captain reminds children that they have signed a contract to go to sea with him. Outline of session given – story of One Eyed Sheila.

B says: "remember when the boat sank last time."

Singing song.

Captain encourages all children to work as a team, moving feet together and making pirate sounds.

Captain shares smelling and tasting experience. Tells the story of limes and scurvy. Weevils in biscuits – signing. R says: “you need to tap them to get rid of the beetles in biscuits.”

Anchovies.

Lots of excited noises from children. Some children spit out/put their food in the bin.

“I now like limes” “Yuck, disgusting” “I ate all mine” “It tastes like salmon”

Captain asks for ideas what they can smell at the dockside.

“It’s not very sweet, but it ain’t very nice.”

Captain asks shall we get to sea and the children shout yeah!

The scene changes to the deck rolling. Captain tells the story of One Eyed Sheila who appears when there is a storm approaching. Captain models what to do to make the ghost appear and asks the children to make a scared and frightened face when the ghost appears. Captain enters the screen and a ghostly outline of his figure appears. The children scream and pull faces.

Boy K takes a turn at being the ghost. As K approaches the screen he starts to look over at his peers to see if they have frightened faces looking for the same reaction. K looks at Luke and says “put me normal.”

K chooses R and the boys swap. R stands in the screen looking at his image. Luke changes the white figure to a grey figure (someone shouts: “a change”) and Captain shows the children how to use the voice effects. R reacts to the strange ghostly echoes and starts walking like a zombie.

The children sway and K (girl enters the screen). K starts to move her arms and sway looking at the reaction to action on the screen. K moves to the back of the room and watches her shape get bigger as she moves forward, she does this several times.

Captain supports JL entering the screen, he invites her to join him to see what happens when there are two people. Captain stands and JL squirms around the floor, she explores the height that she can raise her head and body without being seen in the screen.

“I can’t see” says someone from the side.

On the side K has the microphone he uses his hand to bang the top. Captain asks K to demonstrate this to his peers and the sound he is making.

Captain invites his shipmates back on board as they prepare for the storm. Captain hands out the instruments.

The screen goes dark as the storm arrives, the children make noises with their instruments and the excitement levels rise. Captain shouts “abandon ship!” children return to their seats.

An underwater scene appears and Captain swims to safety. One by one the children wait patiently to swim to safety. N can’t help but to stop and explore the water. Luke attaches a fish to him and N plays with the fish by jumping and moving around, the other children watch. “We have our clothes on?!” says N and the other children laugh. K runs forward to splat his image on the screen as he has done for the past two weeks.

Back in their seats Captain reminds the children that they should be speaking and listening and working together by sharing and taking turns.

Luke changes the screen to a desert island.

“Have we lost our ship?” asks N several times wanting to play out the same play narrative from last week.

Captain hands out the mango as tropical fruit is found on the island.

K (girl) takes centre stage in front of the screen. She spins and moves around.

Captain asks B and R to help Luke with the iPad. They make a grass skirt appear and B makes the skirt larger and smaller and moves it around.

Captain asks K (boy) to give K (girl) directions and tells her to act out what he says. Instead K looks at the grass skirt and says “put it on me!”

Captain reminds KG to listen to KB.

“Go like this” KB demonstrates ad KG tries to copy him.

B and R resize the skirt and moves it around the screen.

Players swap and N takes the screen. N splats the grass skirt and a pineapple with his hand.

“N copy me!” says KG. Captain explains how to mirror. N copies KG’s movements.

Luke, R and B make a shark appear.

“Shark!” someone shouts from the side.

Captain reminds the children about the places they said they wanted to go last week. None of the children seem to remember their requests.

A beach scene appears. “That’s the beach where I went to” says R “there’s an aquarium over there.”

A bus stop is next. KB steps forward and stands at the bus stop with his hands in his pockets. N joins in and asks “where is the bus?” KB stands still.

Luke asks if they can sit on the bench in the bus stop. Both boys walk backwards, but then sit on the floor and their image disappears.

K runs back and forth splatting himself.

The children swap and KG steps forward to take a turn at sitting on the bench. She walks backwards the turns around so that her back is facing the screen and she sits.

“Wrong way” “walk backwards” the children shout.

She tries again several times before getting it right.

A street scene appears with a fish and chip shop. “I think that is Westfield” shouts KB.

JL and Captain cross the road to the chip shop and knock on the door. They cross back again. “I wanted to do that!” shouts N.

Captain shows the children that they can draw pictures to put in the screen next week. The children give ideas what they would like to draw such as fruits etc. The children take it in turns to explore the example drawing.

“Sit on the sun” says KG to KB and JL. Luke resizes them and places them on the sun. R and KG take a turn and ask Luke to put them on the sun, when there they hold their bottoms and scream. “Make me slide on the watermelon” says KG. N and B take a turn N asks to go on the sun “oh my bum’s hot!” he shouts.

Plenary

Group 2

Children enter to the dock scene, they immediately enter into the spirit of being a pirate.

“Do we need to write our names?” ask the children for a repeat of previous play.

Captain reminds the children of what they will be doing.

Singing the song. Children shot “Arrr!” after the song.

Tasting.

“It’s not fish is it?” asks someone even before the tasting has started.

“Worms?!” shouts someone else.

“That is bitter, I’m not avin that again!” says M.

“I’m not avin fish!” “Blugh!”

Captain explains the sign for biscuit.

“Weetabix” says R. “That’s yuck” says H.

Captain gets out to sea. He lets K (girl) and B take to the screen. K starts play fighting and B joins in with an invisible sword.

Captain tells a ghost story. K and B move backwards. They sit down.

M takes the screen as the ghost and a white figure appears. “That’s me I’m the ghost” says M.

Captain invites J to make sounds. After a bit of encouragement and a suggestion to make “ooo” sounds he does so quite loudly and with confidence. Captain asks everyone to give J a round of applause.

It starts raining on the ship and H goes in. H moves around with his frame and he appears as a grey shape. He walks around in circles as he has done in previous weeks.

“The waves are getting bigger” says J. “Will they get huge like last time?” he remembers. Luke starts the storm.

H abandons ship and L (girl) has a go. She spins around as they grey figure.

“L hold on!” someone shouts. “Go right down to the bottom!” shouts another.

L follows the suggestions.

B takes a turn when the screen changes to underwater. As he approaches the screen he appears as the ghost “UH?” he says not quite understanding why he is still the ghost in this scene.

“The waves are still huge” says J from the side.

Captain asks M to go and sit next to Luke so that he can see the iPad. M makes a shark appear on the screen and he starts re-sizing it up and down.

“Kill it” says H from the side and B takes a big karate chop at the shark. Captain offers B a pretend sword and a game begins with B taking swipes at the shark and M moving it away or re-sizing it.

“Ha! You missed it!” says M every time B does not hit the shark.

“He’s moving the shark, but playing hide and seek” says an observer.

“There!” shout the children when the shark appears “you missed it!”

Captain tells the children that they can create their own island by drawing it. The children give ideas: “a shark with a sword” “a cheater” “and a wolf.”

The Captain shows the children what the picture looks like in the screen by using the web cam and tells the children that they can do the same next week and go into their pictures.

Plenary.

Initial thoughts:

Mirroring was seen as a feature of embodiment, but also in a dynamic between a silent movement director using visual aids for players to copy and act out. Repeating was also another key element as seen in previous weeks; however some children did not repeat their behaviours and instead chose to explore new aspects of play (e.g. N who appeared to want to explore social and co-operative collaborations with his peers).

Perspective taking and reaction to action were key embodiment features – same as last week, but this week observers and distant directors were aiding the player to make perspective taking choices.

Generating ideas was much stronger again this week and also adopting ideas. The groups seem to be working much more effectively as a team. Discussion dynamics were evidenced again as question and answer but children appeared confident to speak out and give their ideas. The children were also starting to make a lot of visual and verbal connections. They also used recall to aid repetition of play themes and previous narratives.

Role Evidenced	Participant	Example
Master Coder (Game Maker)	M, B, H and Captain	All contributed to the making of the kill the shark game. The rules were unspoken except the general aim to kill the shark. The observers joined in saying “there!” and you missed it!”
Constructor	All	Music makers. Using instruments to create the sounds of a storm. Using the sound effects for ghostly noises, using voice and hands.
Observer	All	Side-line seats watching live in-action play. Some are silent, some are verbal saying what they can see (descriptive) and now some are directive.
Distant Director **Visual Director**	Some Some	Lots of the children were shouting out ideas for action this week compared to last. Some children acted out what they wanted the player to do instead of telling them. The player then mirrored their actions
Player	All	All children took turns to play either alone or in pairs. Who played and when they played was managed by the practitioner (Ben).
Play Director	Some	Free play was manifest most frequently. Children acted out their own internalised play ideas.
Technologist **Technologist Assistant**	Some M, R and B	Luke showed and coached the children how to change sizes and move things around. Direct instruction rather than learning through observation.
Technologist Observer	-	-

Table 19: Mixed Reality Roles Week 3

RQ2: How deeply do participants immerse in mixed reality roles?

Reflecting on previous weeks:

In terms of a hierarchy:

Player

Game Maker or (Master Coder)

Play Director

All are closely aligned.

For these children Player (being in the screen) involved active and imaginative live play. Players could either play out their own ideas or take on board and adopt ideas from the side-line observers.

Being a game maker involved making the rules of play which were not spoken such as splatting the skeleton (previous week seen again this week as splatting the self), bashing or kicking the rat, killing the shark (this week was a collaboration between the player, the technologist and the observer and the facilitator).

A Play Director was more likely to initiate and act out and bring to life their own internalised ideas to life in live play rather than that of the observers (such as climbing the mast).

This week the children did a lot more explorations and being dramatic performers was less evident. They did however make music and generated sound effects. As a team we felt that these roles were aligned with being constructors.

Constructor

Music Maker – sound effects

Dramatic Performer – needs further unpicking. Is this distinct from playing?

All children were observers in various roles.

Observer silent

Observer vocal – saying what they see (Describer)

Observer vocal - Distant Director

These roles are closely aligned.

All roles included side-line seats watching and observing live in-action play. In addition to being a distant director, some children were directing through movement and the player copied their mirror image. This could be a **Visual Director**.

Technologist was manifest when the children were assigned tasks by Captain and then to some degree became the **Technologist Assistant** but not **Technologist Observer.**

RQ3: How does the practitioner in-action see this taxonomy manifest?

Ben Edwards

- Hierarchy.
- Clustering.

"The other thing that struck me thinking about the hierarchy of different roles, thinking about directors when we tried to get the direction through a verbal channel it wasn't accessible to N, but when it was done through a visual channel it was. So there is something in that in terms of for our young people that role doesn't have to be someone sat back issuing instructions it could be someone mirroring and being able to copy what someone else is doing for you."

Further discussion to take place 27/11/2014.

RQ4: What does the practitioner do to facilitate the learning/play experience?

In addition to previous weeks:

Feature or Stance Adopted	Facilitation	Impact
Tasting and smelling experience.	Children were given the opportunity to make sensory connections with the images they were seeing on screen and the noises they were hearing.	*"There was more sensory investigation this week at the start and perhaps that had an impact on the digital play." Ben*
Assigning roles.	Children were asked to take certain roles, e.g. technologist, director and player in order to work towards their targets.	Reflective discussion to follow 27/11/2014
Visiting familiar places.	Children were presented with a range of scenes that they had requested the previous week such as the bus stop or the beach but could not recall their wishes once they were shown.	*"I wonder if the issue with that is that in their mind's eye their view of that place looks completely different." Ben*

Table 20: Creative Practitioner Facilitation Week 3

Team points of reflection

Interesting aspects / Benefit or impact

- General outcome and feel of the session. Children's mood and what happened in school prior to workshop.
- Unsettled in class.
- New member of crew (classmate joining workshops).

"It required reminders and other conventional strategies that I would use in a classroom setting to allow them to re-anchor and bring them back into the fold, whereas last week it felt to me that I didn't need to rely on those behaviour management strategies as I felt the resources and materials were enough."

"Sense differences between the groups."

- Repeating the same thing again.
- N (boy) wanted to play and repeat.
- Time and allocation of players.

"In my experiences of working with groups with their cognitive level, the repetition can be quite a secure thing provided there is an additional thing to the end, so they hook into it, it gives them a sense of security and from that base then they can be creative."

"Developmentally - socially he needs to play and be hands on with things."

"Maybe emotionally today he was a bit sensitive. Perhaps we need to come off script to support him."

"He just needs more time to play."

- Shark and sword play.
- Directors.
- Playing with the screen.

"Genuine interaction."

"More instructional from the side-lines."

"I was fascinated by KL's response to actually not wanting to be on it but just skirting around it, it was totally contrary to what the other kids were presenting."

- Ghost sounds.
- Reflecting.

"I've seen so many strengths of J's that wouldn't reveal themselves in a normal conventional classroom. He has played in a reciprocal way with C last week, he has felt confident enough to share some of his creative ideas and confident enough to perform."

"I wonder with J if watching it again, just seeing himself would help with expressing what he was feeling."

"From a feedback point of view what I'm noticing is that the young people are getting better at recalling things that just haven't happened, so there is the capacity to talk about more things."

- Developing confidence and play.

"J was much more confident and expressive today."

"N would be a really good candidate for using small world resources."

"N did really well with mirroring K's movements."

"This is the task, this is the outcome, this is what success looks like – I'm succeeding."

Future transformations

Next week

- Sign new crew member in.
- More screen time.
- Thinking about how much enjoyment/ what they are feeling.
- Emoticon sheets available during live play for pupils struggling to express their thoughts and feelings.
- Watching footage or images for reflection.
- Integrating small world objects.
- Web cam control.

RQ5: What is the experience of mixed reality *Pop Up Play* from a child's perspective?

The sensory experience of tasting a range of sweet, sour and smelly foods had a positive impact which left lasting memories:

"I like the food, all of it."

"I like the apples."

"I like the taste of the fish on the cracker."

"I like eating the fish."

All of the children joined in the food smelling and tasting experience, and some reported their dislikes having tried new foods for the first time:

"I didn't like the food bit it was yuck!"

"The fish!"

"I didn't like the crackers too much, but you add the fish to it I liked it."

A few children had a go at expressing their reflective feelings, for some this was easier than others:

"I didn't like the shark, he was a bit tingly."

"I can't remember."

"I don't know."

During this session we saw the children start to enjoy making their own gaming experiences, two children expressed this as their favourite thing:

"I liked the bit when B put the shark on the board and it was eating me."

“My favourite bit is getting the sword and try to stab the shark and chop the fish.”

All of the children enjoyed their screen time and this was talked about in various ways: situational, imaginative and visual.

“There.” (points at the screen)

“Excuse me is the fish and chip shop open?”

“I liked that bit on the end.” (going into the drawing)

“I like being on the boat, the big boat, there was storm, rain, all the water was going on the boat and I got wet!”

“I liked it when we sat on the sun and my bum was too hot!”

“I liked the bit when we were the ghosts.”

“I like when we were under water, the shark.”

“I liked it when the pineapple was on N’s head.”

“The storm, there was a ghost on the ship.”

Some of the children got to have a go at controlling the iPad, for one child this was expressed and the most enjoyable element of the session:

“I like doing that.” (pointing to the iPad)

“Moving it around.”

“I like to do that again.” (the iPad)

Future wishes were expressed in several ways: gaming, repeating and storytelling.

"I want you (points to B) to kill the cat."

"Carrots, more vegetables."

"Pineapples."

"Go to the fish and chip shop to see if it's open."

"Some sea with some dolphins jumping over and some little fish swimming by."

"My favourite story is Dolphin Man versus me and I'm going to be really small when I go in and fight him."

"I thought we could pretend that there is a dolphin and we sit on it and it jumps like that."

"Godzilla."

Children's Voices

PUP Week 4 Three Ways 28/11/2014

RQ1: How do participants engage in mixed reality *Pop Up Play*?

Weeks 1 to 3 have given us all great insights into what children are doing in PUP. This week as with other weeks Captain (Ben facilitating) kept some continual elements which have run throughout the sessions.

- Children enter to dockside scene and sounds
- Opening song

- Signing of contract for new crew
- Reminder of food stimulus/connection
- Get costumes on/dress up
- On ship
- Storm at sea with sound effects
- Underwater chase the shark
- Desert island
- Review and closing song

This week I have chosen episodes of specific interest which demonstrate new elements of play rather than giving a generalised view.

Group 1

N enters the screen with his costume on. He looks at himself for a while. He takes a timer from the side and places it on the floor. Here he is repeating past behaviours. N takes his hat off and tries to place it on K as an act of sharing, but K refuses it and says “it’s your hat.” N walks around the screen looking at himself. He then starts to take more notice of his surroundings and says “oops I’m so sorry Mr Pirate” “I am squashing the pirates” as he walks in front of the people on the dock.

The children are given messages in envelopes which contain scenarios to act out. K boy and K girl are asked to talk to each other about missing home. When the children enter the screen K girl approaches Captain and starts to talk to him about going home. Captain encourages her to talk to her ship mate. Interestingly instead of looking at the screen both children turn around to face the captain. They seem unsure of what is expected of them. K boy just spies through his telescope. When prompted by the Captain K boy tells him about a real life situation that is happening at home rather than engaging in deeper imaginary play.

JL and N take to the floor. Captain gives them a biscuit as a prop. JL tells N to pretend that it is making him sick and he starts to retch sticking out his tongue. N starts to eat the biscuit and JL asks “is it nice?” Instead of carrying out the imaginative thread he replies “yes” and carries on eating. N stands watching himself eat a biscuit. He holds his hand out and says “I will drop it in the water.” JL pretends she found a beetle in her biscuit and starts to wretch. JL says to N “urgh you ate a beetle” but N carries on eating watching himself on screen.

B and R get a provocation to act out being on a desert island; on the island is a cave. The children are asked to act out a scene in which they find things in the cave, what they might say to each other etc. B and R set about discussing their ideas: “treasure” “a ghost!” R puts a sheet of voile over his head preparing to become the ghost. In screen B and R start to act, but then soon adopt their default mode of fighting each other. The two boys don’t even realise when the treasure appears on the screen,

even when the observers are shouting out “it’s treasure” “there’s a box of treasure” and the distant directors and saying “go over there!”

Captain assigns roles, K girl sits next to Luke on the iPad and is shown how to control a shark on screen, K boy is given a pretend sword and he starts to play a game of slashing the shark as it appears. KG makes the shark bigger and smaller and sometimes makes the shark disappear completely; as a result KB stands still constantly waving his sword around.

N takes a go on the iPad to control the shark. KG stands next to N as his observer/assistant. R jumps in the screen and starts waving his sword around and kicking his legs doing karate. N moves the shark around erratically. To exit the screen, R dives across the floor as if he is swimming away.

Exploring islands. Children put their pictures under the webcam. JL starts to make scary sounds with the effects maker. K goes inside her picture she pulls up her arm until it disappears inside her sleeve and she says “I lost my arm, I lost it.” B joins K and she points to the blue wavy lines and says “this is the sea, jus here.” B looks at Luke and says “can you put us in the sea.” K and B start to move their arms around as if they were swimming and Luke moves them in the sea.

N is invited to make the sound effects for his island. He invites JL to join him. N makes scary noises and a ghost sword appears on the screen. JL pretends to fight the ghost sword by using a real toy sword. N stands in the screen with his microphone looking at himself as he makes noises. Instead of fighting the ghost sword JL starts to run her sword over N. She continues to do this to N even when prompted to look at the screen she does not.

Boy K takes to the screen to fight the ghostly sword. R moves the sword around by controlling the iPad. Captain notices that B has started to make his own sound effects so invites him to take on a constructor role hitting a cymbal each time K hits the sword. “I killed you K” says R as he controls the sword. He then makes the sword tiny and says “you can’t get me!”

Group 2

C chooses an envelope, he enters the screen with a TA, he starts to act out a scene where he is the Captain and using a telescope he looks for land. He reacts to a noise he hears and he says “it’s a whale.” Someone from the side shouts “a ghost.”

J and LM chose an envelope; they are asked to talk about their favourite thing at home. They enter the screen and sit in silence for some time just looking around. Captain intervenes and encourages them to think about their ideas by asking questions. The children speak in very soft voices which cannot be picked up by the recording equipment.

Captain puts M's picture under the webcam. M uses a sword to point to the screen and describes what he has drawn "a tree, the background, a skull, I dug it up" he says. Luke turns M into a skeleton and makes him disappear "he's copying me" says M. Captain invites the children to give M ideas. Instead of saying M do this M do that, the children say "M I dare you to make the skeleton dance" "M I dare you to be a Superman." Luke makes him fly. The class hum the theme tune. M carries out the commands then once he has finished he turns around and folds his arms.

LM is next to explore her picture. When the children say "I dare LM to fly around" she does not wait for Luke to do this for her, instead she starts to flap her arms and takes control herself. The children give her lots of commands which she plays out.

Captain puts C's picture under the webcam. He invites C to choose some small world play figures to put on his picture, he chooses an elephant. Instead of playing with the small word objects under the webcam C takes his place in the screen. Luke makes C really small and places him on top of the elephant. C asks to fly and Luke makes this happen for him. Captain invites C to sit on the toilet he has drawn. C sits on the floor. Captain gives his instructions to help him make it look like he is sitting on the toilet. C sits quite happily on the toilet.

B explores his island and immediately says "there is a shark; I want to meet the shark." Luke makes a shark appear. B says "I want the shark to come down a bit." Luke lowers the shark. As soon as the shark is lowered B enters into the slashing the shark with the sword game.

J invites B to his island. J says "I will show you where the treasure is." B starts to pretend dig, but J says "no there is already a treasure chest there" pointing to his picture. B runs at the screen saying "gold, mine!" J protects his picture by turning his back to the screen saying "no it's my island my treasure." B starts to play fight. "You are a thief" says J "no, I'm gonna guard it from you." B and J start to play a game where B tries to get to the screen and J blocks him.

H puts himself in front of the screen and Captain and K use finger puppets. "I will kill that finger puppet" says H as soon as he enters the screen. Captain demonstrates using voices to interact with H but all H wants to do is slash the puppets with his sword. The children seem very amused by the puppets on the screen that appear extremely large. K starts to interact with Captain's puppets by pulling them off his fingers.

Overall children seemed more confident and competent using the technology. Mirroring was again the most preferred mode. Some children repeated their behaviours as seen in previous weeks and some repeated other's play themes as they wanted to try them out for themselves. There was a lot more child-initiated play moments manifest in comparison to last week which was more about exploration. The children seemed to struggle when there was a set theme or scenario which they had to act out. There seems to be an interesting

dynamic developing where two or three children work together to create a game, each taking a different role but still working together. The children clearly enjoyed taking ownership of the visual elements and also enjoyed sharing their ideas. There seems to be something in creating a product which appears powerful.

Roles Evidenced
Master Coder or **Game Maker**
Player Play Director Visual Director Performer/Actor
Constructor Music Maker/sound effects Puppeteer Visual Artist Camera Controller
Observer Silent Vocal Describer Distant Director Visual Director
Technologist Technologist Assistant Technologist Observer

Table 21: Mixed Reality Roles Week 4

There were no new roles evidenced this week. Main roles are in bold, clustering in plain text.

RQ2: How deeply do participants immerse in mixed reality roles?

Reflecting on previous weeks. In terms of a hierarchy this is not appropriate in this school context. At present the clustering of roles stands as above in the table.

Game Maker or Master Coder (previous adopted term)

I have found that being a game maker can happen in various roles, i.e. as a technologist, as a player, as a constructor. Game making has usually manifested when more than one person is on role at any given time. Last week this was when one person was on the iPad, sizing and moving the shark and one person was playing in the screen trying to slash the shark with their sword. This week a constructor was also included to make sound effects each time the player hit the shark.

In previous weeks being a game maker was much more of an individual role which involved making the rules of play which were not spoken such as splatting the skeleton, bashing or kicking the rat.

Player

Performer/Actor

Play Director

Visual Director

All are closely aligned.

I have moved performing/acting from constructor into the player category as the other modes of constructor seemed to be aligned with more of a supporting role, whereas being a performer/actor seemed to be aligned with being in the screen as an active live player.

Being a puppeteer added to the element of being dramatic performers as did music and generating sound effects. As a team we felt that these roles were aligned with being constructors.

For these children player (being in the screen) involved active and imaginative live play. Players could either play out their own ideas or take on board and adopt ideas from the side-line observers.

A play director was more likely to initiate and act out and bring to life their own internalised ideas to life in live play rather than that of the observers (such as climbing the mast).

A visual director was an active player who used movement and embodied gestures to show players what to do instead of verbally telling them. This has been moved from observer as it is a more active and embodied role.

Constructor

Music Maker – sound effects

Puppeteer

Visual Artist

Camera Controller

All are closely aligned.

Being a music maker involved creating sound effects for images that appeared on the screen, e.g. the storm, the ghost. This role also included making sounds for games.

Puppeteer included using small world props and finger puppets in front of the webcam.

Children were visual artists creating their own drawings so that they could enter them in the screen.

Camera controller is yet to be evidenced in this context.

Observer

All children were observers in various roles.

Observer silent

Observer vocal – saying what they see (Describer)

Observer vocal - Distant Director

These roles are closely aligned.

All roles included side-line seats watching and observing live in-action play.

Technologist

Technologist Assistant

Technologist Observer

Technologist is defined as a participant that actively takes control of the iPad. The technologist assistant is a participant that shadows the technologist and helps them with the controls by way of doing what they are told, e.g. press this, slide that etc. A technologist observer watches only.

RQ3: How does the practitioner in-action see this taxonomy manifest?

Ben Edwards

As a team we all agreed that a hierarchy was not entirely appropriate in the setting of the school. We all agreed that clustering of relationships was more fitting. We also discussed:

- Time and allocation of players.
- Dynamics facilitating different roles.
- Set a timer/change roles by using a carousel.
- One puppeteer, one in the screen etc.
- Sound effects.

"Groups of two or three."

"Maybe you have one acting, one on puppets, one on sound effects, one on the iPad. Then we are looking at those different roles by virtue of the responsibilities."

Further discussion to take place 11/12/14 to talk about the final analysis of clustering roles.

RQ4: What does the practitioner do to facilitate the learning/play experience?

In addition to previous weeks:

Feature or Stance Adopted	Facilitation	Impact
Role play envelopes.	Children were paired up. Each pair was presented with a selection of plain brown envelopes. Children chose an envelope which contained a slip of paper with a scenario. Children discussed the scenario then acted it out in the screen.	Some children needed direct support to enable them to take part. Others were good at discussing their ideas on the side-lines, but when it came to playing out their ideas in live play they regressed and began playing out their play themes from previous weeks, i.e. fighting each other.
Assigning roles. **Mixed reality dynamics.**	Children were asked to take certain roles, e.g. technologist, director and player in order to work towards their targets. The roles were assigned to children in clusters; one was the player, one the technologist, one the constructor.	Children reacted to each other, with support from the facilitator they made a game, each child then took their own part to play out the game in live action. Collaboration was encouraged and supported.
Exploring drawings.	Children were given the opportunity to bring to the session a drawing that they had done in class of what they thought their island would look like. Drawings were placed under the webcam and children entered them through the visualizer.	Children really enjoyed the power of seeing their drawings on screen. They also enjoyed telling others their ideas and "going in" to interact with their images, e.g. sitting on the toilet, or swimming in the sea. Some children also made up stories and games, e.g. K and B guarding the treasure on the island.
Finger puppets.	Captain modelled the use of finger puppets through the webcam. Character voices were used along with questioning strategies.	One child enjoyed the experience of using the puppets towards the end of the session; the others equally enjoyed the puppet scenario by watching it from the side-lines.

Table 22: Creative Practitioner Facilitation Week 4

Team points of reflection

Interesting aspects / Benefit or impact

- General feel and flow of session.

"I felt today was more child-led."

"It's quite nice to have the two groups, one is like the pilot group then you can refine it for the second. By the time we got to the second group they were doing the majority of the work, they were working on their own narratives."

"This way of working is about encouraging them to develop speaking and listening skills through imaginative play."

- New features – envelope role play scenarios.
- Children struggled.
- Space to explore what it felt like before stepping forward with intervention strategies.
- Too tight/lack of understanding/expectations unknown?

"In part it is about a level of understanding, some children don't connect. Maybe it's about receptive language? In terms of the level of understanding it may well have been pitched too high."

"I wonder if modelling it would work? They can copy, but asking them to say things to each is a bit removed."

"If we want to get the children to develop a scenario they should story-board it and the visual is there for them and rather than it being loose, you frame it more."

"How we get the best out of our young people with expressive language needs is to start with a framework and then gradually remove the framework so that they can do it for themselves."

- Best things happen when unexpected.
- Children want a product, video, DVD rather than play games.

"Maybe it's a way of working, quite often we do story sharing to get them to find their own voice."

"It might be that it is something interesting and rewarding for him. Playing a game might be and instant reward, but retelling a story and having an audience is more rewarding."

"I think we should look towards making a product, we have given the kids enough experiences to know what sorts of things they can do."

- Reflecting.
- Repeating.
- Abandon use of iPad – did not work.
- Children growing in confidence.
- Fascinated by new elements.

"I want our children to be free to express themselves."

"I'm delighted with how much ownership they took of the session today. Something simple like a webcam is really transferrable idea isn't it. Something like that can be set up very easily, for example the puppetry had loads of scope."

"We could look at it at the end."

"Their ideas have been incorporated more week by week."

Future transformations

Next two weeks.

- Array of props – choose 3
- Backdrop – cinema or Punch and Judy
- Who is in the story, where are you, what happens next?
- Make video/product
- Puppet show
- Model a show
- Concentrate on making
- Move roles around/change dynamics
- Simple questionnaire at the end

RQ5: What is the experience of mixed reality *Pop Up Play* from a child's perspective?

The use of the iPad images to aid reflection did not work well.

- Children's routines were disrupted.
- Images were grainy as too dark/light reflection from PUP equipment.
- Children could not see what was on the screen as it was too small.
- Children touched the iPad randomly making the gallery go into edit mode.
- Too many in the group/small screen/video could not pick up what children were saying as all speaking at the same time.
- Children got upset if the image was not of them.
- Some children were unable to participate and had to leave the room to re-settle themselves."

Children reported that they enjoyed being entertained:

"I liked it when B was singing the song."

"Everyone's pictures, it was good, especially C's, the toilet bit it was funny."

"I liked the finger puppets."

Some children spoke about their emotions:

"I was happy."

"It was exciting."

Children articulated their thoughts and feelings about the visual elements they enjoyed:

"I liked the under the sea bit."

"I like the storm."

"I liked it when I was flying... (makes excited noises)."

"I like seeing myself."

"I like being something else."

"It is quite good coz when you are in it you are actually in a screen."

Some elements of gaming were mentioned in the feedback which also included scenes that the children had made and working with others:

"I liked grabbing B."

"I made the storm look bigger and I tried to kill K."

"Being on my island and guarding the treasure from B."

"My favourite bit is going on my island and letting Captain Red Beard get the shark on and I got the sword and hi-yah… chop chop chop chop!"

"I like N and J…when he went under his arm and looked sideways from there and it worked I pushed him away and got him, I like working with someone."

"I liked killing the finger puppets. They were being naughty."

Ownership of ideas played a big part in today's sessions:

"I liked it when we put ourselves on our own coloured picture."

"We could do it like this and use a sad face and go on that."

Ownership and making a concrete product also featured in the children's expressions of desires:

"We should make our own videos, like Frozen."

"Yeah we could make a Frozen DVD."

"I could be Olaf."

Children expressed a wish to take more control of the iPad:

"I would like to do more of that thing… (pointing to the iPad controls)."

"Be on the iPad."

They also spoke about repeating the sensory elements of food tasting:

"Eating fish."

"Have biscuits again."

Some children also spoke about repeating some of the elements of play that that they enjoyed the most:

"Kill the finger puppets again."

"I want to go on my island again."

Children's Voices

PUP Week 5 Three Ways 04/12/2014

RQ1: How do participants engage in mixed reality *Pop Up Play*?

This week as with other weeks Captain (Ben facilitating) kept some continual elements which have run throughout the sessions. The plan was as follows:

- Song
- Dockside
- On ship
- Explore iPad controls
- Storm at sea sound effects with instruments

- Underwater chase shark
- Desert island develop parts of the body
- Puppet show with self-generated characters
- Exploring own collaboratively generated character
- Feedback
- Review and closing song

However the children were a little unsettled when they entered, they were missing their TA support at the start of the session and there were some technical difficulties throughout. All of these factors had an impact and led to one session with Group 1 which was improvised and adapted to the needs of the children.

Some children found it difficult to engage with the role of constructor (making visual art) whereas others did this activity for the majority of the session.

Some children were unable to take part in the new group activities and moved freely around the room and self-initiated their own play, whereas some stood on the periphery watching until they also felt safe enough to join in.

Children naturally gravitated to the areas that they were comfortable with and enjoyed the most.

Some children actively self-initiated play using the techniques and tools that they had been shown over the last four weeks, i.e. using the visualizer, creating sound effects, puppetry and controlling the iPad. Some continued to play out themes and narratives from previous weeks – the dock, the storm, abandon ship, the island etc.

Some children actively sought out Luke at the back of the room as they thought that he was controlling what was happening on screen. They either wanted to give him instructions in order to make things happen or to have a go at being the technologist.

Once the children found out that the iPad was on the side-lines they either jumped straight in or shadowed and waited for their turn to naturally happen.

This week, two target focus children were chosen to follow and track their movements, behaviours and dynamics.

Child K (girl) KG and Child K (boy) KB.

Time	Child KG	Child KB
0.00-6.00	Group time. Listening to Captain. Answering questions.	Group time. Listening to Captain. Answering questions.
6.00-8.00	Technologist observer. (via instructions from Luke).	Technologist observer. (via instructions from Luke).

8.00-10.00	Observer. N playing.	Observer. N playing.
8.01	Distant Director – “make him stand on the pirate’s head!”	Silent.
10.00-16.00	Group time. Listening to Captain. Collaborative drawing of monster, modelling, dividing up parts. “Can I do the belly?”	Group time. Listening to Captain. Collaborative drawing of monster, modelling, dividing up parts. “Bottom of the leg.”
16.00-18.30	Constructor. Drawing body parts of monster.	Observer. Watching others.
18.30-24.00	Constructor. Floor space. Drawing body parts of monster. “The purple bits are the veins.”	Constructor. Floor space. Drawing body parts of monster.
24.00-25.00	Group time. Listening to Captain.	Standing in front of webcam to try and be the player.
25.00-28.00	Group time. Listening to Captain. Telling others about their picture. “The colours I used are yellow, purple and red, the purple is the veins and the red is the blood.”	Group time. Listening to Captain. Telling others about their picture. “That’s the bottom part, that’s the top, both legs.”
28.00-30.00	Group time. Listening to Captain.	Standing in front of webcam to try and be the player.
30.00-32.00	Group time. Listening to Captain. Talking about puppets.	Group time. Listening to Captain. Talking about puppets.
32.00-38.00	Constructor. Table top. Making individual puppets. Drawing.	Constructor. Table top. Making individual puppets. Exploring materials. Unravelling and re-rolling foils. Internal dialogue.
38.00-40.00	Observer. Watching N and Captain play finger puppets on a drum with a picture frame in between them.	Constructor. Table top. Making individual puppets. Support from TA.
40.00-42.00	Puppeteer (out of screen) – still constructor. Café scene with finger puppet and drawn puppet on card.	Constructor. Table top. Making individual puppets. Support from TA.

42.00-43.00	Puppeteer (out of screen). Constructor.	Observer. Watching KG and Captain. Walks into play space to get a pencil, testing movements around space.
43.00-45.00	Constructor. Making sound effects with N.	Constructor. Table top. Making individual puppets. Support from TA. Colouring in.
45.00-46.00	Puppeteer (out of screen). Constructor. Invites N to "come to the cinema."	Walking around play space. Constructor. Making sound effects.
46.00-47.00	Player. Screen time with N and KB. Pulls funny faces.	Player. Screen time with N and KG. Runs back and forth.
47.00-49.00	Player. Screen time with N. Sword fight.	Constructor. Making sound effects.
49.00-50.00	Technologist. Resizing and moving N around screen.	Constructor. Making sound effects.
50.00-51.00	Technologist. Resizing and moving N around screen.	Technologist observer. Placed self next to KG.
51.00-55.00	Player. Sword fighting with N.	Technologist. Took over when KG went to play. Making it rain, moving and re-sizing. Made the storm at sea. Changed to the desert island scene. Changed back to storm at sea after N's request.
55.00	End reflections.	End reflections.

Table 23: Time Spent in Mixed Reality Roles Week 5

Other interesting points:

N said "make my skin come back!"

N found it hard to settle into the constructor role, he was completely fascinated by the screen and wanted to be in front of it for the majority of time.

N said: "has the rain made puddles, can I jump in the puddles?"

N: During an underwater scene N said: "make the fish come now Luke."

Roles Evidenced
Master Coder or **Game Maker**
Player Play Director Visual Director Performer/Actor
Constructor Music Maker/sound effects Puppeteer Visual Artist Camera Controller
Observer Silent Vocal Describer Distant Director Visual Director
Technologist Technologist Assistant Technologist Observer

Table 24: Mixed Reality Roles Week 5

There were no new roles evidenced this week.

Main roles are in bold, clustering in plain text.

RQ2: How deeply do participants immerse in mixed reality roles?

Reflecting on previous weeks (there is no change to this section as there were no developments). In terms of a hierarchy this is not appropriate in this school context. At present the clustering of roles stands as above in the table.

Game Maker or Master Coder (previous adopted term)

I have found that being a game maker can happen in various roles, i.e. as a technologist, as a player, as a constructor. Game making has usually manifested when more than one person is on role at any given time. Last week this was when one person was on the iPad, sizing and moving the shark and one person was playing in the screen trying to slash the shark with their sword. This week a constructor was also included to make sound effects each time the player hit the shark.

In previous weeks being a game maker was much more of an individual role which involved making the rules of play which were not spoken such as splatting the skeleton, bashing or kicking the rat.

Player

Performer/Actor

Play Director

Visual Director

All are closely aligned.

I have moved performing/acting from constructor into the player category as the other modes of constructor seemed to be aligned with more of a supporting role, whereas being a performer/actor seemed to be aligned with being in the screen as an active live player.

Being a puppeteer added to the element of being dramatic performers as did music and generating sound effects. As a team we felt that these roles were aligned with being constructors.

For these children player (being in the screen) involved active and imaginative live play. Players could either play out their own ideas or take on board and adopt ideas from the side-line observers.

A play director was more likely to initiate and act out and bring to life their own internalised ideas to life in live play rather than that of the observers (such as climbing the mast).

A visual director was an active player who used movement and embodied gestures to show players what to do instead of verbally telling them. This has been moved from observer as it is a more active and embodied role.

Constructor

Music Maker – sound effects

Puppeteer

Visual Artist

Camera Controller

All are closely aligned.

Being a music maker involved creating sound effects for images that appeared on the screen, e.g. the storm, the ghost. This role also included making sounds for games.

Puppeteer included using small world props and finger puppets in front of the webcam.

Children were visual artists creating their own drawings so that they could enter them in the screen.

Camera controller is yet to be evidenced in this context.

Observer

All children were observers in various roles.

Observer silent

Observer vocal – saying what they see (Describer)

Observer vocal - Distant Director

These roles are closely aligned.

All roles included side-line seats watching and observing live in-action play.

Technologist

Technologist Assistant

Technologist Observer

Technologist is defined as a participant that actively takes control of the iPad. The technologist assistant is a participant that shadows the technologist and helps them

with the controls by way of doing what they are told, e.g. press this, slide that etc. A technologist observer watches only.

RQ3: How does the practitioner in-action see this taxonomy manifest?

Ben Edwards

"I guess they gravitate towards their dominant learning style. In terms of a hierarchy of roles, their role is as they see it themselves."

"Therapeutically drawing is right for him [Boy R], whereas for me Boy K worked really well behind the iPad directing things, N being playful with his voice and making noise with the instruments and making sounds, and JL playing things out in motion, she is most engaged when she is moving."

Further discussion to take place 11/12/14 to talk about my final analysis of clustering roles.

RQ4: What does the practitioner do to facilitate the learning/play experience?

In addition to previous weeks:

Feature or Stance Adopted	Facilitation	Impact
Explore iPad controls	Luke explained some functions to the group and showed them the screens and controls.	More children wanted to explore the iPad during this session; they actively sought out Luke thinking that he had the controls. The children who were able to read seemed to make a lot more choices to change what was happening on screen.

Making puppets – collaborative and individual	Children were asked to choose part of the puppet that they would like to create. They were the asked to make their own individual puppet.	Due to technical difficulties the puppets were unable to be screened. Some children used the finger puppets instead as modelled by Captain. For some children the making took over and they did not engage in any other activity.

Table 25: Creative Practitioner Facilitation Week 5

Team points of reflection

Interesting aspects / Benefit or impact

- General feel and free flow of session.
- Children chose to participate in some activities and not others.
- Self- initiated play.

"The interesting thing about this week is that they were able to free flow, but they were able to free flow because they were secure enough and grounded enough in all of those different areas with the exception of the drawing stuff because that was new."

"I felt like I was shoe-horning him [Boy N] into it. At that point I felt like there was no real learning in it for him in trying to make him sit down and draw a bus leg."

- Appealing to individual children's interests.
- Children seeking out favourite or appropriate activities.
- Boy N's desire to find out more about how it all works.
- Grounding children in one activity.
- Expectations of repeating activity.

"I wonder if there is any scope for him [Boy N] to explore it on his own, like if it was just him in the room he would be really interesting to watch just to see how he interacted with the system and how he could gain that sense of control with it."

"There is safety that they get from that repetition and consistency, but there is some flexibility within the structure to change some things but still give that message that you will be OK."

"It's about giving that confidence to explore familiar elements within the holding space."

- So many different things going on at the same time.
- Children looking for iPad controls.
- How they accessed different activities with control and agency.
- Making parents players.

"It would be quite nice to get the parents in there and get the kids changing things on screen for them."

"They would love directing them I'm sure."

- Individual and collaborative working.
- Facilitation of dynamics.
- Children on periphery of activities.
- Choices being made – which role to take.

"In terms of independent working there were times where they were totally self-directed which was lovely to see and they were managing the sharing of resources."

"Having Miss C in the mix made a big difference as they were struggling at the beginning. It can limit the potential to steer the children down the route which you may be wanting them to be going, but that doesn't mean to say that that the route they end up going down on their own steam isn't equally as valid. There may have been things that happened that may not have happened if there were two adults in the room directing things."

"I learned a lot from that session I don't think that the technology necessarily inspired the creativity today, I think that it inspired it indirectly through the children realising its potential form last week."

"If I was to do it again, I would do a little puppet show for them on there so that they have a starting point to work to, it was all a little bit abstract for them. I wonder how many of the children realised that their puppets were going to go onto there? I don't think that I made that clear so I would certainly change that."

"Four weeks' worth of input came spilling out today. There was learning happening there which enabled me to relax when the children were off task as you might put it doing other things."

- Helping peers. KG in particular.

"This is the right forum for that to happen as that is one of her targets."

- Developing coping strategies, KB in particular.
- Learning new skills.

"To me KB has been really relaxed in here. You would know if he wasn't and I think that speaks of the flexibility of a) within the system and b) within the workshop that we have been running."

"I think that there is that room to get the balance between challenge and success right so that the children feel stretched but not inhibited by the fear of failure. Because this is quite playful that fear is diminished."

- Sessions not long enough as weeks go on.
- Children more confident and competent.
- New roles to explore.
- New tools to use.
- More agency and control.
- Ability to move around and make choices.

Future transformations

Next week.

- Performance
- Limit props to enhance creative thinking
- Swapping groups around group 2 goes first
- Parental/special person invites
- Parents/special people as players
- Photos for newsletter
- Simple questionnaire at the end

RQ5: What is the experience of mixed reality *Pop Up Play* from a child's perspective?

Being visual artists as part of the constructor role featured as some of the favourite things for the children this week:

"I really enjoyed making Godzilla."

"Making puppets."

"I did a picture would you like to see it?"

Even though the children never got to play with their puppets or body parts they made some children enjoyed using the finger puppets to create their own narratives:

"I did a puppet show."

"Puppet show."

For some children this was the first week where they had been given a go on the iPad, this proved a very powerful tool affording agency and control:

"I liked controlling the iPad."

A small number of children are yet to experience the full role of technologist as they have either been an observer or an assistant. When asked some said:

"Next time I want to do something different, I want to do the iPad and make a storm."

"The iPad."

Constructing also featured as another repeatable experience that the children want to engage with, however this was to build on ideas already started.

"Next time I'm going to add some things, some eyes and stuff."

This was further elaborated upon adding in an element of dramatic story telling:

"I'm gonna do like get puppets with the monster, it will be funny. Like hey do you want to get married? (told in a high voice) I'm going to kill you (told in a scary voice)."

Finally, mixing realities was also spoken about as a future wish, bringing the outside (real) into the inside (digital):

"I want to do like when we go outside we have a pirate ship that we could go in. Yeah coz we are pirates in here and we got a pirate ship outside."

Children's Voices

PUP Week 6 Final Reflections Three Ways 11/12/2014

RQ1: How do participants engage in mixed reality *Pop Up Play*?

This week as with other weeks Captain (Ben facilitating) kept some continual elements which have run throughout the sessions. The plan was as follows:

- Song
- Costumes
- Dockside
- On ship
- Storm at sea sound effects with instruments
- Underwater chase shark
- Desert island body part puppets
- Finger puppet tour of backdrops
- Exploring iPad controls with parents
- Closing song
- Parental feedback and questionnaire

The dynamics of this week were slightly different as some children had their parents in the room watching them and some of the others who did not were missing out on

sharing the experience with a special person. As a result some children were distracted whereas others were perhaps a little disengaged and withdrawn.

Group 2 participated first as they missed out on last week's session. Last week the team chose Boy B and Girl KH from Group 2 to follow their movements but we did not get the opportunity to see them. In week 5 the flow of the session was predominantly child led which allowed for the opportunity to follow the children as they chose their roles, whereas this week the session was more practitioner facilitated and led, thus comparisons between the two groups participating in Week 5 and 6 would be unfair and perhaps give a false impression.

Instead of full tracking here is an overview of how Boy B and Girl KH from Group 2 engaged in mixed reality *Pop Up Play* this week.

Boy B was really enthusiastic and engaged in a range of roles including player, observer, verbal director, technologist, and constructor. B adopted several strategies for gaining roles including putting his hand up, giving help and advice to people, watching and shadowing, moving chairs to be next to the iPad, and offering to do voices/making sound effects.

Girl KH was quieter than usual during the session, at first she did not want to take part in the dressing up and required extra support. She was the player for a short time and explored the camera set up on the side – waving her hand in front of it to see if it was attached to the system by looking at the effect on the screen. For the majority of time she was a silent observer and spoke only briefly to offer direction when a parent was playing find the treasure.

Roles Evidenced
Master Coder or **Game Maker**
Player Play Director Visual Director Performer/Actor
Constructor Music Maker/sound effects Puppeteer Visual Artist Camera Controller
Observer Silent Vocal Describer Distant Director Visual Director
Technologist Technologist Assistant Technologist Observer

Table 26: Mixed Reality Roles Week 6

There were no new roles evidenced this week.

Main roles are in bold, clustering in plain text.

As a team we discussed these findings which have been emerging over the course of the six weeks.

The Team's final reflections on roles can be found in Section 3.

RQ2: How deeply do participants immerse in mixed reality roles?

Reflecting on previous weeks (there is no change to this section as there were no developments). In terms of a hierarchy this is not appropriate in this school context. At present the clustering of roles stands as above in the table.

Game Maker or Master Coder (previous adopted term)

I have found that being a game maker can happen in various roles, i.e. as a technologist, as a player, as a constructor. Game making has usually manifested when more than one person is in role at any given time. E.g. when one person is on the iPad, sizing and moving the shark and one person is playing in the screen trying to slash the shark with their sword and one person is also included to make sound effects each time the player hits the shark.

In previous weeks being a game maker was much more of an individual role which involved making the rules of play which were not spoken such as splatting the skeleton, bashing or kicking the rat.

Player

Performer/Actor

Play Director

Visual Director

All are closely aligned.

I have moved performing/acting from constructor into the player category as the other modes of constructor seemed to be aligned with more of a supporting role, whereas being a performer/actor seemed to be aligned with being in the screen as an active live player.

Being a puppeteer added to the element of being dramatic performers as did music and generating sound effects. As a team we felt that these roles were aligned with being constructors.

For these children player (being in the screen) involved active and imaginative live play. Players could either play out their own ideas or take on board and adopt ideas from the side-line observers.

A play director was more likely to initiate and act out and bring to life their own internalised ideas to life in live play rather than that of the observers (such as climbing the mast).

A visual director was an active player who used movement and embodied gestures to show players what to do instead of verbally telling them. This has been moved from observer as it is a more active and embodied role.

Constructor

Music Maker – sound effects

Puppeteer

Visual Artist

Camera Controller

All are closely aligned.

Being a music maker involved creating sound effects for images that appeared on the screen, e.g. the storm, the ghost. This role also included making sounds for games.

Puppeteer included using small world props and finger puppets in front of the webcam.

Children were visual artists creating their own drawings so that they could enter them in the screen.

Camera controller is yet to be evidenced in this context; however children are experimenting with the web cam in static form by playing in front of it.

Observer

All children were observers in various roles.

Observer silent

Observer vocal – saying what they see (Describer)

Observer vocal - Distant Director

These roles are closely aligned.

All roles included side-line seats watching and observing live in-action play.

Technologist

Technologist Assistant

Technologist Observer

Technologist is defined as a participant that actively takes control of the iPad. The technologist assistant is a participant that shadows the technologist and helps them with the controls by way of doing what they are told, e.g. press this, slide that etc. A technologist observer watches only.

RQ3: How does the practitioner in-action see this taxonomy manifest?

Ben Edwards, Luke Woodbury

The 5 main roles were discussed as follows:

- **Game Maker**
- **Player**
- **Constructor**
- **Observer**
- **Technologist**

It was agreed that being a “Game Maker” can happen in any dimensional space, e.g. when playing, observing, or being the technologist. The facilitator can also be the game maker.

The main definition of a “Player” in terms of someone in front of the screen was agreed, however in this context the sub-role of “Visual Director” emerged as a player *or* observer who was directing by physical embodied action instead of using words. As a result “Visual Director” remained in two categories – player and observer. The sub-role of “Performer/Actor” was also left in the category of player. Following discussion it was felt that this role incorporated the screen as an integral part of play and thus was more digitally immersive than the role of constructor where it was first categorised.

The team discussed the sub-roles inherent within being a “Constructor” – music maker/sound effects, puppeteer, visual artist and camera controller. We talked about the when and how of making music and posed the question that if someone made music or sounds in front of the screen did that make them a player? Luke also queried the sub-role of camera controller and whether this should be in the category of technologist? The complexity of these questions was difficult to unpick and answer, but the team agreed that what all of these sub-roles had in common was that they were perhaps physical supporting roles enabling mixed reality play to enter another dimension, i.e. through music/sounds, puppets/small world toys, visual art, and moving a physical camera rather than being solely interactive with the screen and digital technology.

“Maybe the roles are based either in the real world or the digital world.”

"The interface between the two worlds."

The role of "Observer" posed no difficulty in reaching an agreement and neither did "Technologist".

"Looking very generally over it for me, this model of assigning roles is far more applicable if we got them through the door and we just said right guys on you go. But because there is such an established structure in order to support the needs of our young people with their additional needs and being on the autistic spectrum invariably we will be giving them the opportunity to taste of all of those things."

"If I go back and think about last week there were definitely folks who were showing a leaning towards being a technologist and not being into the artier side of things."

"It will be interesting to look back and see how much the word directorship has been used; I think that there has been a huge change in the amount of direction coming from the side-lines from session 1 to today."

"It also comes down to the kids knowing what the system can do as there have been quite a few people firing ideas in – do this, do that."

Ben posed the question that if someone saw an object in class and said "oh that would be good in the screen" or had an idea when out of the session, where would that fit in the roles as defined – perhaps constructor?

This is a good question as in our testing phases we have mainly concentrated on roles manifest during sessions.

Reflectively I think that this is all part of mixed reality play in terms of keeping an imaginative play space open in the mind once the session has finished and then bringing those outside experiences and knowledge back into the session. This can flow in and out, perhaps through a permeable boundary.

This is something that we should think about more deeply going forward for future research to potentially identify the full impact that PUP has on cross-curricula learning. Perhaps we should consider an ethnographic study where a researcher embeds themselves into class culture rather than taking regular snap shots to see what flows in and out?

RQ4: What does the practitioner do to facilitate the learning/play experience?

As a team we spent some time reflecting on the range of 21 points of facilitation as evidenced over the last 6 weeks, these are:

- Working with smaller groups
- Acting in role
- Contract signing
- Introducing people, resources and materials
- Free play exploration (digital)
- Free play exploration (real world)
- Reflective discussion
- Consistency
- Verbal communication of generated ideas and feelings
- Music makers/composers/sound effects
- Game makers
- Taking part – active participant modelling
- Tasting and smelling experience
- Assigning individual roles
- Visiting familiar places
- Role play envelopes
- Assigning roles – mixed reality collaborative dynamics
- Exploring drawings
- Finger puppets and small world toys
- Exploring iPad controls
- Making digital puppets – individual and collaborative

In terms of best practice Ben's thoughts are captured here:

"I think my drive every week was to explore a different part of the system based on either the shortcomings of the previous session or following the lead of the children's interests."

"The biggest motivator for our kids is fun; if they are having fun the learning becomes incidental and powerful within the mix."

"We tried a lot because the system was evolving as well week on week, but the kids were also driving that. Look at the puppets for example that led on to talking about the backdrops and that was a eureka moment for me in the whole of the process. It's all well and good providing them with these lovely backdrops and lovely resources, but actually what you want to see most is

their work up in lights and for them to be able to interact with it. For our children that was probably the most engaging element to it, but then to add all those other technical bits to it was sparky."

"Best practice wise if you are going to use this system it's about ensuring that you use the pupil's voices and ideas. It has to be central to it."

"Using their voices and ideas informs the theme. When we started we were exploring War Horse which is quite an abstract concept for our young people, now we are exploring pirates relating that to a whopping great big pirate ship that we had built in the back field. They are motivated by it."

"It needs to be as child led as it is practitioner led."

"You could have a team of mentors where the kids show each other how to use it."

In terms of best practice Dr McConnon's thoughts are:

Enthusiasm, confidence and enjoyment are key to creating a mixed reality play space for exploration which makes participants feel safe enough to relax and have a go.

Rules, expectations and outcomes are clearly defined for learners with additional needs.

Sessions are built up over a course of time starting with an introduction to the technology and are gradually increased in length by introducing new elements during each session until a full knowledge bank is created.

Being in the thick of the action, playing along with the children, having fun and modelling how the system can be used is crucial.

Improvisation and intuition in terms of anticipating problems or knowing when an idea had run its course is essential in keeping a vibrant pace to keep participants enthusiastic and engaged.

Having "a box of tricks" or "something up your sleeve" to do in case the system crashes or does not work a certain way is an excellent idea so that there is not an over-reliance on the technology and the system alone.

Managing dynamics and assigning roles to encourage mixed reality collaborations worked extremely well and offered children the opportunity to learn new skills and develop reciprocal relationships which they may not have experienced if dynamics were not facilitated for them.

RQ5: What is the experience of mixed reality *Pop Up Play* from a child's perspective?

This week the children's parents were given the opportunity to express their thoughts and feelings about *Pop Up Play* both in terms of their own experiences and what they have learnt and shared with their child about mixed reality play.

6 children had a special person attend the session and 5 questionnaires were completed.

8 questions were posed to parents and the responses are as follows:

1. **How much did you enjoy the session?**

☐	☐	☐	☐	☐
Very much	**Somewhat**	**Undecided**	**Not really**	**Not at all**

100% of parents said that they enjoyed the session very much. A few also stayed behind to talk to the team about the possibility of getting the software to use at home and how they would go about installing it and what equipment they would need to run it on.

2. **Was there a moment during the session that particularly engaged you and why?**

The responses were:

"Joining K, being blind folded and looking for treasure."

"It was all really interesting."

"Use of their own drawing as pop up puppet."

Two parents did not respond to this question.

3. **Has your child talked about *Pop Up Play* at home, or discussed anything that you saw in the session?**

☐ **Yes** ☐ **No**

Four parents (80%) said that their child had not talked about *Pop Up* Play at home, or discussed anything that they saw in the session with them. One parent (20%) said that their child had.

4. **If yes, what did they talk about?**

Even though only one parent reported that their child had discussed *Pop Up Play* at home, four parents completed this question:

"Dress up."

"Minecraft."

"He doesn't talk much about school!"

"Maybe to Mummy."

5. **Does your child use technology at home?**

☐ **Yes** ☐ **No**

100% of parents said that their child used technology at home.

6. **If yes what do they use?**

The results were as follows:

40% Games console, e.g. Xbox

40% PC/Laptop

20% Smart Phone

100% iPad/Tablet

7. **What has your child learnt during the *Pop Up Play* workshops?**

The responses were:

"Not sure yet."

"More confidence."

"Songs."

Two parents did not respond to this question.

8. **Would you take your child to a digital learning workshop outside of school?**

☐ **Yes** ☐ **No**

80% of parents said that they would take their child to a digital learning workshop outside of school. One parent (20%) wrote on the form "maybe".

19. Embrace Arts

What is the experience of mixed reality *Pop Up Play* from a child's perspective?

Day One

When asked what the children enjoyed the most there was a range of responses. Some responses focused on 'real world' play such as dressing up and drawing, but most focussed on the unique aspects of the PUP system such as controlling images, mirroring and hyper embodiment.

"I enjoyed dressing up in a costume."

"I like drawing the mazes."

"I liked it how you can change the scene."

"Yes definitely I have just generally enjoyed pretty much all the day, but if you want a specific highlight, I think the best thing is how we manipulated it so that I could be like an animation."

"I liked the bit were we could get attached to the things that are actually on the screen and then make them move. When you move, they move."

"I liked it when there's like if you have a sword on the screen someone can hold it and like actually do it [waves arm around]."

"You could call them connections because it's connecting to you."

Participants commented on the 'use-ability' of the system, and in particular the ease of use of the iPad and the freedom that they felt they had been afforded in the session in order to explore its capabilities rather than being instructionally told what to do.

"I really liked the general how it works. I have just got a new tablet and things and I've always struggled understanding it, but I find Pop Up Play is easier to explore."

"It's like with these things you usually have to have someone there explaining it to you, whereas with this you can just explore and do it."

"It was quite easy for me coz I have a pad at home."

One participant reported that they preferred to work on the computer rather than the iPad, however acknowledged that this was personal preference. PUP affords both possibilities so this was not problematic for his continuing participation.

"This is probably something very personal to me but I just don't really like touch screens that much, so I would probably like to have it on a central computer with a keyboard."

Some children were of the opinion that even though the controls were easy to use they thought that in order to get the most out of the system that it was equally as challenging.

"*Simple to understand, hard to master."*

"It's quite easy to understand but when you get to it it's also a challenge."

Children were openly given information about the different types of roles they engaged in and asked to comment on any role that they identified they had adopted in the session. This is a new feature of *Pop Up Play* facilitation. A range of roles were discussed and children identified when they had been the technologist, the

player, and the director. Interestingly no-one mentioned overtly making games or constructing.

Technologist

"I liked it when how you could use the controls to make people bigger and smaller."

"I really liked being the technologist."

Player

"I liked playing it in the screen."

Director

"I like being the person who organises."

Some children advanced their thinking beyond that of identifying themselves with single roles and spoke about the assigning of multiple and mixed roles working in collaboration either alone or with others. Participants also spoke about the problems they encountered when working in collaboration with others and the problem solving which became part of mixed reality.

Multiple and mixed roles

"She was the player and you were the animationer."

"I kind of liked it when I was doing the mazes I was struggling to go through it because somebody else was controlling it and they didn't know where I was going, so I liked walking and being there controlling it instead."

"If we didn't have it in the right place then they would walk off the screen."

Children spoke about their future ideas for using the system in different ways. Some children reported that they would like to develop elements of gaming which included creating and manipulating the self and other people from different perspectives, using the cameras to create additional illusions.

"I kind of think that it would be good instead of having like a consistent player…we would have a camera projecting on the back of the room sending it to the screen and let's say that anyone on there would have a hit marker

around them. This would mean that there would be one person who is the technologist standing in front of the screen who would pretend to have a gun, like a plastic pistol and then they could move it and then they could use a touch screen which would show the background and the tech stuff, you could tap them when they hit their hit box and they go argh!"

"Hit box."

"Multi-purpose like if I was going to play a board game you could have someone like on an extra camera in the corner with what's going on and then there would be someone with a background like… [unable to hear]. Then you see the board in the corner and then you see me and I would be playing the game, say like I was going forward [demonstrates movement and sounds]."

Some participants said that they wanted to enjoy a deeper sense of immersion into the system where real and digital elements were merged together for more authentic interplay.

"Backgrounds and real props which interact."

"It could be like an interactive simulation."

"You could use a background and then make it on the camera so it's like visual something but with all the swords and rats and stuff, so you could have a play pirate ship and then you would be on screen and then you could attach the sword to your hand…[pretends to be a pirate]."

Day Two

The unique functionality of PUP was highlighted as the most enjoyable part of the session. The ability to become something else and control that something else along with becoming immersed in different places and unique experiences was reported by the children.

"I enjoyed the puppets."

"I liked to be able to go home to my sister and say that I went to Dr Who's time. It was on the screen, there was a background of Dr Who's tardis…inside the tardis! Somewhere quite rare - I have always said that if there is anything that I could do I would always take a chance and go to the tardis and I can go up to her today and say that I was in the tardis."

"Iconic…like you know this place, a lot of people know this place but hardly anyone gets the opportunity to step foot inside this place."

Feedback from some participants on day two indicated that they had a much greater understanding of PUP processes. Rather than saying they liked certain functions, they were able to explain why and how they worked.

"I've been my toy robot today. Asha put it on the computer, she took a photo of the robot, she made a line around all the different pieces of the robot, she took it apart and built it up again on the screen and then she joined it up again."

Agency, ownership, scale and manipulation were all mentioned as powerful explorations of children's own drawings. There was also an understanding of the mixing of real and digital "making outside" and merging "inside" the different worlds.

"I enjoyed like how you could draw something and the put it on the screen and you could actually walk around in your own little picture."

"How like with that [the system] you can make them bigger and go in them by shrinking."

"Going inside your own drawings – that is really cool."

"I liked how you could make your own maze and you can make other people go in it on the screen."

"I liked drawing the pictures outside and then making them go on the screen."

When asked how participants responded to the technology on day two as compared to day one children were able to recall reflectively how they had developed their skills and knowledge.

"Yesterday I went away feeling a bit like why am I coming because all it is is you just go into somewhere? And then today when I made my giant thing which is going to go on it as a background there [points] I really think it's going to be fun seeing my drawings and the one thing I've always wanted to do is go in my drawings and see how it would be. I think it's inspiring."

"Easy!"

"I found the technology kind of more interesting than yesterday."

When asked about identifying the roles the children had adopted in the session, most of them named their favourite or most preferred role or activity.

"I liked doing the web-cam."

"The player!"

"I like being the constructor."

Some children also recognised that they had become absorbed in one or two particular roles and had not explored the full range of roles and opportunities within PUP.

"I was too busy doing the robot and the pictures so tomorrow I will have a go on the iPad."

More children today compared to day one spoke about multiple and mixed roles as part of *Pop Up Play* and the control that this afforded them.

"I think I've done them."

"The roles that I've quite enjoyed today is being the technologist, what I haven't done much of but I quite like how the technology works. I quite liked being the instructor too."

"I like being both the technologist and the player because I did something interesting where I put all bits of me in front of each other, then I would use it to raise up and make sure that they couldn't see me, then I would use the button to change me back to me using the pad."

Some children acknowledged the challenges that can surface when working in collaboration with others.

"I think it's going to be quite hard with the game because we are all going to have to remember which part we are going to do and what the game is about and things."

"We've only got one morning to do it!"

One particular participant (Boy J) enthusiastically came up with the idea of creating a bank of add ons. Add ons which could be created and uploaded and downloaded as part of a shared online community experience.

"What I think will be great for this… say you wanted a Mario model, say there was like a little web cam where people can make their own models and share it, and other people could download it so they could download a Mario model and play with it their end. Like have it as part of the program so when you start it it will be like Pop Up Play and it will look for add ons that other people have made. You could have official add ons and people made add ons and people could rate them."

When asked about further developing the system the children instigated a discussion which resulted in an emergent idea which incorporates them further into being part of the system and again is about control - making the iPad part of them.

"You could have a big belt with very big buttons."

"You could have a mirror attached to see what you were doing."

"All different shapes like the diamond button could be to change you and the square be to like put you back into that funny thing using different shapes."

The children also had an emergent discussion about making interactive games on a higher level. Both games hold elements of intuitive reactivity by the system in response to the player's actions.

"Easy to pick up but hard to master, but there is a lot of stuff that you have to get the hang of if you want to get the full amount out of it. Because right now it's a very good idea to have like using the connect camera to just be in the picture but one thing that would be especially good is if you could have it so that the pictures are interactable."

"Using a person disguise, using editing of each frame and put a person disguise on then it would look like they kept changing colour as they danced – like a rainbow dance or something."

"It would be really cool – like you take a photo of the colour and you have to do the same dance moves as the colour is coming up next and you could see yourself on it…yellow pink blue [demonstrates movements]."

"What we could do is have it a lot faster like it could be on a loop so after it's gone through all the different colours of the rainbow it could stop and go back to red and just basically be a rainbow person on the screen."

"Maybe you could get surfers and skateboards and stuff and cars and you press the button on the iPad and you could get in it [the car] and actually drive it yourself and get on the surfboard."

"That will be good to help you to learn to drive."

"When you change cars it could change suits like Batman's suit and car. And water for the surfboard and road for the car…change the background."

After two full days of PUP children were still enthusiastic to return and continue exploring the system and its capabilities.

"We want to come here for two years!"

"Two million years!"

Day Three

The combining of multi-dimensional elements was reported by the participants as an enjoyable aspect of *Pop Up Play* - deconstructing and re-constructing the self and others through all possible worlds.

"The implementing of a lot of things that you would like to be a part of. This is also what I would like in my bedroom. To be honest the thing that I liked implementing the most was the puppets [demonstrates movements]. Like … was a robot and … was a zombie."

"I liked taking all the things that we had in the actual world apart and putting them back together on the screen. Well we stand in front of the screen and we shrink ourselves and the robot is still attaching to us…I was gone."

"I liked having my sword and then taking a picture of it and then locking it on and it ended up that the handle was so big and it looked really funny. I liked it when I held my proper sword and then you could see both the swords."

When asked who had danced with their self, the responses indicated that participants had fully understood the processes involved to achieve the results that they were seeing and experiencing. Even after three days children still reported that they enjoyed using the technology and that mirroring was a strong mode of embodiment.

"I did that yesterday it was actually quite funny…you don't need anyone else to dance with you can just dance with yourself on the screen."

"We had the projector and there was like a little me on that small projector and the with the web cam there was a big me in the background…[two on the screen] I just began dancing and they copied."

"Amazing!"

"Seeing yourself on the screen."

All children said that they found the iPad easy to use except Boy J who continually said throughout the three days that he preferred to use a computer.

"It's not a bad system in the slightest the iPad…I just don't personally use tablets."

Collaboration was a key element of PUP recognised by the children as a mode of co-operative engagement which could potentially increase results, however they acknowledged that this was sometimes easier to achieve than others.

"You could make a really high class production if you had one person doing sound effects on the thing and one person changing the background on the computer and have multiple iPads for different jobs and then if everyone worked in tandem you could literally like change it in seconds…change the sound, puppet, and background at the same time and it would be amazing."

"I found that everyone worked together the whole time."

"Sometimes… other times not really."

When participants discussed their favourite role, being the player and the technologist were reported as preferred singular and mixed roles. However Boy J said he preferred to remain in control from conception to completion starting with being the constructor making a physical object which can then be transported into the system.

"I liked it when you could attach the puppets to yourself and do lots of dancing. The skeleton."

"I liked using the iPad and changing the backgrounds. I liked it because you could actually choose which one you wanted and you could design it."

"I didn't think like I'm going to be on the iPad and I'm going to be on the screen, it's the role of making something before any of it to put something onto the screen. If you were to make a puppet then put the puppet on screen

and then be the puppet I would be at the start in making the puppet rather than actually being the puppet."

When asked what the potential uses of PUP would be at home, participants responded with enthusiasm. Some children also repeated feedback from previous days including interactive gaming, creating a data bank of resources and setting up the ability to network remotely with others.

"Everything!"

"I would do it for 105 years!"

"More mazes and games."

"Kind of have an interactive background…an animated background is impressive so that you can interact with it, so if you went like this [moves arm] and hit a balloon it would then pop."

"I would draw backgrounds and upload them onto it."

"Another thing is making it so that people can upload their own pack of stuff and you can download it as a pack…like online…animated alphas."

"Maybe making it like I could have it in my house and J could have it in his house and then we could still see each other."

When asked if participants would like to interact and immerse themselves in the world of Minecraft this created a buzz of excitement and all participants said:

"Yeah!"

When asked if the system was suitable for young or old people, the children were open and gave the impression that everyone could use it, but rather it was the purpose, use and scale of *Pop Up Play* that was changeable.

"I think it's made for both."

"I think it kind of depends how you view the system…it could be made for old people who really want to do high class acting production things that they can sell and then it could be also made for kids who want to make silly little skits with a £30 camera. It's kind of the same activity just on how the scale of things would be worked. It's still Pop Up Play it just depends on what type of Pop Up Play you want."

Children's Voices

20. Final Summary

This final phase of testing *Pop Up Play* in 2014 has revealed some interesting insights surrounding three main areas of investigation:

- **Roles**
- **Facilitation**
- **Children's perceptions**

The study of roles has confirmed that in every PUP session there is the potential for a mixture of individual, collaborative and communal roles to be manifest. These roles can be divided into two categories – main and sub, for example technologist is the main role, and sub-roles include technologist observer and technologist assistant. However the notion of a 'hierarchy' or 'value system' which has the potential to classify one role as higher or more beneficial to participants was found as inappropriate by our research partners. Taking this into account the analysis showed that these roles can be clustered into core areas. Dr Vear suggests that these be defined as 'zones'. Thus In every zone, e.g. play zone, observer zone, technology zone, constructor zone, etc, there is a potential for a variety of roles or activities to take place. Furthermore analytical tracking has shown that every PUP session is distinctly different for each and every child, therefore the learning experience is always unique.

With regard to facilitation of roles three distinct pedagogical features emerged:

- **Freedom of choice – natural dispersal**
- **Description and decision – agentic action**
- **Assigning – managing dynamics**

This is the first phase of testing that has revealed these new insights.

Freedom of choice in sessions allowed for participants to make their own decisions about where they wanted to be and what they wanted to do. Natural dispersal in sessions, i.e. not telling children what to do afforded them opportunities to self-initiate their own learning. The counterintuitive nature of this way of working is that

some children will continually repeat the same roles and the same actions and thus may need extra encouragement and support in discovering what other opportunities can be enjoyed in PUP.

The facilitator describing roles to participants in order for them to make decisions about where they wanted to be and what they wanted to do was distinct from natural dispersal in the sense that children were being given information in advance in order to take agentic action rather than discovering the various roles during active live play. This way of working allowed the children to organise themselves and co-ordinate their movements and behaviours which encouraged co-operative learning.

Where children needed more help with self-managing the dynamics of the session the facilitator would assign roles. This in itself is not an entirely new feature of PUP facilitation as we have seen in previous phases of testing deciding who plays at what point has been key to providing equitable access to the system. However this phase of testing has provided fresh insights into managing dynamics where there has been a mixing of realities by the facilitator, i.e. active participants are in the play zone, the technology zone and the constructor zone – all working collaboratively at the same time together.

Children's perceptions of PUP also revealed some interesting insights. It was clear that children enjoyed all aspects of the system, particularly the elements which afforded them control and freedom of expression of their creative and imaginative ideas. Going into self-made drawings and visiting unique places and spaces had a powerful impact on the children.

Scale and sense of self were reported by the children as particularly strong aspects of PUP. Children enjoyed seeing themselves on screen and manipulating and controlling objects. The puppet feature (skeleton and transformers) were a constant source of embodied enjoyment as were the overlays. The ease of use when controlling the iPad was also frequently mentioned. This was particularly interesting as it seemed that for some children they were using this intuitively without instruction.

Children also grasped the concept of mixing realities with ease describing these as inside and outside spaces. Some children were able to learn about the digital processes and verbalise what they had discovered. Some children spoke about working in tandem with others during mixed reality play and said at times they found this challenging.

The most discussed aspect of PUP was surrounding the potential uses of the system. All discussions included elements of interactivity – what can be done with the technology. Interestingly this seemed to be split between dramatizing (persona and narrative exploration) and gaming (defining and making rules), this is of particular interest as running throughout all of the evidenced roles is the notion of directorship and game maker.

Dovelands Primary with Braunstone Library

Ideation Card Testing

Contents

21. Aims and Objectives

De Montfort University, together with The Spark Arts for Children and Dotlib Ltd has created an immersive learning environment for children using a mixed reality system. This has enabled an investigation into how augmented and virtual reality can be used as a tool to engage young minds in creative play within immersive technology. The system has been named *Pop Up Play* (PUP).

In the first phase of testing PUP "worlds" the project used images relating to children's literature (War Horse and Alice in Wonderland); children also created their own worlds with images and artefacts and explored environments using shoe boxes and paper play (the city, underwater, space, and tea parties). Video cameras and motion-tracking placed participants and their avatars into these projected worlds for creative play and open-ended learning.

Managed workshop activities helped build the team's understanding of the creative-cognition framework which is based on Creative Opportunity Group Scheme (COGS)[32] theory and embodiment-cognition. Both theoretical frameworks were revised and refined during the initial testing phase and pre and post-test data revealed the potentiality of increased communication and the positive effects on co-operative and collaborative behaviours along with increased emotional resilience through working with PUP. In addition, the role of the creative practitioner was found to be crucial in engaging and encouraging explorations of narrative self and sustaining play through interactive and immersive gaming techniques.

In the second phase of testing the team worked in partnership with colleagues at the Brite Centre Library, Leicester and New Walk Museum and Art Gallery, Leicester. Arts practitioners were briefed on managing the dynamics of the setting through rotating facilitation approximately every three minutes and were informed that the most successful sessions were found to incorporate demonstrating, co-constructing, and meaning making. The focus of the second phase of testing was to hone in on the types of roles manifest when engaging in PUP and closely examine how participants adopted these roles by tracking their behaviours and movements throughout the sessions.

In the third phase of testing *Pop Up Play* during 2014, the team worked in partnership with Three Ways Special School, Bath and Embrace Arts, Leicester. 5 main research questions were formulated. The research team focused on exploring more deeply the types of roles manifest, the dynamics of the session, facilitation and children's perspectives.

[32] Sage, R. (2000). COGS: Communication Opportunity Group Scheme. University of Leicester.

This final phase of testing focussed on the use of PUP ideation cards. The team examined the use of the prototype pack in order to explore the impact on participant's imaginative ideas and creative behaviours in action. The team also evidenced the impact of the cards on best practice.

22. Methodology

Research Design

The overall research design incorporates action-research methods from two different perspectives: in-vitro (outside looking in) and in-vivo (inside looking out). These methods have been chosen in order to gain knowledge through action, and are concerned with the nature of the action as a thread of investigation leading to new knowledge that has operational significance for the field. As such, this method will test the *Pop Up Play* system and the creative-cognition framework, whilst testing the transformational affect upon its users.

Sample

The sample for this phase of testing consisted of two combined partners: Dovelands Primary School, Leicester and Braunstone Library (already established as a research partner in PUP). As a new partner Dovelands Primary is briefly introduced below.

Dovelands Primary School[33] is located in the Western Park area of Leicester approximately one and a half miles to the west of the city centre. Dovelands is an 'all through' primary school catering for children across the 3-to-11 age range. At present they have 550 children on roll including the children in their part-time Early Years Foundation Stage classes, this makes them one of the largest primary schools in the city. Dovelands is a popular school which benefits from having parents who are interested in their children's education and who wish to work closely with the school. Parents give generously of their time and skills and there is always a good response to initiatives that call for their support. Despite being such a large school, there is a strong sense of community within and beyond the school, with many links to cultural and sporting organisations in the locality.

[33] http://www.dovelands.leicester.sch.uk/welcome/

Participants

Eight children in total (boys and girls) of mixed ages from years 5 and 6 participated in the workshops. The 4 boys and 4 girls were chosen by staff to participate in the project in order to increase their creativity and communication skills.

Year 5	Year 6
Girl O	Girl K
Girl J	Girl L
Boy A1	Boy K
Boy F	Boy A2

Table 27: Phase 4 Participants

Jayne Williams, an experienced creative practitioner and artist in residence at The BRITE Centre, Braunstone Library led the workshops supported by Laura Evans, a creative technologist from The Spark Arts for Children.

Ethics

Ethics were negotiated between all parties and agreed with the University of De Montfort Research Committee and adhere to the *Ethical Guidelines for Educational Researchers* (BERA, 2011)[34]. The procedures included issuing a plain language statement and written parental consent form to all participants informing them of the aims and anticipated outcomes of the research. The right to abstain or withdraw from the project at any time was upheld. Both raw and analysed data material was participant anonymised and stored in a secure project-specific data system.

[34] http://www.bera.ac.uk/researchers-resources/publications/ethical-guidelines-for-educational-research-2011

23. Process

The Workshop Sessions

Pop Up Play had a three day residency at the school. Children were actively engaged every afternoon for the three days in workshops from 1 pm to 3 pm.

The prototype cards were set into 4 categories: change, challenge, create and connect. See Table 28 below for examples of associated provocations. In addition there was also a 'superpower' card which enabled the children to re-invent any aspect of the play.

Card Title	**Example of Provocation**
Change	Tinkering - colour, sound, image or background
Challenge	Shift - game, player, problem, solving
Create	Major shift - make a maze, timeline, small world
Connect	Meaning making - find the links, explain, discuss

Table 28: Card Titles and Examples of Provocation

Three modes of facilitation were trialled: timed buzzer, orchestrated blends, self-initiated selection.

Mode of Facilitation	**Description**
Timed buzzer	Every 3 to 4 minutes a buzzer sounds. Children select and read a card.
Orchestrated blends	Practitioner controls the cards and offers them to individuals, pairs, or collectives as a call to action.
Self-initiated selection	Children monitor, control and select their own cards when they want or need one.

Table 29: Modes of Card Facilitation

After each workshop (or day) pupils were given the opportunity to feedback their thoughts and feelings to the team. This was arranged as 'circle time' discussion groups. Discussions were informal and equitable allowing each child an opportunity to express themselves. The ideation cards were used as a reflective tool during Day 2 to discuss the children's levels of enjoyment, the technology, roles and future uses of the system and ideas.

All feedback was documented via voice recorder. When the children had left the workshop, the *Pop Up Play* team and practitioners had a session de-brief which was also recorded.

Data Collection Methods

Data was collected by the following methods:

- Live play naturalistic observations.
- Video film footage: Capturing action and narrative (two cameras). Camera one was directed at the group of participants (in action players and side-line observers). Camera two was directed at the screen.
- Pupil and practitioner feedback.
- Still photographs.

Data Analysis Procedure

Post session Dr Linda McConnon worked both deductively and inductively with the recorded video data searching for direct evidence of the impact of the cards on imagination, creative communication and best practice associated pedagogy which was examined by thematic analysis.

Participant feedback was also transcribed and analysed for themes.

Participant and practitioner feedback, along with still photographs complemented the other data sets and were used to disseminate findings and inform discussions at the *Pop Up Play* Think Tank, Symposium and Launch (February, 2015).

Rigour

The project team sought to maintain quality and trustworthiness in terms of credibility and dependability by triangulating findings working both inductively and deductively. The team upheld protocols and procedures making each stage of the project transparent by sharing insights and findings which were validated or indeed challenged by other team members.

24. The Session Findings

Day One

The children were introduced to the team and then told the basic outline of the cards, their intended use and the rule that they can ask for one at any time they think they need, or would like one.

Play started at a calm and steady pace. Children were given the opportunity to explore a variety of situations and scenes.

Girl O was very enthusiastic. She was quick to pick up perspective taking. In the Tardis she turned her back on the screen so it looked like she was using the typewriter and climbing objects. She directed other players to use the same technique, for example when players were in the city she told them to turn around and climb up the buildings.

When Girl K was in the city she enjoyed playing with scale, becoming the giant and stamping on cars and buildings.

When Boys A1 and A2 went into the beach scene there was lots of input and ideas coming from the director zone. “You can probably smell fish and chips” said one girl whilst others said “shake his hand” and “build a sandcastle”. Lots of the children joined in with making sounds - voices of a crying baby and a cross parent.

Children asked lots of questions once they had started seeing the possibilities in the technology and the freedom of expression afforded to them in the session. “What sound effects are there?” “Do you have world war 1?” “Can we get more than one person in and see what it looks like?”

The children thought that the ‘Where’s Wally’ game could be improved. They came to the conclusion that because the background was not the same colour as their

uniform that they would be found quickly. They also realised that when you walked back into the room and in front of the screen you could see the area that the person was hiding in and thus the game was not hard enough. They started using the iPad re-sizing tool to make themselves really small and the ones doing the seeking went to the side of the room and turned their back instead of leaving and entering the room in front of the screen.

When playing the maze game children verbalised their ideas, evaluations and directions “I think it will be easier to walk” “the box doesn’t go all the way” “go up a bit” “crawl”.

When playing with the small world construction toys Boy A1 started his own narration as did some of the other children when playing with the soft toys. Once this type of play was initiated it was difficult to distract the boys as they were deeply absorbed in constructing Lego.

Throughout the session 6 cards were used: 2x change, 2x challenge, 1x connect, and 1x invent superpower.

Change media backdrop was an easy card with an instant result.

Change an action led to a chain of events which included a player inviting themselves into the play frame and then making letters by manipulating body shapes.

Challenge invent a problem led to children giving ideas such as hanging off a spitfire and other ‘game like’ ideas and rules but this was not followed up on.

Challenge change direction was not successful, children could not think of any ideas to change direction and one said “no”.

1 connect card was used for challenge (discussion). 1 child was prompted to share ideas with a teacher visiting the room – they described what was happening. Another child said that they “felt excited to carry on”.

The invent superpower card helped children create and communicate game ideas and rules: “If I touch the fish lots of baby fish will appear” “I touched the fish you need to make it rain”.

Some of the wording was a bit ambiguous, for example when reading a rhyme about going from space to an Olympic race, to a face the children took this literally and wanted to put a face on the screen.

Reflections

. The team discussed:

- The need to find an alternative way to utilise the cards in day two
- Using a timer to prompt a card choice
- Mixing the cards up
- Separating the pack into categories
- Using the change and challenge cards in live play
- Using the create cards in a longer session
- Using the connect cards as a reflective tool
- The facilitator having more control over the cards
- The facilitator picking a suitable card for a particular situation or child
- Splitting the session into two halves – the first half using a timer, the second half the practitioner chooses a card

Day Two

Jayne opened the session and explained that we were going to play a card game and that every four minutes a buzzer would sound and someone would pick a card.

Yesterday in the feedback someone came up with the idea that going into live play mode with the system should be called “deality” and when coming out of it “reality”. Jayne suggested that we all say “deality” three times and the session would begin.

When the play started children in the director zone started shouting out ideas to the player “kiss the shark” “make the shark kill you” “surf the shark”. When the ideas waned Jayne reminded the children that they could be directors.

Once again the technology zone, in particular the iPad was very popular and children needed reminding to pass it on for equitable access.

During the first 20 minutes of live play Jayne trialled the use of the card buzzer system. Every four minutes a new card was introduced. During this time 5 cards were trialled.

A challenge card was first - change the rules. Immediately someone looked at what was going on in the play zone (pirate ship exploration) and questioned “what rules are there?” Some children shouted directions, “make her walk on water” “make her fly”. Other children came up with some game rules “when you see fire drop and do a barrel roll” “every time it rains you have to dance to it’s raining men”. Similarly to yesterday, ideas were being created and communicated but not followed up on.

The second card was a repeat (also played yesterday): going from space to an Olympic race, to a face. Yesterday the children took this literally and wanted to put a face on the screen, exactly the same thing happened today. Jayne did prompt for other ideas and someone asked “can we play ‘Where’s Wally’?”, again this was played yesterday.

During playing ‘Where’s Wally’ the buzzer went off and a connect card was chosen. The card prompted the children to use other ideas (adoption) but this was interpreted as generating ideas. “Find Wally and hide near him” was proposed but other than that the card did not take the children on any further.

A change card was chosen next – change sound. The person on the iPad made some water sounds happen and children started to share their ideas “it sounds like a washing machine” “you could get a picture of a washing machine”. After a short while it needed Jayne to keep the momentum going. “It sounds like bubbles in the water” said a child “how could we create that ourselves?” asked Jayne. The play continued without the use of the card prompted ideas.

Another change card was chosen - change action. Again this didn’t go anywhere past someone saying “swimming”. At this point Jayne felt that the use of the buzzer and card prompt was disrupting play and hindering the natural flow of ideas and action.

From there play returned to ‘Where’s Wally’. Girl L (her first session today) showed signs of boredom asking what the time was and if this is what they were going to be doing until the end of the day?

Jayne suggested that the group tried something new and suggested using a moving film. Children enjoyed the new elements of the moving film, puppet control and lively, vibrant music.

For the remainder of the session 11 cards were used, some were chosen by Jayne when she thought that children needed a boost or that there was an appropriate moment in the play to introduce one. Some cards were requested by the children. During the plenary a further 4 connect cards were used to prompt reflective discussion. In total 20 cards were trialled today. 7x change cards, 3x challenge, 3x create, 6x connect and 1x invent super card.

Reflections

The team discussed:

- The effectiveness of the cards
- The children’s interpretations of the cards
- Were they a hindrance or a help?

- Adel posed the question “can the cards aid deeper immersion into the system/game play – or do they just move us laterally along at surface level?”
- When would the cards would work best i.e. 1st session or when children were more familiar with the affordances of the technology?
- At times the card was not enough it needed the practitioner to follow up and keep things moving
- Were the cards for the practitioner rather than the children?
- What type of practitioner would benefit from using the cards and why?
- Could they work as a planning tool?
- If they would be used again?
- Try not to mention them in the next session and see if the children ask for them?

25. Critical Evaluations

Episodes

The children are in the middle of watching a moving video, one child is in the play zone on the screen and the others are in the director zone on the side-lines.

Girl O asks: “are we allowed to do a card?”

Jayne responds by asking her what sort of card she would like, change, challenge etc? and passes the pack to O asking her to see if there is a card that fits the action taking place.

O takes the cards and starts to look through the pack. Some cards she reads the words and others she simply looks at the pictures. As O sorts through the cards she places them in a pile on her lap.

O selects three cards from the pile and looks at them in turn whilst the others are focussed on the play zone. She narrows it down to one and hands the pile back to Jayne. “I found one” she says and Jayne asks her when she wants to use it? “Now” she replies.

Jayne suspends play and O stands up to read the card. “Create a story but don’t bore us to tears”. The children sit in silence and Jayne repeats the card. Then she prompts asking the children to think what the story is about the puppets they are using on screen. “About a weird robot” says one boy. The play continues and Jayne re-focuses the group asking who is going to make the story, does someone want to narrate it, do the voices etc? Children start to volunteer with hands up. “tell us the story and maybe A (boy in play zone) will respond to what you say...someone start” says Jayne.

One girl starts narrating for the boy in the play zone: “once upon a time there was a green man with horns, he had a friend called Bonny, he was called Big Bonny”.

Three children are gathered around the iPad and the others are watching.

“And then he had another friend, shaky eyes and another friend. He liked being green and he likes dancing.” The boy starts to move and dance, Jayne encourages the dancing to continue.

“He likes not wearing any clothes” says the girl. Jayne adds “and he likes working out at the gym, has anyone got his voice?” Several of the children make funny voices.

“He likes cabbage and used to be evil” …the story continues.

Jayne gets up and gives a card to Boy F. He takes the card; the same dynamics are in place. Boy F reads the card: location change. Jayne repeats the prompt: “let’s change the puppet’s location.” The iPad has now moved along the line to Boy A2. “This is the 6th flag discovering kingdoms” he says as he selects a new scene. Jayne describes the scene as being on a rollercoaster and asks the children to do the voice…the girls scream!

Girl K continues with the narration responding to the new scene. “Soon it got dark, one day he went to the moon…and likes listening to soothing music.”

Meanwhile Boy A2 on the iPad changes the scenes and sounds telling his peers sitting next to him what he is doing.

Lots of separate conversations break out.

Jayne keeps the momentum going: “I’ve got a change card for Girl L”.

L takes the card and reads it out loud: “scale, change the scale”. Jayne repeats the message. Boy A is still on the iPad and Jayne asks if the puppet should be taller or shorter?

“Shrink” “make him massive” “massive then shrink” the director’s ideas flow. Girl O reaches over to the iPad and moves her fingers to alter the size. Boy A2 is still holding it on his lap. Jayne asks L if she would like a go on the iPad to carry out her call to action and A2 passes the iPad along the line to L.

“I’m too small” says A in the screen. “That’s coz you haven’t got connect on” problem solves another child. Four children crowd around the iPad, Boy F sits at the far end watching and Girls O and J sit at the other end and are not really engaging with what is going on.

Jayne checks the results: “are you happy with that scale?” “Yes replies L but I can’t get the sound up.”

The children are watching a video of the corridors at school. Jayne introduces a change card and asks Girl J to read it “all change” reads J.

Immediately children start to ask if they can do certain things, be in the screen, be on the iPad etc? J takes the iPad and two other girls take their place in the play zone shortly followed by two boys.

The children jump excitedly up and down the corridors and explore the staff room etc.

A2 asks Jayne for a card. “Lightening: change the light”. Laura demonstrates changing the lights on the iPad. The lights change but the flow of play does not change direction and the card is quickly executed.

Jayne jumps up and gives a card to Boy A who is sitting at the far end. He reads it out and Jayne asks for the play to be frozen. “Add a twist to the narrative, change it re-arrange it, make it fit” reads A and Jayne repeats. She prompts A to have a go at narrating and he says he will try. “One day….” Starts Jayne.

“One day there was a girl called L…”

The play continues without narration.

Jayne calls for another card. Boy A2 reads “make the game hard as nails or easy as pie”. Jayne asks for a group decision by way of ‘a hands up vote’ and the children decide that they want to make it as easy as pie.

The play continues without a change in rules or difficulty level.

The children choose their own self-initiated play and decide to play word association and charades with the web cam. They organise themselves.

The play continues for a prolonged period without a card.

Whilst waiting, in between players and guessers Jayne asks if anyone wants to take a connect card? “Make a new link to a player or rule” reads Girl J. Jayne repeats and Girl J reads the card again. Jayne continues to prompt with suggestions.

“You can do actions” suggests one child, Jayne suggests another think.

The ideas do not come and the play moves along without a card.

The play continues for a prolonged period without a card.

Boy A2 reads another card. “Superpowers.”

Jayne interprets the card and asks for group decisions, “let’s invent some superpowers do you want to do them individually or create one massive superpower?”

The children organise themselves, some work alone and some work in pairs. They all enter the constructor zone and start to draw their ideas out. The web cam is also put on. Jayne sets a time limit and offers ideas, writing, sketching etc.

Jayne introduces two more cards into the mix. Girl K reads out a challenge card: “invent a new character” and the children are asked to choose a small world character to introduce the person they have drawn with the superpowers. A create card is also read out by Girl L “create a story but don’t bore us to tears”. Jayne models how to quickly think of an idea and tell it to the group as an on the spot performance.

After a minute of thinking the children decide if they are going to work alone or in a group, some choose individual, some collaborative. They tell the group about their character’s superpowers.

Atom Man

Laser Eyes

Magic Stone

Super Guy

Magical Hand

Shoot water, make a magical rainbow, fly

Fart rainbows, invisibalize

Water and fire powers

Dr Linda McConnon’s Evaluations on Use of Idea Cards

Potential Uses

- **Creative communication**
- **Re-engage, re-focus, re-group**
- **Planning and playing**
- **Reciting and reflecting**

The evidence shows that the cards have the potential to increase creative thinking and communication of ideas. Then cards give children confidence to read aloud, come up with ideas and share them with their peers.

The cards are a call to action and enable children to ‘have a go’. At times children were passive rather than active and the introduction of a card allowed them the

opportunity to join in again. This was evidenced as changing the direction of play, giving the children a task, or connecting with others.

The cards have the potential to be used as a planning tool. The four categories of change, challenge, create and connect afford any practitioner a broad range of activities. In live play the four categories can be used separately or combined.

As such there is no hierarchical value system, i.e. one set of cards does not produce better results than the other, but it is suggested that the novice practitioner uses one pack of cards from the deck at a time.

Starting with the change pack of cards, it is also suggested using these to allow the children and the practitioner some familiarity with the system and to understand its unique affordances. This will work well as an introductory tool regardless if the practitioner is experienced or not when children see PUP for the first time.

The challenge cards are the next step once the system has been mastered, then create and finally connect. The connect cards work well as a reciting and reflecting tool. Children can use these to explain, describe and discuss what they have done and what they will do next.

Facilitation

- **Rules – timed buzzer, orchestrated blends, self-initiated selection**
- **Dynamics – individual, collaborative, communal**
- **Interpretation – reading, repeating, re-wording**
- **Scaffolding – suspending, supporting, showing**

The rules of using the cards should be stated so that children know how to access and use them. A timed buzzer system has the potential to work well in the very first PUP session along with the change cards so that children can learn about scenes, sounds, and scale etc. The change cards usually produce fast results so a quick turnaround is recommended.

Orchestrated blending is for the more experienced practitioner who has a greater knowledge of the cards and the different realities that can be mixed, maximising engagement with multiple zones and outcomes operating at any one time.

As well as the practitioner facilitating, children should also be given the opportunity to ask for a card when they feel they want or need one. At times children asked for a card when they were looking for something new or novel or if they were feeling disengaged or bored.

Once again as in every PUP session the issue of dynamics was evidenced. The cards offer the practitioner the opportunity to call on individual children if they can

see that they need ‘pulling back in’. Rather than picking someone out verbally, a card in the hand was found to be a concrete tool. Children were also encouraged to work on cards in pairs or as a team, getting everyone involved via group voting etc.

The ambiguity of the cards enabled several interpretations to be made. At times children struggled to find the meaning embedded within the message. The cryptic clues facilitated reading out loud, repeating, and picking out key words and phrases for analysis and evaluation.

Throughout the session children needed scaffolding in order to keep the ideas coming and the pace of play flowing. The role of the practitioner was to suspend play when necessary allowing children time to read out cards and focussing minds to answer the provocation. Some children needed support to interpret their ideas into action and needed the practitioner to come up with alternative suggestions. Modelling and demonstrating was also evidenced, i.e. showing children how to use the iPad functions, telling a short story, giving examples etc.

Tensions and Blocks

- **Timing**
- **Appropriateness**
- **Meaning**
- **Manifestation**

In some instances the timing of the card was not quite right. Some children were not ready to stop or freeze their play, nor change the narrative thread or direction.

The appropriateness of cards along with timing was also a tension. For example someone picks a card requiring them to carry out an action on the iPad when they have all just changed roles.

At times children struggled to find the meaning of the card and therefore the ideas did not flow.

At other times many ideas were generated but were not adopted and the manifestation of turning thought into action did not get followed through.

Team Evaluations on Use of Idea Cards

Some of the team were concerned at the initial pace of the session and lack of responsiveness:

“They were eased in much more calmly - more gently.”

“Once they got going I felt like it went well.”

“At the beginning there wasn’t a massive response but once they started seeing what it could do it was like wow!”

Group dynamics also featured:

“There was a real sense of them coming together and working together even though a lot of them didn’t know each other.”

“One child wanted to do multiple roles at once.”

“Girl O was enthusiastic, she probably got it quite quickly, she was looking for other new things and was the first to ask for a card.”

“If someone chooses a card we need to put that person in charge so that we all listen.”

“Get in pairs and deal them random cards.”

“It also depends on the dynamics of the children in the room.”

“Some people want to change the action and others will want to continue with what they are doing.”

The team looked at both the merits and problems of the cards:

“They were making links to other things.”

“Changes are quick to happen.”

“If that card is not right then we need to move on to another one.”

“The cards can inject ideas but not necessarily manifest them.”

“My initial thoughts could see how some of them could work.”

“Some of them read as instructions rather than provocation.”

“I did write some that were specific and some that were more open.”

Timing featured strongly in the discussion:

“Choosing a card at that point was the wrong time.”

“The discuss card was brought in too early.”

“I tried to use the cards as if I wasn’t an expert practitioner and let them have autonomy over them. Some of the cards don’t fit in with what they are doing. If they have started a new task they are reluctant to change.”

“They should be integrated in a game mode perhaps if a timer goes off.”

“For me as I was writing them I was wondering how they would interpret them and use them. I think the cards work to some extent; but you can never chose the timing of when the cards come in - unless I was in charge of them. I would notice when someone was getting bored and say right who wants a change card and orchestrate it in that way.”

“We need to decide how we are going to manage the cards.”

“Because the technology was so new they were absorbed in what they were doing.”

“I wonder whether there should be separate times for the different cards. The change ones should go at the beginning of the session; challenge should be in the middle and connect at the end. It’s almost like circle time – connect and reflect to inform what they are going to do tomorrow.”

“Use create first but tell them they only have 10 minutes.”

“Random or selected cards?”

“It depends, for example you can’t have make alphas and upload puppets at the same time.”

“Some of these cards are for when you are six weeks down the line, not when it’s all fresh.”

“Perhaps you need to be an experienced practitioner to know what cards will be relevant, to whom and at what time.”

“I might look at what order I was going to do them in.”

The team discussed the distraction of ‘real world’ objects:

“As soon as you bring the Lego out it changes the focus onto that.”

“We could do a live action film with all of the elements so that we don’t focus on the small world toys the whole time.”

The impact on practice was discussed:

“How do we use the cards in practice?”

“It’s about the manageability really; we are never going to be able to try out all of the cards tomorrow.”

“For me the cards sort of get in the way, but I am trying to introduce them more.”

“For the inexperienced practitioner they are a tool.”

“It could be that they are a tool for the practitioner to begin with and then we introduce them to the kids as well.”

“These would probably be best used in the games to alleviate the three minute problems. They sort of got in the way at times.”

“The best exploration of this would be to take a group of kids who know the technology really well and perhaps they need the cards to keep it going as they are starting to get bored.”

“Sitting in a circle and taking a card is fine it’s how you mange what comes after that.”

“Should we let them see the cards and choose or deal them out at random? Some of them are really quick, some will take ages.”

“Or does one person make the storyboard, one person makes the puppet, one person does the background, one does the sounds?”

“Shall we shuffle them all up instead of keeping them as separate piles?”

“Discuss and reflect and enhance.”

“I had to orchestrate some cards but I would have done that naturally anyway.”

The team discussed the impact on the children:

“I think they enjoyed picking and reading them and then they didn’t really go anywhere.”

“They seemed a bit confused and it was a lot of effort to figure out what it means and to think of an idea and it was easier to carry on with what they were doing.”

“L chose a card and it needed the iPad so she had to take the iPad off somebody else or tell someone else to change the scale.”

“The four minute thing I found very restrictive. I tried to make it exciting but they weren’t really that bothered.”

“The four minute thing works if they stay on the same activity and then it’s only the card that changes it.”

“That way of working might work best on day one when perhaps the adults have more control over the iPad.”

“In that four minutes they may have already changed the background six times so they would just change it again.”

“Maybe three minutes to make it shorter as a way of taking them through the system.”

The role of the practitioner to keep momentum going and not rely solely on the cards was highlighted:

“Some of them were saying that they didn’t know what it really meant so I was trying to push them to see if they could figure out a solution.”

“You are still having to do it.”

“Episodic.”

As a team we noticed the tangible and concrete qualities of the cards:

“They paid more attention to it if I said I’m giving a card to so and so now.”

“More input and more action if you nominated someone.”

“It was nice to re-engage someone, to use the cards as a way back in without saying I’ve noticed you’re not doing much…have a card.”

“They read it and then they are in action straight away.”

“The cards made it happen quicker. A definite call to action.”

Immersive or lateral impact?

“When you are flicking through the cards you do feel like you are missing what’s going on. I think you need to get to know the cards if you are going to use them – there may be too many.”

“That is tricky to answer as we are skilled at working with young people. I think they could aid deeper play if you were a librarian. For example I know people who would need all those cards or a prompt or pdf.”

“They felt a hindrance to me.”

“Yes in terms of immersion I think it would take me away from the technology and being immersed in that kind of reality. I think it engages you more in what’s going on here [the cards] and playing with the other participants but in terms of playing with the technology I think bringing the cards out.”

“Perhaps it differs depending on what role you are playing. For example the difference between being a player and a technology controller.”

“I would probably use them in my planning.”

“When the children were given the superpower card they were able to get into it straight away as they had already been to other worlds.”

“You need the technology to inspire. Without the technology the activity would have been surface level.”

Young People’s Evaluations

Day One

Boy F came up with an idea of going into and out of the system:

“*Reality when we switch if off and deality when we switch it on.”*

Children gave excited and enthusiastic responses as their first impressions of PUP:

“I would definitely want to come back again!”

“I thought that it was really fun, you can act, you are on a screen, and also things like the backgrounds and effects. It’s kind of like you can see yourself and it’s fun.”

“You can see what you are doing wrong and correct it, if you didn’t have the screen you couldn’t see what you were doing wrong. You can see what needs changing and improving.”

“I found it interesting and a lot more fun because you can set the scene.”

“It’s not like you are just on the screen you can add things on like the different backgrounds.”

"I like doing this [making Lego]. You can build stuff. If you made a ship or a vessel you could place it on that thing [the web cam] then you could put yourself on it like you are actually on the boat."

"You could draw backgrounds and make a movie and edit it."

Children spoke about engaging in the different realms:

"Technology zone, it was interesting, a little bit easy getting used to it."

"I quite liked doing the acting bit being in the screen. I liked how you could see yourself but I also like making and doing the toys. You could move them however you wanted and make little stories yourself."

"I liked the player zone and the technology zone. I think I would like doing them both together and separately."

"My favourite zone was the construction because I just like building stuff and making it like that. You can get different effects and pictures."

"I was mainly looking at the paper and what we were building."

"Probably the building one."

"I like different technology."

"I would like to figure out how to use the iPad a bit more."

When discussing our first impressions of the cards children gave positive feedback suggesting the cards were idea generators:

"I think they were quite good because you can choose one and it tells you how to change things which was quite interesting."

"I liked it because it wasn't just the same thing and it gave us different things to do."

When asked if the cards work there were mixed results:

"It a little bit works."

"I liked it how most of it was rhymed."

“I think it should tell us what to do so we are not just stuck on one thing and we get to do more things.”

“It depends which one you chose, if it was a change it could tell you to change the backdrop or the idea to something you haven’t already done yet. But the other ones are prompting you to do other things.”

Children mentioned the challenge of dynamics when a card was introduced:

“*Change direction didn’t work because people were too busy.”*

“If you are bored with what you are doing you can pick up a new card and it will say either move onto this thing or carry on doing what you are doing and add in a little bit more into it, like when we were doing Where’s Wally we were just looking for Wally then we added people into it.”

“It was nice asking for a card and getting one when you wanted one.”

“Just the person who has chosen the card.”

Day Two

When asked to reflect on what was new in day two children compared their experiences of PUP to normal classroom activity:

“I got to play with the iPad and make different creatures, different, sizes and different sounds. I thought that it was really good and fun because it can make you go out of reality and then you can just go back into reality whenever you want.”

“I liked the powers. I liked how we made up our own little stories about them.”

“I liked it how we could create our own superpowers and act out our ideas about them.”

“Normally in class if you do a good piece of work or something you want to show the class you either go to the front of the class to show it or put it under the visualizer so that everyone can see it on the big screen. This is a bit similar.”

Children were asked to share their thoughts on the facilitation of the cards, the results were mixed:

“I liked it at the start where we stopped it every four minutes and we all got a chance to take a card.”

“I think it was good because it changed it sometimes if we were a bit bored with what we were doing.”

When asked if the cards gave them more ideas children said:

“A bit more.”

“Same.”

“Good.”

“Sometimes they didn’t help that much because I didn’t know what they meant.”

“They were a bit confusing but then they got explained.”

“Some of them you really had to use your mind to think about it. It helps your imagination.”

If children asked for a card they shared their motivations:

“Because it let you do different things.”

“What I would do is like decide and then show them.”

When asked what their preferences were for facilitating the cards there was a mixed response:

“Jayne to give out the cards.”

“Bit of choose and Jayne give them out.”

“I like it when I was given a card because it’s nice to have the opportunity to read something.”

“I prefer getting a card.”

“I don’t really mind.”

“I preferred the four minute buzzer because it gave you more of a chance to think about it and make your mind expand.”

“I like it when you can choose to take a card or not because if you feel like you need to add something to it then you can choose a card.”

“I like it when we had the timer and when you could just choose a card. If you got bored you could choose a card and then things will get better.”

Children were asked if they got bored?

“Just the tiniest bit.”

“If it was all day – yes.”

“The cards would help if it was all day because it would change things.”

“Make you do different things.”

Children were asked if they acted on their cards?

“Not that much.”

For the second half of the feedback the connect cards were trialled.

Rationalize

“Make sense of all this PUP stuff, discuss what you love and what you don’t love quite as much.”

“I like the idea you had of doing the charades and doing Pictionary I think that will be a good idea.”

“I liked it when we were doing the charade game and playing ‘Where’s Wally’.”

“It’s helping you with your creative mind and making it expand to a whole other level.”

“It’s helping you know what you need to do and improve on maybe.”

Explore Possibilities

“Adventure out the new world, talk about alternative realms.”

“I have no idea what that means!”

“Plasma World – it’s like dark stuff, I think like when it goes into you something happens.”

“I would like to add the scene of Minecraft.”

“I have Minecraft books.”

“I’ve got figures.”

“It’s a bit like another dimension isn’t it?”

“Different Minecraft worlds.”

“We could create Unicorn Land.”

“Candy Land.”

Word Connect

“Time to use other words; connect with someone else’s blurb.”

“It’s like the back of a book telling you a bit about it.”

“It might mean what other people like to do.”

Connect Challenge

“Connect to the challenges; discuss how they make you feel, what’s the big deal with all these changes?”

“*Fun challenge.”*

“When we all had to work together.”

“If you don’t get along - you have to pull together.”

“If it was the whole class it would be way too busy.”

“There was something I wanted to do but never got the chance.”

“Use other actions, find another vibe, create a reaction, connect to your groovy side.”

“I’m not sure.”

[no ideas forthcoming]

It is clear that some cards had a more expansive and sustainable response than others.

26. Final Summary

The PUP ideation cards are worth pursuing and producing, they seem to be an essential part of the PUP toolkit aside from the manuals etc.

It is acknowledged that there was sometimes a 50/50 ‘hit and miss go’ with the cards during testing, however this was more to do with our participants. Both children and adults were quite happy to carry on the flow of the creative session without the cards as they did not always need them once they had grasped the concepts of the system and had generated and adopted each other’s ideas.

Some of the team had concerns regarding the level of immersion that the cards afforded. Questions were raised if they were moving play along at surface level rather than immersive depth? This is a possibility, however it was clear that the cards did aid the production of ideas and were a concrete engagement tool and a direct call to action. It's what happens with the idea that is key in order to assess full impact.

At present there are a lot of cards which could be grouped down and the cryptic clues could be refined and simplified whilst being mindful of longevity and sustainability issues when repeat use is proposed.

This first prototype of cards catered for upper primary aged children and beyond with regard to the wording and clues. Thus the team are mindful that the cards will need developing if younger children are using the cards for themselves. The use of indicative images will aid use.

During this short phase of testing the team acknowledge that it was not possible to explore the cards in the fullest sense by any means and it is anticipated that there could be many more ways to use them. This exploration and experimentation will be opened up to the PUP community.

In short the cards have broad appeal and are an innovative tool for the practitioner - experienced or otherwise.

27. Conclusion of Project

Pop Up Play as a Transformative Space

The insights gained through this research project are significant. They point to an innovative technological system accessible and usable across a broad range of users and applications. It provides a framework for incorporating mixed reality environments, pedagogy, communication skills and embodiment in digital creative play. It offers a rigorous basis for a theoretical means with which to measure and value the correlation between these elements within mainstream and SEN settings.

The findings from this research also suggest that a new ontology of practice has been developed in order to accommodate the innovative nature of digital creative play. This was particularly apparent when experienced practitioners were asked to describe the transformational practices within the delivery of their case studies; they were adamant that it was a new practice with its own signatures and proposition.

Furthermore, the young-people participants and their practitioners evaluated their engagement within *Pop Up Play* as intuitive, describing it as 'of their world'. It is clear that they "get-it" and that it incites an engagement strategy – and imaginary dimension of possibility for play from their first encounter. Several of our stakeholders discussed this phenomenon using the digital-natives epistemology, in so much as they felt that 'the children took control' and that 'they were teaching us'.

Having said that, we acknowledge that much more work is needed to validate these findings and add rigour and depth to the evidence. In fact, we would suggest that thorough quantitative / qualitative longitudinal studies across a range of populations at scale and over time, to assess the extent and duration of the impact of being involved in digital creative play.

However, the fundamental innovation with this system is in the way it allows the participant to see themselves in-action; and to *feel* themselves in-action. This is a crucial point, and one that sets this research aside from any other theatre practice workshop scenarios, insofar as traditional theatre play can only endow the participant / experiencer with empathetic relationships and to 'see through other peoples eyes' (Boal). This brings into sharp focus the potential of this research outside of digital play, and draws attention to its potential in engaging participants in understanding issues around, for example, digital wisdom, citizenship and pro-social behaviour; wellbeing or quality of life, self-esteem, emotional and social skills, increased cognitive abilities; in supporting treatment, management of specific physical or mental health conditions, skill acquisition and development; criminal justice specifically child protection; or just great, life changing art as participator, spectator or immersant. One significant incident – journey – we witnessed was by a child with learning difficulties who is on the autistic spectrum, who asked to visit a

bus stop within the screen, by himself. His experience, was more than simply watching an image of himself *in-the-now,* superimposed onto a bus stop, as due to his phenomenological incorporation into the image, and the mixed reality world encompassing his own physical reality, he really did experience the bus stop within an ‘embodied state of being’ (Callija, 2011).

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