Magic Land: The Design and Evaluation of an Interactive Tabletop Supporting Therapeutic Play with Children

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ABSTRACT
We consider the role and design of digital technologies in play therapy settings with young children. Through an aggregation of the researcher and practitioner literature, and results of discussions with therapists and counselors, we propose a set of design requirements for digital technologies that support non-directive play within a play therapy context. We explore how to design for these complex requirements through the development and evaluation of Magic Land, a set of four play therapy applications for an interactive tabletop. Based on our experiences we recommend that designers create digital interactive toys, which create opportunities for play that would not normally be possible within the traditional play therapy environment.

Author Keywords
Multi touch tabletop, play therapy, primary school children, development research, and expressive play medium.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Design, Human Factors

INTRODUCTION
Supporting mental health through technology is of increasing interest to the HCI community [7,11]. Mental health is essential to sustaining satisfying relationships, as well as self-awareness and resilience to personal and relational setbacks. For children and young people good mental health also enables them to take part in educational and social activities as well as maintain positive self-esteem [1]. Given the positive benefits associated with good mental health there is concern that children in particular are experiencing greater levels of mental health problems [30].

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This is a particular concern given that anxiety and depression in childhood are established precursors to depression in adulthood [9, 31]. Mental health problems are also a significant societal challenge. For example, over 90% of young offenders in the UK have had a mental health problem as a child [20]. Taken together such evidence establishes the need for children’s well-being promotion as well as the need for therapeutic interventions specifically designed for children.

Figure 1. The Magic Land interactive tabletop prototype.

Play therapy is one therapeutic approach currently used with young children. According to Piaget’s cognitive theory [22] and Bowlby’s attachment theory of child development [34] play gives a child the opportunity to adjust their understanding of confusing feelings and situations by replaying these events in a safe environment. Play also empowers the child to explore alternative, more appealing or desirable, outcomes [34]. Play therapy is especially appropriate for children aged between 3-12 [16,27] who use play as their language to express thoughts and feelings [33]. Digital technology is a familiar media in children's lives. Video games and virtual reality applications in particular have already been successfully deployed in psychotherapy to treat a range of anxiety, panic disorders and phobias [4]. Yet, despite the potential suitability of technology in therapies with older children, digital technologies are largely absent in therapies for young children. This is especially surprising given the importance of intervening in mental health problems at as young age as possible [12].
Interactive tabletops constitute a new generation of digital technology that allows for direct interaction through a horizontal multi-touch surface. They have been used to promote children’s fantasy play [18], storytelling [3], creativity [19], and collaborative interaction [24]. Although play therapy is based upon these elements, there is little research on how these activities could be used within the therapeutic framework with children. Such frameworks would suggest that a child’s play is deeply therapeutic when there is a working relationship with a therapist and a breaking down of defences providing therapeutic release. The question becomes how do we design applications that can support these therapeutic facets of play?

Play therapy practices at the moment remain embedded in traditional toys, representative objects and other creative materials, largely chosen by the therapist. Moreover, therapists are reticent to bring digital elements into therapy sessions. Therapists consider that technology interferes with the therapeutic process since it has the potential to exclude the therapist from building the therapeutic alliance with the child if one-user centered digital system is introduced into the playroom. Furthermore, since technology may not always be sturdy enough for continuous play, therapists are concerned about the frustration and disappointment digital toys can bring for the vulnerable child in therapy.

However, children increasingly request access to game consoles and other digital devices in the play therapy room, which suggests that trying to keep digital technologies out of the play therapy setting is unrealistic and will ultimately be counter productive. HCI research is yet to investigate how technology might support play therapy. In response, we explore the potential of the interactive tabletop as a toy offer within in play therapy for a young audience (aged between 5-11). We believe that the features of interactive tabletops, unlike traditional computers, have potential to not only fit into the therapy room, but also become a play platform that supports non-directive play therapy principles.

We describe several engagements with play therapists, which used non-directive therapeutic play with children over the course of one year, as part of a user-centered design process. Based on this experience we articulate how non-directive play therapy principles could be translated into a set of design requirements for technologies that seek to act as toys within the play therapy context. We also show through the development and initial evaluation of our Magic Land prototype (Figure 1) how these complex requirements might be accounted for in design.

PLAY THERAPY APPROACHES
There are a number of different approaches to play therapy, namely directive and non-directive. We focused our attention on non-directive play therapy, since it is one of most widely used approaches in the UK (where this research is being conducted), and has proven to be an effective psychological intervention for primary school children (aged between 4 – 11) [34].

Non-Directive Approaches
Non-directive play therapy emerged in the 1940s in the context of an increasing humanistic approach to psychology, known as client-centered therapy (or person-centered therapy). This approach stressed genuineness, acceptance and trust between the client and therapist in which the therapist does not evaluate, analyze or judge the client. The core belief in non-directive play therapy is that the child is the expert in their own life and their perception of experiences is their reality. The play therapist remains non-directive and engaged throughout the course of therapy, and no objectives are set for the child to achieve. A therapist is mainly concerned with the present of ‘here and now’ and the focus is on the therapeutic process of the child/therapist relationship [2].

Non-directive approaches see the child not as someone who needs to be changed, but rather as someone who is already good enough and needs to be accepted through unconditional positive regard for the way she is. This reflects the belief of a child as a thinking, independent, constructive human who is capable of self-determination [27]. The therapist’s role is crucial as it is the child/therapist relationship, not the utilization of toys that promotes and facilitates the child’s growth. This is realized through establishing a trusting relationship with the child by being warm, empathic and understanding [2]. Sensitivity, genuineness, transparency and congruence are the crucial factors in non-directive play therapy [34]. The relationship established between the child and the therapist aims to carry the messages: ‘I am here, nothing will distract me’; ‘I hear you’; ‘I understand you’; ‘I care about you’ [16].

Toys, however, have an important role to play as they become the language of the child and should be carefully selected but not collected [16]. The materials for play have to meet the following requirements: encourage creative and emotional expression; be interesting for the child; contribute to exploratory and expressive play; allow for non-verbal expression; provide opportunities for mastery without guidance or structure; allow the child to play in a non-committal fashion; and be sturdy for continuous and repetitive play. In non-directive play therapy toys with these qualities should allow children to express family conflicts, anger and aggression; help them deal with their fears; and provide the opportunity to experience a sense of mastery and creativity [16].

RELATED WORK
Over the last 20 years interactive technologies have become a central element in children’s play. Not only do interactive toys increase children’s interest and engagement in play activities, they have a history of being used with children to support health and wellbeing. For example, Billow was developed for children in hospitals and was designed to address children's need for increased human interaction and social development, mastery and control, comfort and security [26]. More recently, interactive toys have been
shown to support social exchanges and the cognitive development of children with socio-relational disturbances, learning disabilities, and autism as well as provide opportunities for emotionally and mentally disabled children to fully engage in, and enjoy, play [5].

Given the motivating and engaging effect of play, interactive toys and games have also been developed to support children’s learning [29]. However, this game-based approach to learning is widely criticized for limiting essential aspects of outdoor play like spontaneous social interaction, physical movement, and rich face-to-face communication [28]. Some sectors of the game design community has sought to address such criticisms through the creation of augmented environments that combine both tangible toys and virtual reality [13] and the promotion of socialization and face-to-face interaction between players [12].

Social exchanges around play can be promoted through deploying games on interactive tabletops, where multiple users can interact with an application simultaneously. Unlike traditional computers, interactive tabletops allow for face-to-face interactions that enable small groups to work together in educational contexts [6]. Tabletops promote peer collaboration [12], and encourage externalization of thinking and higher order skills [15,24]. Games on interactive tabletops have also been used to train child-specific motor skills [17]. In addition, games on an interactive tabletop have been used to support collaboration between therapists and children with Autism Spectrum Disorder in Cognitive-Behavioral Therapy [10].

Recently the use of tabletops has been extended to promote children’s creativity through such play activities as storytelling and fantasy play [18]. These applications have been shown to foster creativity, incorporate identity, and support collaboration [3]. However, despite there is a lack of design guidelines for how similar applications can be designed to promote these very activities in therapeutic contexts when interactions must also support the therapeutic relationship, breaking down of defenses and emotional release.

In summary, interactive toys and tabletops have been largely developed to support collaboration and social exchange as well as team work in educational and therapeutic contexts. But, few studies have investigated how technology could support therapist/child interaction in a one-to-one therapeutic session. Further, although technology has been identified as enabling creativity through storytelling and fantasy play in educational settings, little is known about how technology could support creativity in a therapeutic setting. It is to this space that our work contributes.

**DESIGN PROCESS**

Our design process began with a thorough understanding of the non-directive play therapy approach through both a literature review and the first author undertaking six weeks of intensive training thereby satisfying the taught component of a professional play therapy qualification. In addition, over the course of a year we engaged with a number of non-directive play therapists and children to understand how an interactive table might support non-directive play.

**Therapists’ Engagement**

We engaged 10 play therapists in a one-hour focus group and an additional two therapists in face-to-face semi-structured interviews. Play therapists were selected to take part if they had experience using the non-directive approach in play therapy with children.

At the beginning of both the focus group and the face-to-face interviews we demonstrated a selection of activities and the capabilities of a SMART interactive tabletop. These activities took the form of pre-existing applications designed to support collaborative learning and included a puzzle and a math exercise. This created an opportunity for the therapists to experience the technology so as to stimulate their imaginations as to how the technology might be used in the play therapy setting. We then went on to solicit therapists’ ideas on how such interaction tabletops might support non-directive play therapy. For example, we asked ‘What is your first impression of the tabletop?’, ‘How, if at all, could interactive tabletops be used in non-directive play therapy with primary-school children?’, ‘What play activities, if any, would you like to see designed for the use of the table in play therapy?’.

**Design Requirements**

We express our knowledge of current practice and understanding of therapists’ thoughts for technology in therapeutic play as a set of design requirements for digital toys appropriate for non-directive play therapy.

**Warm and Friendly Relationship**

The first principle of non-directive play therapy stresses the importance of the friendly relationship between child and therapist. To allow for relationship building, the therapists emphasized the need for any activity with a digital toy to be visible and accessible for both the child and the therapist. Additionally, the therapists recommended that digital content evocative of scary places and stairs should be avoided, as should dark colors, so as to create a ‘welcoming and reasonably comfortable’ (PI) environment for the child to develop trust. The importance of trust is also reflected in Ericson’s emotional theory of child development, which identifies ‘trust versus mistrust’ as the first of five stages in the lifecycle from infancy through adolescence [34].

**Unconditional Acceptance**

The child must be accepted just as they are. Digital toys should promote play activity that is simple enough for the child to master whilst also sophisticated enough to support a child’s self-expression. At the same time the toy has to be flexible and reflect the acceptance of various possibilities, character behaviors and play outcomes. Facilitated play
should not be about winners or losers but encourage the expression of a range of feelings and behaviors. According to both the therapists and literature [16], safety is a crucial factor in allowing children to be able to both express themselves and explore.

**Feeling of Permissiveness to Express Anything**

Any digital toy should provide a safe, flexible means of free play with no rules and ample opportunities for self-expression. The therapists emphasized the importance of providing the child with a choice of both: (i) playing with things that appeal to them; and (ii) creating their own environments and being able to express their present, past and future identities. Opportunities for fantasy and imaginative play should permit the child to ‘detach’ and work things out in a safe environment, for example, ‘The representations could be scared or brave for them so they can detach but just giving them that opportunity to be apart from it...it’s a fantasy’ (P4). According to Piaget’s theory of child development, fantasy play as internal representation and symbolism allows for assimilations of experiences, which result in the development of a sense of understanding and mastery [23]. Fantasy is also a way of distancing oneself from the painful events [16], constructing and finding meaning, expressing emotion, and exploring identity [25].

**Return Responsibility to the Child & Let the Child Lead**

A digital toy should place the control of play in the hands of the child, empowering them to become more trusting of themselves: ‘the more control the child has the more willing they are ... to trust themselves and the effect is bringing all the power within them’ (P4). Mastery through play is considered important within the therapeutic environment [27] and contributes to the development of the child’s sense of power, control and mastery of environment. This is particularly important for children who live chaotic or disrupted lives [16].

Digital toys give the child freedom to choose what and how to play. Freedom and choice allows the child to develop a sense of direction. This requires a digital toy to be non-structured and afford children the opportunity to create their own scenes and characters: ‘non-directive, where the child is allowed to produce whatever within what the application can provide...’ (P4). Recommendations from [11] also suggest allowing children to create their own toys to provide a child with further control over their symbolic play. Indeed, this is an area where digital toys have a unique potential.

**Types of Play**

In addition to the above design requirements, therapists identified role-play/storytelling, creative and emotional expression, fantasy play and new play opportunities as potential types of play around which the application on the interactive tabletops could be designed.

**DESIGNING MAGIC LAND**

Magic Land was designed based on the requirements described in the previous section. These requirements are relatively abstract and challenging to both design for and evaluate and Magic Land is a first attempt at realising these requirements into a working system. As such this paper presents exploratory research on how to design systems that reflect the complex principles of non-directive therapy rather than a structured comparison of digital and traditional toys. In addition, the development of Magic Land enables an inquiry into what technologies could potentially offer for children and therapists in a therapeutic context.

Magic Land (Figure 1) consists of four toys implemented as an integrated suite of multi-touch applications on a SMART Table: *Flying Feathers* to support creative and emotional expression (Figure 2), *Rosebush* to support storytelling (Figure 3), *Hero/Avatars* to support fantasy play (Figure 4) and *Water* to support new play opportunities (Figure 5). A child can open each specific toy from the “home” screen by pressing on an image that represents the toy. An exit button on the right top corner of the screen allows the child to return to “home” at any time. One way we sought to support the *Warm and Friendly Relationship* between therapist and child was through enabling the therapist to save progress and particular choices so that a child’s play can continue in a session where it finished at the end of the previous session. To explicitly design for trust and privacy we ensured each child’s play was stored securely on a memory stick to keep the child’s work accessible only to the child and the therapist. We describe in the next section how we implemented the complex non-directive play therapy requirements in the design of Magic Land.

**Flying Feathers: Supporting Expression**

*Flying Feathers* (Figure 2) responds to the expressive elements of Unconditional Acceptance and Feeling of Permissiveness to Express Anything by supporting a child’s creative expression through painting, drawing, mixing colours and creating scenes in picture frames. These options allow the child to make art in the presence of the therapist, which enables a child to connect with their feelings and particularly those that cannot be easily expressed in words [32]. We provided a wide palette so the child could identify with and express a broad range of feelings. Our aim is that a child’s artful expressions can act both as a ‘container’ for powerful emotions and a means of communication between child and therapist if the child tells the therapist the meaning of these colours or artworks.

Interactive tabletops enable play with elements that would not be possible to use in a traditional play therapy room (such as playing with floating feathers and snowflakes; lights, fire, and ice, burning fireballs and frost frames to change picture patterns). Tabletops also afford the manipulation of objects and images through rotation, scale and move (RSM). Such possibilities for manipulation provide new creative outlets that are not available in a
traditional play therapy setting. We enable other types of play that are normally impossible, impractical or dangerous. This Returns Responsibility to the Child by enabling a child to manipulate and master objects that would normally be outside of a child’s control.

Figure 2. Flying Feathers: Supporting Expression

Rosebush: Supporting Role-Play

One can argue that digital applications are not the best playing tools for role-play. We, however, believe that, it is still useful to study what it is exactly that therapists think to be ‘suitable’ about interactive tabletops for role-play and what it is that children can express through the digital medium. Following a non-directive approach Rosebush (Figure 3) supports role-play, evoking a Feeling of Permissiveness to Express Anything. In this toy, images of trees, flowers and animals become the child’s language, allowing a child to create environments and stories and, thus, to explore understandings and feelings of real life events. We included images that could be seen as friendly, aggressive etc. to encourage expression of common themes in a child’s play that the therapist would be looking for: goodness-badness; powerful-powerless; dependence-independence; helpful-unhelpful [21]. Blobby characters with a variety of emotional expressions are used in traditional play therapy to help the child express their feelings. We sought to enhance the traditional use of these characters, by providing the capability for a child to change the facial expressions (thereby further externalizing these expressions) of the characters by drawing on them. To Let the Child Lead we also included a range of objects that could be appropriated by the child according to their wishes and imagination. We hoped this feature encourage metaphorical and symbolic play (e.g. a child could re-imagine a stick as a sword for use in a storytelling scenario). Here, the advantage of the digital representation and interaction is that the child can manipulate the objects (through scale and rotation) to further support symbolic play in ways that are not so easily achieved with traditional toys.

Figure 3. Rosebush: Supporting Role-Play

Hero/Avatar: Supporting Imaginative Play

Hero/Avatar (Figure 4) supports the child’s creative expression and imaginative play. To support Feeling of Permissiveness to Express Anything it is valuable to empower the child through imaginative creative play with avatars and superheroes. Rather than providing a set of already made famous superheroes (e.g. Batman or Wonder woman) Hero/Avatars encourages further creativity by enabling the child to create their own hero. The child can choose from a range of different options (artist-developed male/female/child bodies; skin; eyes; ears; clothes; boots; gloves; necklaces; companions; wings and auras) to create a hero of their own imagining. Swords and magic weapons are also included to promote the child’s empowerment through imaginative play. Similar to Rosebush, the pictures in Hero/Avatar reflect the themes of goodness-badness; powerful-powerless, etc. The child can also colour and resize the hero as well as use the hero in other applications.

Figure 4. Hero/Avatar: Supporting Imaginative Play

Water: Supporting New Play Opportunities

The final application in Magic Land, Water, returns Responsibility to the Child by again creating opportunities for play that cannot be offered in a traditional play therapy room environment. The Water application allows the child to joyfully play with water. Joyful play has two principal therapeutic benefits: (i) it contributes to a sense of happiness and well-being; and (ii) it is a powerful antidote to the stress of living [27]. We created opportunities for the child to make ripples, add pebbles and various stones, ships, shells etc. We also combined it with the sounds of rain and thunder and corresponding visual effects created on the surface of the water to explore the possibility and potential benefits of bringing music and play therapy together. The child can also add and remove fish, which swim around the surface and are responsive to the child’s touch. In the UK play therapy sessions are typically conducted on school premises, as such Water brings a life-like natural environment experience to the child as an alternative.
**Figure 4. Water: Supporting New Play Opportunities.**

**STUDY METHODOLOGY**

To evaluate the extent to which *Magic Land* met our design requirements we adopted a three-phase approach sensitive to the ethical issues surrounding the design of applications for mental health interventions [4]: (i) interface usability tests; (ii) mock-therapy sessions; and (iii) a real world deployment. Our evaluation of *Magic Land* does not focus on its advantages or disadvantages over traditional tangible toys. We aim to instead develop an understanding of how digital systems on interactive tabletops can be designed and what they can offer for non-directive play therapy.

*Phase One: Interface Usability Tests*

Eight children aged 4–11 (who had not been referred for play therapy) played in an undirected manner with *Magic Land* for 30 minutes. Each session was video recorded and analysed for any usability issues. Since the children were not referred to play therapy we did not analyse the videos to evaluate the extent to which our play therapy specific design requirements had been met. However, we did seek to find out how easy/difficult it was to use *Magic Land* without instruction, that is, the extent to which its functionality and capabilities were *discoverable* and the ease with which children appropriated the features into their play. All children were asked ‘How was it to play with the Magic Land?’ The answers were collected through the non-verbal affective scale (adapted from [35], see Figure 5).

*Figure 5. Non-Verbal Effective Scale (Adapted from [35]).*

We were also interested in understanding how engaging the children found *Magic Land*. The adapted ‘little man’ movie scale on the San Francisco Chronicle movie review page [14] was used to answer the question ‘How good was your play with the Magic Land?’ (Figure 6). The value and reliability of these character based Likert scales for determining children’s emotional responses to systems has been previously been established [14].

*Figure 6. Adapted Likert Scale (see [14]).*

**Phase Two: Mock Play Therapy**

As outlined by Doherty [7], role-play or mock therapy is a valuable method in medical interaction design. In particular, role-play creates opportunities for therapists to ask questions, clarify issues and increase confidence in using the system before trials in clinical settings [7]. Mock therapy is also used as standard practice in play therapy to support training and therefore therapists are experienced and well trained on how to use this technique. Three mock play therapy sessions were used to evaluate *Magic Land’s* appeal and suitability for real clinical contexts. Each play therapist conducted a 30–45 minute video recorded session with another play therapist who played the role of a child client. Mock therapy sessions were followed by focus groups and one-to-one interviews. Both the recorded sessions and interviews were analysed using thematic analysis. In addition to verbal feedback, the therapists also completed written evaluation forms to ensure every therapist’s view was accounted for.

**Phase Three: Real World Deployment**

Assured that *Magic Land* was harmless (based on the interface usability tests and mock therapy sessions) for the use in real life play therapy sessions with children, we conducted a deployment of *Magic Land* in non-directive play therapy sessions with primary school children. The study took place in one primary school and involved one play therapist (B), who used a non-directive approach to play therapy. Five children of primary school age, referred for play therapy sessions, used *Magic Land* once a week for 30–40 minutes over a period of two months. During this period other traditional toy materials (musical instruments, pencils, etc.) brought into the playroom by the therapist were also made available to children. Although parents granted permission for the video recording of the play therapy sessions, the therapist expressed concerns that the video camera could make children behave ‘unnaturally’. Given that other forms of unobtrusive observation (e.g. one-sided mirrors) were not available in the setting, we did not video record these sessions. A semi-structured interview was conducted with the therapist at the end of the deployment to evaluate *Magic Land* from their viewpoint.

**RESULTS**

The goal of our evaluation was to assess the extent and ways in which *Magic Land* fulfilled our design requirements by triangulating data collected from evaluation phases 1 (usability), 2 (mock therapy) and 3 (deployment). A deductive thematic analysis was applied to all collected focus group and interview data.

Table 1 presents the children’s engagement and simplicity of *Magic Land* use during interface. Out of seven children six reported that *Magic Land* was easy and one very easy to use. Further, two children found it excellent and five – very good.
<table>
<thead>
<tr>
<th>Simplicity of use</th>
<th>Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easy</td>
<td>Excellent</td>
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<tr>
<td>Very easy</td>
<td>Very good</td>
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Table 1. Interface usability tests results.

One should remember, however, that these results are just preliminary and indicative of what could have happened in the main study that is being conducted at this time.

**Warm and Friendly Relationship**

There were no reports or observations in either the mock therapy sessions or real world deployment indicating that either *Magic Land* or the interactive tabletop itself negatively influenced the child/therapist relationship or interrupted the therapeutic process: ‘it certainly didn’t do any harm for the therapeutic process and, if anything, it gives them an interest, got them engaged’ (B, real world deployment)

However, *Magic Land* was sometimes perceived as something that interrupted the child’s usual talk. The therapists stressed the importance of being able to follow the child’s play with any toys. Some therapists also expressed a desire to be involved in a child’s play in *Magic Land* by explicitly including features that would allow them to do something together with the child. For example, the therapist in the real-world deployment sometimes felt excluded from the relationship because the child played on the tabletop by themselves, without inviting the therapist to join their play: ‘With the tabletop it’s the child.... does something and I feel left out. I’m not engaged with them and with the tabletop the child is making a picture and I’m observing it’ (B)

Best practice in non-directive therapy is a matter of debate. Indeed, when similar issue arose in a mock therapy session discussion, one of the therapists argued that their role in non-directive therapy is to observe and reflect rather than participate (unless invited) in the child’s play.

**Unconditional Acceptance**

Some of the requirements to support unconditional acceptance were: simplicity of use; flexibility that allows for self-expression; and expression of a range of feelings and behaviours. With *Rosebush* the usability tests and mock therapy sessions illustrated that users could relate to the emotions of characters in the pictures or create their own emotional expressions for the characters to express their feelings. For example, in a mock session following a made-up scenario, a therapist who played ‘a child’ identified themselves with a picture of a sad blobby character to express how they were feeling when their dad threw them out of the window. In a second role play ‘the child’ used options to erase a pre-set emotion on the character’s face and drew a new ‘happy face’: ‘I am happy in the warmth by the tree’ (G). Therapists, however, suggested widening the range of images for emotional expression and enhancing the traditional use of emotional characters so that these images do not just reflect emotions themselves but also gender, age and cultural backgrounds of people they represent: ‘...it allows the child to bring more feeling and expression into what they’re creating and create a situation not just an image, within that image there is that situation, there is that person that is either sad, or sleepy, or upset, or angry.’ (P4, mock therapy)

After the real-world deployment of *Magic Land*, the therapist suggested that we include a “feelings chart” in the *Rosebush* application. The chart could present a number of words and pictures that describe feelings so that the child could attribute them to the characters and scenes they create. The therapist thought it would make play in *Magic Land* more ‘therapeutic’ because it would prompt the child to think about their feelings. It was also suggested that such a chart might encourage more discussion between therapist and child therefore providing deeper insight for the therapist about the child’s inner world.

**Feeling of Permissiveness to Express Anything**

We designed for *Feeling of Permissiveness to Express Anything* through the provision of opportunities for the child to create environments in *Rosebush*. In addition a child could explore present, past and future identities and engage in fantasy play in both *Hero/Avatar* and *Flying Feathers*. The therapist in the real world deployment told us that children expressed themselves in creative ways in *Flying Feathers* through the creation of scenes, which they later saved, making drawings, and mixing paints. The therapist overseeing the real-world deployment also commented that each of these toys allowed for creative expression. Children especially liked to use a frame that changed the patterns on their drawings and images: ‘They love it!’ (B). In the mock therapy sessions, pictures in *Rosebush*, *Flying Feathers* and *Hero/Avatar* also permitted creative expression through storytelling. Creating scenes through images triggered discussions around past and present events, fears, likes and dislikes. In the real-world deployment, however, the therapist expressed that the child should be provided with prompts for storytelling. For example, background pictures of where the story takes place (beach, forest etc.) or hobbies and activities for avatars. The current configuration of static pictures and a blank page was seen as ‘limiting’ and ‘blocking’ the therapy. The therapist felt it did not let her and the child explore together the options of ‘what happens next and what if’ (B).

Opportunities for fantasy play with objects like fire and snow, not available in traditional play therapy room, permitted expression of emotions. After a mock therapy session one of the therapists reflected: ‘...in one of your creations you wanted an area that would feel cold but away from that you wanted the warmth and there was two completely different feelings’ (P4).

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Fantasy play with _Hero/Avatar_ was observed as permitting users to deal with their anxieties. In an example of fantasy play in a mock therapy session one user created a strong superhero, who flew around the interactive tabletop. He used a third person narrative referring to the superhero as “he”. Subsequently the same user chose a flying background and expressed anxiety associated with flying. By the end of the play session the user had switched their language to “I” when referring to the superhero: ‘I think I’ll put myself down here by the tree where it’s warm’ (G). Therapists noted that fantasy play could also occur through re-sizing images enabling a new means of emotional expression: ‘It gives the opportunity to the child to use size to express something about the person…and it is really open for their imagination and feelings. It’s a concrete way of doing this without saying any words…’ (P4)

**Return Responsibility to the Child**

Designing to _Return Responsibility to the Child_ aimed to: (i) allow the child control over the environment; and (ii) to support a child’s sense of mastery and empowerment. Therapists suggested that playing with objects not available in the traditional play therapy room (e.g. floating snowflakes and burning fireballs in _Flying Feathers_, rain and thunder in _Water_) could empower a child to develop a sense of mastery over the environment. We observed a user playing with floating snowflakes when dealing with their anxiety of flying. She made the snowflake fly to show how cold it was up in the sky and made them stop floating to create a warm scene with a tree deeply rooted into the ground. In one of the interface usability tests a child constantly played with fireballs. As it turned out their play was preceded by a fire alarm being set off in their house the previous night. This child persistently made very large fireballs then resized them so they became very small and then vanished. After the play the child said ‘I can’t play with fire at home but here I can!’ We can speculate that the child was gaining a sense of control and mastery over their fear by playing with fire in a safe environment. Interestingly, while therapists were concerned that the loud sounds made by the thunder and fireballs would be frightening for children, we saw no evidence of this when observing children play with _Magic Land_. While it is hard to say why they found it enjoyable, the play therapist’s feedback in real-world deployment indicated that children loved being in control of it, turning the sounds on and off; rotating the images and making them quickly vanish.

**Let the Child Lead**

Designing to _Let the Child Lead_ aimed to: (i) provide the child with a choice; and (ii) allow for freedom. The unstructured nature of the elements of _Magic Land_ were described by therapists as allowing enough freedom for the child to be in control of their play. Although _Magic Land_ included a wide range of images and sounds, therapists suggested that it could further support a child’s free play and choice by letting the child upload their own pictures and music. Therapists did not comment on whether opportunities for symbolic play in _Rosebush_ supported the child’s free play and enlarged their choices.

**DISCUSSION**

In this paper we have explored how digital technology can be designed to support non-directive play therapy with primary school children, as well as provided a specific instance of such a play therapy technology designed for an interactive tabletop. In this section we consider what our findings might mean for further design of play activities on interactive tabletops intended for non-directive play therapy with children.

**Potential Benefits of Technology in Play Therapy**

We can identify the fostering of both creativity and a sense of mastery, the enhancement of traditional play therapy toys, and children’s increased interest as the main benefits of using _Magic Land_ into play therapy.

Our findings suggest that flexibility in choosing various pictures and simplicity of use of the interactive tabletop can support a child’s creative play in the therapeutic context. In addition, opportunities to change the facial expressions of the characters by drawing on them indicated a new potential way of fostering the child’s creativity through allowing for emotional expression. We identified that the child’s fantasy play on the interactive tabletop could also be supported by the introduction of sounds and play not available in traditional play therapy room (e.g. burning fireballs, avatars). Such play can foster the child’s sense of mastery, empower them and may also contribute to the development of feeling of trust in self. This feeling of being in control can further become the base for the child’s confidence and self-esteem {16}. Furthermore, _Water_ in particular illustrated how we can provide the child with opportunities for joyful play. This type of play not only enhances creative play but also can release stress and can lead to improvements in emotional wellbeing. However, with regard to the potential of interactive tabletops to foster the child’s creative expression and a sense of mastery in therapy, it’s apparent that more studies, and a more targeted methodology, are required to understand how particular interaction design decisions around interface options promote creativity and mastery rather than just provide pure entertainment.

While the literature on non-directive play therapy does not favour interactive toys, and designers and therapists discuss the appropriateness of digital toys in play therapy, children (according to play therapist’s feedback) exhibited deep interest and joy playing on interactive tabletops in our study. Some therapists’ concerns that technology would take over the traditional materials were not justified. Although very interested in the tabletop, children used other (more conventional) toys that were made available for them in play therapy room. This supports our intuition that the interactive tabletop should not be seen as a replacement but as an enhancement to traditional play therapy toys. As such Magic Land is simply an initial foray into a potential
valuable niche for the application digital technologies in play therapy. It seems that digital toys can become a means for child’s expression and we would argue that in fact there is an ethical imperative to develop more and better toys, as well as to systematically evaluate their therapeutic value.

**Potential Challenges of Using Technology in Play Therapy**

From the very beginning of this study the majority of non-directive play therapists expressed reluctance and concerns about the introduction of technology into therapy. Their principal concern was the potentially negative impact of technology on the relationship between the child and the therapist. Whilst, the therapists who engaged in mock play therapy sessions did not believe that the technology interfered with the relationship between child and therapist, we received a mixed response from the therapist who had used the technology in real-world therapy sessions. Even though interactive tabletops are used for promoting collaboration in education through externalization of thinking and encouragement of teamwork, the nature of therapeutic relationship is rather different. Therapeutic relationships are based more on warm feelings and emotions, rather than on the performance of collaborative activities. This raises a question of whether it is possible (and if so how) to explicitly design interfaces that foster such warm and friendly feelings using such collocated collaborative interfaces.

Another challenge that is closely linked to the impact of technology on child/therapist relationship is the interactivity of digital toys. Following the concerns that mechanical toys can interrupt the child/therapist relationship and absorb the child in meaningless play, on the whole we designed our interfaces elements and environments not to be imbued with behaviour that implied the sort agency that can be found in highly interactive toys. Our findings, however, suggest that it is not the issue of interactivity but the level of control over the toy that a child has. For example, Water was the most favoured toy and received extremely positive responses from therapists and children alike and was observed to foster fantasy play and to promote a sense of mastery. In fact, the main criticism of Magic Land, after the real-word deployment, was that the activities, except Water, were just static. The theme of ‘brining it to life’ was observed throughout the three Magic Land studies. This suggests that environments and unstructured non-goal oriented interactive games could be used therapeutically in non-directive play therapy if the child is given full control over its creations and usage.

**CONCLUSION AND FUTURE WORK**

As we initially argued, there is lack of exploratory studies on the use of technology and interactive tabletops in play therapy with primary school children. As such, our development of design guidelines and our qualitative study of the use of Magic Land is a much needed contribution to our understanding of how digital toys could be designed on interactive tabletops and their potential value to non-directive play therapy with children.

Our study had a number of significant limitations, the most notable of which was the small sample size. This prevents us from making definitive claims as to both the potential therapeutic value of Magic Land and the efficacy of our design requirements for digital technologies targeting non-directive play therapy. To this end we are currently conducting an extensive real world, long-term deployment from which video recorded sessions and mental wellbeing outcome measures should allow us to initiate a much-needed evidence base for digital play therapy.

However, our study makes a number of significant contributions to our understanding of interaction design for mental wellbeing. First, based on an understanding of both theory and practice we have posited a set of design requirements for digital technologies to support play in a therapeutic context. Second, following these requirements we designed and evaluated a suite of digital toys for use in non-directive play therapy.

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