Imagine That: creating a ‘third space’ for young people with High Functioning Autism through the use of technology in a social setting

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ABSTRACT
In this paper we describe the knowledge building process involved in creating The Lab, a technology-enabled ‘learning community’ of young people with Asperger’s Syndrome (AS) and High-Functioning Autism (HFA), and their parents. We use Vygotsky’s (1978) cultural-historical approach to analyse social engagement through material, individual, and social interactions and the emergence of a ‘third space’ (Gutierrez, 1999 & 2008) as a particular kind of ‘zone of proximal development’ in developing an effective learning environment. We speculate on the centrality of the sensory and perceptual differences of AS and HFA people as contributing to a better understanding of the role of embodied imagination and creativity as essential aspects of their ‘difference’ and their distinct patterns of social and cultural relations.

Author Keywords
Autism, activity theory, engagement, ZPD, third space, embodied cognition

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(HCI): Miscellaneous.

INTRODUCTION
Autism Spectrum conditions are generally understood to consist of difficulties in perceiving social and communicative aspects of everyday interactions and environments, and implicit meaning in written or spoken language (Baron-Cohen, 2008). Many people on the Spectrum also experience differences in ascribing mental states, intentions and feelings and thoughts to other people and things, as well as differences in sensory and perceptual experiences of the world around them, such as responses to sounds, light, smells, colours, textures or tastes.

This paper focuses on The Lab, an after-school technology club for young people with High Functioning Autism (HFA) or Asperger’s Syndrome (AS) who enjoy working with computers. Club members partake in mentored programming, 3D, design and gaming activities within a relaxed social environment. Activities include regular competitions in game making and digital design, but the environment is relatively unstructured and participants are free to explore their own interests individually, or with peers and mentors. In a recent video, The Lab’s facilitators and parents formulated basic principles that focus on the positive aspects of HFA/AS:

- We think differently
- We tend to be big on truth, knowledge and perfection,
- We can be great with detail and highly original
- We may choose individual creativity over cooperation
- We’re not great socially, but what do you know? (the video then shows participants interacting at The Lab)

We now speculate that we could also add notions of embodied learning and imagination through the following principle: ‘We see, feel and hear differently’.

ACTIVITY THEORY (AT) AND THE ZONE OF PROXIMAL DEVELOPMENT (ZPD)
Activity Theory (AT) is a framework for analyzing human activities within their context. The basic concept of AT is that learning is a socially-situated and artifact-mediated human activity. Its critical contribution is to analyze the social nature of human activity by describing the community in which the subject acts. In a learning community, tools mediate the processes between subject and object; rules mediate the processes between subject and community; and division of labour mediates the processes between community and object (Engeström, 1987; Leont’ev, 1981; Vygotsky, 1978).

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Engagement Theory emphasizes the crucial importance of human interaction in group activities, not individual interaction with an instructional program. It is based on the idea of creating collaborative groups that work on challenging and meaningful projects. This view has much in common with Vygotsky’s socially-based constructivism. Three characteristics of the ZPD promote motivation and independent functioning: they are non-controlling, optimally challenging, and transfers locus of control to the learner (Sivan, 1986). The first two relate to promoting intrinsic motivation, an innate desire to be competent, and the third relates to self-determination, or behaving without external pressures in accord with the individual’s feelings and needs. The relationship between The Lab’s mentors and members provides a framework for motivation to be integrated into practices, for cognitive and emotional needs to be met, and for competence to be achieved. Also important here is the sense of safety engendered by a setting where young people with AS/HFA are with others like them, and so are free to be themselves without being subject to the social stigmas and bullying they frequently encounter at school.

Moving from Vygotsky and socially constructed learning to Papert’s (1980) constructivism-inspired notion of ‘Constructionism’, we find that Papert has much to say about the use of computers for learning, including ideas about knowledge construction through the physical building of an object, model or game. This, in turn, has inspired Mitch Resnick, the developer of the ‘Scratch’ programming language and founder of the ‘Computer Clubhouse’ network, an operational model for The Lab through its notion of a safe and supportive space within which disadvantaged young people can experiment and learn in their own time from mentors and each other.

Such spaces are particularly suitable for children with autism, whose lack of play skills lead to fewer opportunities to gain the social, emotional and cultural experiences needed for normal development (Jordan & Libby, 1997). This failure can be self-reinforcing, resulting in children remaining socially marginalized. Play has an important role in the ZPD because ‘the child moves forward essentially through play activity’ (Vygotsky, 1978: 103); play creates the zone of proximal development. Leont’ev (1981) explains that this activity ‘contributes in a decisive way to the development of the child by promoting new actions and psychological processes that anticipate a new episode of development’. An important aspect of The Lab emerging in feedback is that members quickly feel ‘at ease’ due to its exclusively AS/HFA membership, and so are much more likely to play and to interact than in the schoolyard or classroom. Additionally, The Lab differs from school in that it does not conduct structured group teaching. Rather, the mentors - who are generally in their early 20s and tend to share interests with members - stimulate members’ interests with challenges and wait for responses to come back once members begin to experiment on their own. Some members also teach technical skills to each other, benefitting both members involved in the exchange.

The Lab’s model has evolved during its 18 months of operation, a process supported by analysis of...
observational data from facilitators, interviews/surveys with parents and discussions with members. Schutt & Linegar (2010) identify engagement as a process of involving two active parties, each possessing power and purpose (Ainley & Sheret, 1992). At The Lab, success generally follows when members’ sense of personal agency and interest dovetails with the use of highly interactive and immersive technologies such as Minecraft. This can be represented using AT’s framework (figure 3).

THE CREATION OF A ‘THIRD SPACE’
It becomes evident that a unique social space, co-constructed over time through interaction between members, families (parents and siblings) and importantly, facilitators and mentors, has been most influential in impacting members’ practice and development of important social and technical skills.

The notion of multiple activity systems within one physical context, and how these overlap to create a ‘third space’ (Gutierrez & Stone, 2000) or ‘interacting activity systems’ (Engestrom, 2001) can offer an important insight into how and when interactive computer-based activities impact on social interaction and skills. The effective use of technical activities in eliciting social interaction and social play becomes a task of ensuring the greatest interaction between these social and technological domains. It is the impetus behind The Lab, since the most positive outcomes were found to be in the overlap between the two activity systems (figure 4).

COMPUTER-HUMAN INTERACTION AND EMBODIED LEARNING AND IMAGINATION IN AUTISM
Our work with The Lab has led us to speculate on the centrality of the sensory and perceptual differences of people with AS/HFA as contributing to their ‘difference’ and that a better understanding of the role of embodied imagination and creativity in autism spectrum conditions might increase our understanding of their distinct patterns of social and cultural relations.

Illustrating the overlap between the aforementioned two activity systems is the popularity of Minecraft at The Lab. Minecraft (http://www.minecraft.net/) is an immersive virtual sandbox-building environment. It allows users to build constructions out of textured cubes in a 3D world and shelters in a fixed grid pattern representing materials such as dirt, stone, various ores, water, and tree trunks. This gives Lab members the freedom to choose how to interact with the game, whose primary goals are to survive attacks by monsters. Members create their own environments that can be explored by them and by other members. Participants feel in charge of the world they create through Minecraft because they ‘own’ it. This makes them feel in control and want to share their ‘world’ by inviting friends into it and exploring it together, thereby combining a tactile and sensory experience with a social one.

Bracher (2012) suggests that recent moves towards recognising the centrality of sensory and perceptual differences indicate gaps in our understanding of the relationships between neurological differences and distinct patterns of social and cultural relations. In investigating the impact of embodied user interfaces on social communication and learning by children with autism, Keay-Bright (2008) calls for a participatory approach to the design of embodied user interfaces. In such interfaces, manipulation is intuitive and expressive acts foster improvisation and an opportunity to encounter experiences independently of skill, knowledge or directed task. Keay-Bright investigates the potential of Reactickles software (http://reactickles.org) designed with autistic children to offer a rich physical and cognitive experience that simulates the perceptible characteristics of phenomena such as elasticity, velocity, gravity and inertia. Williams, Gumtau and Mackness (2012) call for research approaches that move on from notions such as constructivist, contextual, inquiry/problem-based, learner centred or multi-media learning, to a more integrated notion of ‘whole body’ engagement in the world, especially when working with children on the autism spectrum.
spectrum. They report on research investigating the multisensory interaction between perception, action, interaction and making sense of the world, which they call ‘the synaesthetic experience, learning and action’.

Baron-Cohen (2008, 2009) observes that objects offering repetition, pattern and similarity combined with colour and rhythm are regularly used by autistic children as methods to reduce anxiety, but that little has been done to interpret these sensations in digital environments. Through its participatory approach, The Lab is well placed to explore opportunities to use technology to investigate the sensory and perceptual differences of young people with AS/HFA.

CONCLUSIONS
At the core of The Lab is the overlap between its technology and social domains of activity. These domains create mutually reinforcing activity systems, in that social connections are forged through common technological interests in a process described as ‘object-centred sociality’ (Engeström, 2005), and technology skill development is supported by the social nature of the environment. These two overlapping aspects are reflected in project data collected to date. This includes a confidential online survey with parents undertaken in June 2012, video interviews undertaken with both parents and participants in December 2011, mentor observations and feedback volunteered throughout by parents and participants. The following quotes are typical of parents’ responses:

The Lab is really the first place that they’ve experienced where they're not the different kid trying to fit in. Here they can feel that their ideas are valid, that their skills are recognised and appreciated, and more than anything else it's a safe place where they can feel free to be themselves, and also start to really express themselves as a friend, to start to learn what friendship is all about.

I think he's just so excited that he's amongst people that feel about animation and computer games like he does.

Whilst all parents and participants supported the Lab’s way of working, some parents also expressed a desire for more structured activities to further boost their children’s skill development. This is something the Lab project team is currently investigating, including how technical skill development might continue over a longer term of involvement. The Lab project team is also investigating how The Lab’s social environment might be effectively replicated in other places and contexts. This includes examining variables involved in the running of the program such as timing, space layout and activity typess.

REFERENCES
Ainley, J. and Sheret, M. Progress through high school: a study of senior secondary schooling in Australia.


Schutt, S. and Linegar, D. Agents of Engagements: Trialling the use of collaborative technology workshops to engage at-risk youth and teachers in VET. Proc. 2010 AVETRA Conference, Gold Coast, Australia

