ReacTickles Global: 
A Non-Textual Mobile & Networked Play Space

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ABSTRACT
This paper describes, ReacTickles Global, an exploratory project that will investigate the potential of mobile and Internet technologies to encourage creativity and social interaction for young people with Autistic Spectrum Disorders. The paper will draw upon the experiences and outcomes of the Reactive Colours project, which developed on the basis of a flexible and agile design methodology that included the ideas and experiences of the target population at all stages. The broad aim of ReacTickles Global is to explore how the inherent connectivity of mobile and web technologies can be exploited to encourage playfulness and self-expression, and to evaluate the impact of this on learning that is both socially constructed and collaborative.

Keywords
Exploratory, playful, participatory, mobile technologies, experiential, self-expression

INTRODUCTION
The Reactive Colours project, funded by the National Endowment for Science and Technology Awards (NESTA), identified through both empirical and exploratory methods that certain fundamental aspects of social interaction and communication, two of the ‘triad of impairments’ that contribute to the diagnosis of Autism Spectrum Disorders, (Wing, 1996), could be promoted in young children with Autistic Spectrum Disorders (ASDs) through technology enhanced learning environments that enable children to use their physical and perceptual skills.

A practical outcome of this research has been the fully customizable ReacTickles software. The software is unique for this target group as it action driven, responding to sensory impulse rather than instruction. By modeling the design of the software on the highly individual capabilities and behaviours of a small number of children it has been possible to design an application that encourages social interaction through the act of being playful with desktop and interactive whiteboard technologies (Keay-Bright, 2007a). Prompted by these findings, a proposed new phase of the research, described in this paper, will develop a mobile version of the ReacTickles software, called ReacTickles Global. Through this project we will evaluate whether mobile and Internet technologies, in promoting feelings of playfulness and feeling good about oneself, can encourage creativity and flexible thinking, the third of Wing’s (1996) diagnostic criteria and whether this can lead to increased motivation to share experiences with others.

Central to playfulness is the need to ensure that the cognitive overload induced by many digital interfaces is reduced. This means that the activities must enable children to use skills their physical and perceptual skills, rather than purely cognitive ones. Technologies that appeal to a full range of skills are likely to be far more memorable and engaging for this target group, who will generally find sensorial experiences to be stimulating [12].

MOBILE LEARNING
Although research on the benefits of mobile learning is in its infancy, there is growing acceptance that mobile, personal and wireless devices are radically transforming societal norms of discourse and knowledge; the likely impact of both the technologies and pedagogies present significant challenges to formal educational practices [13].

For most young people mobile and Internet technologies shape the culture in which they live; increasingly ubiquitous, they offer seemingly endless opportunities for personalization. Many educational theorists have identified
the potential of mobile devices as powerful resources in encouraging learning communities and meta-level thinking skills [9]. For social interaction via these environments to build critical knowledge, however, there must be willingness from others to participate in communicative exchange. Mobile communication, although ‘personal, situated and authentic’ [13], has an overtly cognitive dimension, and the opportunities for experiencing the sensory qualities for self-expression and playfulness which humans have naturally evolved to acquire remain limited. Much of the theory that surrounds mobile learning concentrates on the pervasiveness of the device in relation to the mobility of learners and the contextualization of learning environments [9]; there is very little research to suggest that mobile devices could have untapped qualities for self-expression though more abstract or symbolic expressions of ‘self’. However, online environments, particularly role-play games, have been shown to allow enthusiastic participation in the symbolic arenas of "embodied life" where players can then devote themselves to indulging their fantasies without guilt or fear of judgment [14]. In response to this ReacTickles Global proposes to explore how mobile and web technologies, through their inherent connectivity, can provide a portal for experimental expressions of self. The role of the technology is to provide a digital playground for constructing identity and discovering others. The wider application is to support constructivist approaches to learning, enabling learners to construct new ideas or concepts based on both their current and past knowledge [11]. In this context intersection of technology, child and practice could lead to a learning gain that is both socially constructed and collaborative.

**REACTICKLES GLOBAL**

An initial idea to migrate some of the salient features of ReacTickles to mobile devices won an award for “Innovative New Forms of Socially Responsive Media Across Multiple Platforms” in the Content 360 competition at MipTV in Cannes, France, in 2007. This led to a contract to develop a concept with promotional support from the National Film Board of Canada.

In this paper I describe our approach to concept development, which although heavily influenced by the Reactive Colours research, will endeavor to find novel and experiential ways of using mobile technologies, based on their unique properties for data capture, ie keypad, camera, GPS systems. In the same way that the ReacTickles rendered visible the idiosyncratic interests of its unique “players” in response to exploratory actions with the body or input devices, ReacTickles Global presents an opportunity for self-expression with mobile devices. For example, users might create ReacTickles using the numerical keypad or camera and add dynamic movements. In addition, it is proposed to enhance this experience through the Internet and to create a generative map of user “art”. In contrast with the current the Reactive Colours website (www.reactivecolours.org/gallery) which hosts ReacTickles in a “static” gallery, the idea for ReacTickles Global is to develop a more responsive environment for users to submit their creations and connect to ReacTickles created by others.

**RATIONALE**

**Physical and Perceptual Engagement**

Underpinning the design of the ReacTickles software has been the role of tangible interaction in learning and the beneficial effects on cognition that arise from physical and perceptual engagement for children with ASDs. ReacTickles used non-representational visual art forms to stimulate relaxation and to reduce the cognitive load. The software maximized on the notion of ‘calm technologies’ afforded through the tight coupling of the physical properties of input devices [15], (i.e. mouse, keyboard, mouse, interactive whiteboard and microphone) and a range of visually dynamic responses, that directly reflected user interest. In relation to this ReacTickles Global will investigate whether the unique properties of the hand-held device can encourage self-expression, not only as an authentic and personal means to enhance communication but also as a tool for making and manipulation [4].

**Visual Arts**

The visual arts, like other perceptual experiences, prompt creative self-expression through our evolved sensory and cognitive relations with the rhythms and modes of dynamic visual stimuli. As human beings we are naturally predisposed to respond to certain colors and other simple forms of visual phenomena. The vibrancy of tones and synchronicity of rhythms that underpin artistic practice provide an accessible route for personal expression and mutual exchange, demonstrating positive, emotional and motivational states of intent, pleasure and amusement [1]. For children and adults with profound disabilities, for example restricted mobility or limited ability with verbal language, the physical and perceptual qualities of non-verbal communication make it easy to mirror another’s expressed emotional state and to participate through actions such as intonation, rhythm and tempo. These imitative reactions remain an unconscious way to please and to induce positive feelings to others by communicating accord [1].

**Technology as a Medium for Self-Expression**

The concept of exploring technology as a medium for innovative aesthetic self-expression is not a new one. Avant-garde artists have long been fascinated by the possibilities of reading one system through another - using the tools and forms of one discipline to do something other than its original intent. For example, the Fibonacci number series has inspired visual and musical works of art through history. Long before the invasion of digital media, animator Oskar Fischinger created ‘visual music’ using shapes and primary colors as a direct interpretation of the elements of
musical notation. In the mid 1970s, Rich Gold's algorithmic sounds led a group of like-minded artists to form the League of Automatic Music Composers (1978), his Goldographs became the inspiration for other forms of choreographed social performance [3]. Artists have traditionally engaged in making as an act of intrinsic pleasure, not for mass audience appeal, but for their friends and peers. This culture of sharing and openness is thriving among interaction artists; ReacTickles Global, being intrinsically rewarding and fun, may have similar altruistic appeal as it maximizes on our innate desire to communicate with others, to strengthen bonds and make new alliances.

PROPOSED METHODOLOGY

Recent research on the role that people with learning difficulties have to play both as the subjects of research and as researchers themselves calls for innovative methods that enable and empower all participants to have a voice in interventions that are likely to impact on their daily lives [10]. The Reactive Colours project addressed this issue by placing young children on the Autism Spectrum, together with their families and teachers, at the heart of the development in face-to-face settings and through the Reactive Colours website. The aim was to introduce a level of participation that would be missed had the project solely relied on empirical methods. In order for the target group to be fully represented it was essential to devise a model that enabled the emergent, unpredictable and idiosyncratic behaviors of people to present themselves without fear of judgment.

For many of the young children involved in the study simply having a person present who was unfamiliar to them could be heavily disruptive, so at all times it was necessary to work at the discretion of teaching staff but to ensure that teachers could introduce activities to children in such a way as to allow the child to lead and demonstrate abilities that might not have been obvious within the confines of a typical classroom situation [5].

In addition to the involvement of a small number of children at a Special Educational Needs school, the rapid iteration and release of ReacTickles software prototypes on the Reactive Colours offered a ‘suck it and see’ opportunity to experiment with the software and give feedback through a variety of online methods. Significantly, the openness of the project prompted users to share with their experiences with others. For the young children using the software in trials at school, the web site had the added benefit of extending the learning experience to the home and other environments (Figure 1).

Figure 1: An example of a ReacTickle Screen © Cardiff School of Art and Design

ReacTickles Global will build on this democratic and agile methodology in order to deepen our understanding of the potential of people who may lack motivation or skill with textual and verbal communication, in an authentic context that explores the constituents of interaction design. The process of involving stakeholders in the design of ReacTickles Global will begin with a design workshop and rudimentary prototypes, which will be offered to a small group of young people to play with. The purpose is to find out what they may find interesting in an application such as this as and to invite them to contribute ideas, which will be used to inform further development. Plans are underway to work with a ‘focus group’ of young people from aged 9-10 years at a holiday club that provides care for young people with multiple learning difficulties. Giving agency to make suggestions and influence decisions to a small group will provide opportunities to explore the kinds of creative expression people find meaningful and wish to share, if at all, before considering wider applications for the technology. Trust can be established on the basis of openness and transparency, and unpredictable responses can be monitored and evaluated in the contexts in which they arise. It is important for the development of this concept that ideas can surface fluently, without pressure to ‘get it right’. This approach supports the belief that we are best placed to appreciate the benefits of technology when we allow people to explore, in other words, it is not about what technology can do, it is about what people do with it. Functionality will be considered in terms of learner objectives, so that requirements are refined without imposing premature design or technology on the outcome.

The programming and design team will iterate versions on the basis of a continuous flow of ideas generated through the collaboration with the focus group. The aim is for short feedback loops, with functioning prototypes resulting from each cycle, so that value to the learner is considered in tandem with ‘usability’.

To ensure that our methodology is open and transparent, versions of the software will be released as it evolves on the ReacTickles Global wiki. In addition to collaboration

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with the focus group, an open-source method for development and distribution will enable people to freely comment on, adapt, modify and share ReacTickles Global without the bias of questionnaires or observation.

Evaluation Challenges
As the technology application becomes robust we will evaluate whether:

1. playfulness with mobile devices can support creative thinking and imagination;

2. the emphasis on visual representations of self can increase the confidence to communicate with others;

3. an open online map can generate an interest in the activities of others.

Being playful is generally regarded as a fundamental element in the creative process. The National Advisory Committee on Creative and Cultural Education (NACCCE) describes creativity as an “imaginative activity fashioned as to produce outcomes that are both original and of value” [8]. However for many young people with ASDs their intuitive playfulness has been compromised by learning activities that are overtly cognitive, appealing to logical and systematic thought processes at the expense of more holistic, experiential approaches [12]. This research will undertake an extensive assessment of existing metrics that are designed to measure creativity and imaginative thinking. The goal of the assessment will to discover an effective evaluation strategy for learning that is tacit and experiential.

CONCLUSION
Reactive Colours was a discovery-led project that gained critical acclaim because of the vital relationship between the design process and the creation of playful digital activities for autistic children, as their unpredictable and idiosyncratic behavioral patterns rewarded the research with a new perspective on interactivity. The interdisciplinary approach to collaboration presented a challenging paradox requiring both imaginative and empirical design methods. Whilst it is often critical to have statistic analysis to satisfy scientific approaches, it is of equal importance, within this area of research, to recognize the value of the anecdotal and spontaneous responses that flow when people are free to invent their own purposes for technology. We also learnt that using non-representational forms encourage fluency and experimentation. When there is no language or cultural constraint pleasure can be derived from the simple rhythms and modes of preverbal communication, such as touch, proximity and synchronicity [6]. Building on these achievements, but equally exploratory, ReacTickles Global will explore ways in which people can relate to each other through the inherent connectivity of mobile technologies. It is our belief that participatory design has a responsibility to faithfully represent the interests and ideas of disenfranchised groups in novel and exploratory ways. In this context, design has the potential to only address and solve problems but to challenge perceptions, reduce the barriers to inclusion and ultimately, to increase advocacy.

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