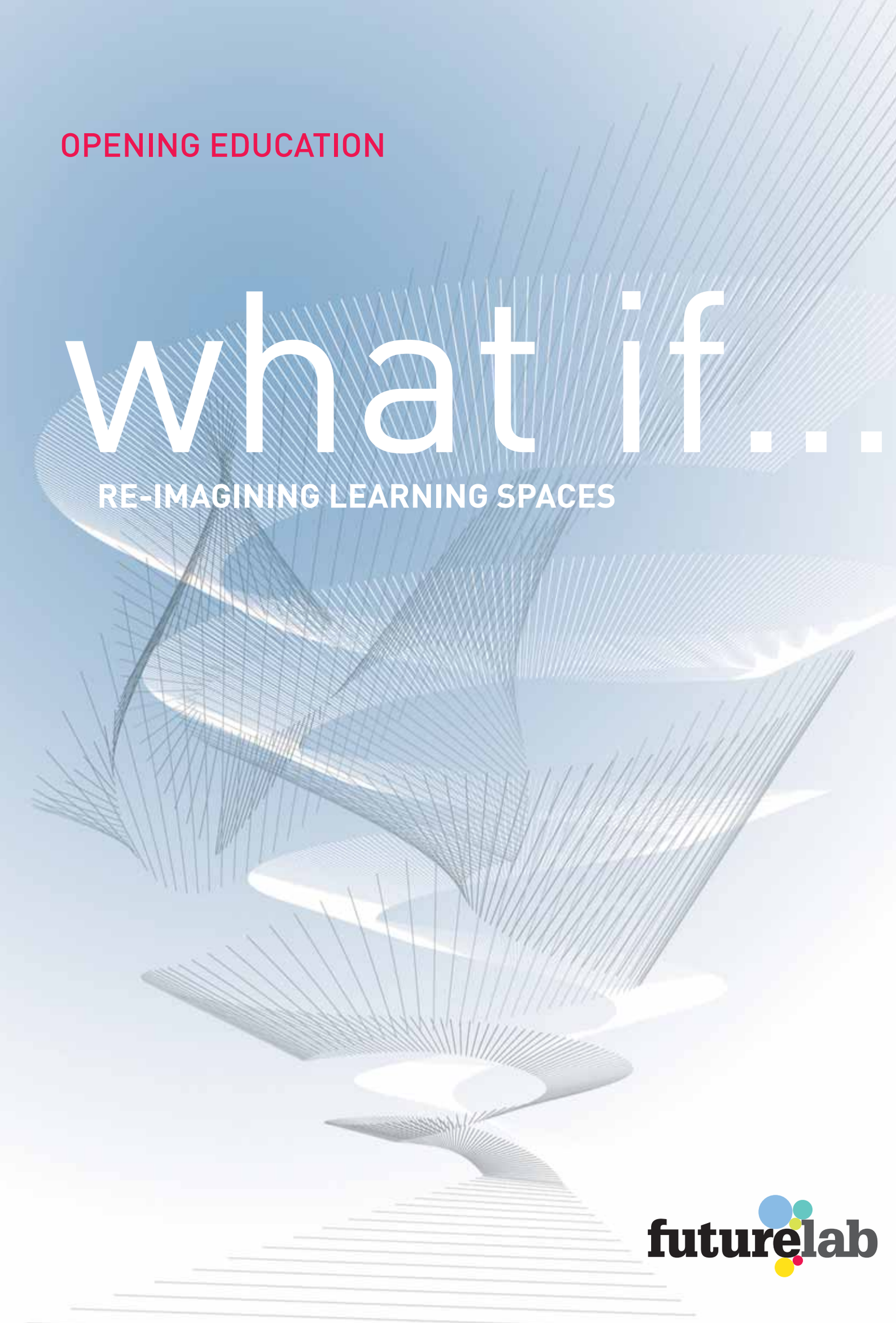
OPENING EDUCATION

what if...

RE-IMAGINING LEARNING SPACES



futurelab

Contents

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Futurelab 2006

About The Opening Education Series

What is the Opening Education Series?

Opening Education is Futurelab's 'blue skies' publications series. As its name suggests, this series is intended to open up areas for debate; to provoke, to challenge, to stimulate new visions for education.

The ideas and arguments presented in these publications are generated in a variety of ways – through events and consultations with thinkers, practitioners and policy makers from a variety of sectors, through thought-experiments and visioning workshops, and as unexpected 'side effects' of the research and development activity that goes on at Futurelab on a day-to-day basis. The series complements our evidence-based research publications by offering a space to propose new ideas that may not yet be ready for implementation or rigorous evaluation.

Why publish this series?

All the research into innovation in industry and commerce suggests that having a superfluity of ideas is essential for growth and development – education is no different. We need to have a surplus of potential ideas, visions and plans so that we have a range of strategies to draw on when we face the serious educational challenges that social, economic and technical change presents us with. Not all ideas will become a reality, not all ideas will survive in the form in which they were first presented, but what cannot be denied is that education, and educators, need to know that there is scope to dream; to think about new approaches and different ways of doing things; to know that the ways we do things now will not be always and forever the same.

It is in this spirit that we publish these ideas. They are experimental and exploratory, both in their arguments and in the forms in which we publish – they don't all look the same, feel the same, say the same thing. They do not all rely on text to make their arguments (in this publication for example, we are exploring rapid creative responses by visual artists to generate new ideas). They all, however, attempt to open up a new area for debate and for action, and we look forward to hearing from you and working with you to determine their fate.

Keri Facer
Research Director

1. Introduction

At the present time we are witnessing a massive investment in the design and build of new schools to equip the UK education system for the 21st century. The economically and architecturally ambitious Building Schools for the Future (BSF) programme is setting out to rebuild or renew every secondary school in England over the next 10 to 15 years. But how much of this effort has been inspired by an equally wide-reaching educational vision? Already, evidence from the Commission for Architecture and the Built Environment (CABE) is suggesting that the design quality of recently built schools is not good enough to achieve the Government's aim of transforming children's education[1]. If the design quality is insufficient – what is the quality of the educational strategy underpinning that design?

The design of these schools will shape the ways in which we think about, experience and conduct education in this country for the next 50 to 100 years. The educational visions upon which they are built will be solidified in bricks and mortar, the learning relationships they envisage will be captured in concrete and glass. The institutions created now will physically encapsulate and determine the ideas it is possible to have about education, learning and learning relationships until the dawn of the next century.

That is a long time to spend working in institutions that do not engage with the educational challenges of the 21st century and which do not exploit the resources that it has to offer.

This paper is not concerned with questions of 'design quality', nor with the funding mechanisms enabling the build of new schools. Instead, our aim is to ask the following questions:

- What are the educational visions and debates needed to underpin the design of new educational institutions?
- What are the digital resources which may reshape the practice of learning in the 21st century?
- What alternative visions could be conceived for the 'schools of the future'?

1 A recent report from CABE identified that "the design quality of secondary schools completed over the last five years is not good enough to secure the Government's ambition to transform our children's education... Too many of the mistakes of the past look like being repeated in the first wave of schools being built under the Building Schools for the Future (BSF) programme". Over half of 52 schools audited in the last five years were assessed as 'poor' or 'mediocre'.
CABE (2006). Assessing Secondary School Design Quality. **www.cabe.org.uk/AssetLibrary/8704.pdf**

Our aim is to ensure equal attention is paid to the educational visions underpinning new school designs as it is to questions over the abilities and costs of architects and builders. Without this educational debate, the new schools currently in development are likely to become straightjackets for educators and learners, rather than sites to support, encourage and develop learning in all its guises over the next 100 years.

This paper arises from a two-day workshop bringing together individuals from a range of design, teaching, mentoring, policy and research backgrounds. The workshop aimed to 're-imagine' learning spaces, and actively encouraged the development of 'what if' scenarios that push the boundaries of current thinking and encourage debate of the relationship between educational goals and the design and resourcing of spaces for learning. These scenarios are presented in the paper, not as recommendations, but as a stimulus for discussion.

The images in this publication are included to prompt debate and discussion rather than to act as simple 'illustrations' of the text. They were generated by young artists as creative responses to the scenarios presented in the document. Translated into image, these 'future visions' of educational spaces are at times challenging and distopian, at others delightful and engaging. They all, however, serve the purpose of questioning our assumptions about what constitutes a 'learning space'.

2. Building 'educational visions': SOME CONSIDERATIONS

"Instead of starting from the physical, you need to start with the program you know you need to have. Then you can see how your existing structure won't let you do that. And then you do the work of making physical changes."
(Dr Betty Despenza-Green, Director, National High School Initiative[2])

'Building schools for the future' is about building environments in which learning will happen in the future. It is first and foremost about education, not architecture. It's about fostering learning relationships, not just combining bricks and mortar. If these spaces are going to work, we need to know what sort of educational interactions and practices we want to take place in them, and to build from that vision to design the spaces, resources and environments to support them. For these reasons, we need what Torin Monahan calls the 'built pedagogy', the educational vision to underpin the design principles for the learning environment[3].

Schools are already having to deal with huge uncertainties related to their viability and sustainability and will face a range of other significant demographic changes over the next few decades, including changing age profiles within local communities, fewer numbers of school age children, the transience and mobility of local communities, as well as a whole range of other economic and societal developments that are likely to impinge significantly on the types of skills and competencies required in the future. In order to respond to such uncertainty and serve the changing needs and diversity within local communities, new learning spaces cannot be rigid or 'exclusive' and need to consider how to build on and interconnect and integrate with informal and formal provision that already exists. Designing new learning spaces requires us to consider not only the purpose of schooling now, but far more importantly, the changes necessary for a better, more holistic education for learners in the future.

We need to start, then, by asking not 'what buildings do we want?' but instead 'what sort of education do we want to see in future?' We need to ask not 'how

2 Despenza-Green, B. Director, National High School Initiative at the Small Schools Workshop based at the University of Illinois at Chicago, quoted in 'Innovative School Design for Small Learning Communities'. **www.essentialschools.org/cs/resources/view/ces_res/208**

3 Whilst this is an exceptionally useful concept to use to think about how to design new learning focused spaces, it must also be remembered that the underlying philosophy behind the term 'pedagogy' implies a particular set of relationships and ways of learning, which not all learning spaces need necessarily be designed around. Monahan, T (2002). Flexible space and built pedagogy: emerging IT embodiments. Inventio, vol 4, no 1. **www.doit.gmu.edu/inventio/past/display_past.asp?pID=spring02&sID=monahan**

many classrooms do we need?' but 'what sorts of learning relationships do we want to foster? What competencies do we want learners to develop? What tools and resources are available to us to support learning?' Indeed, the OECD Schooling for Tomorrow[4] group identified several dynamics that need to be taken into account when considering alternative models of learning and school systems. Immediate contextual dimensions, such as new partnerships with the community, wider cultural influences, as well as establishing clarity about critical learning factors, such as the role of the learner, the organisation and pedagogy, were all thought to be crucial.

Until we ask these questions, then, we will not be designing learning spaces for the future, but will simply be reproducing schools of the past, albeit with more comfortable seating and better ventilation.

This section of the paper is intended to raise some questions that we strongly feel should form the basis for any discussions about the educational visions for future learning spaces. Whilst we acknowledge that there are exemplary schools, consultants and local authorities which embed these sorts of questions in all their design discussions, our argument here is addressed to those to whom these sorts of issues are seen as marginal or irrelevant in the decision-making process for commissioning new school design.

2.1 What sort of education do we want in the future?

Will 21st century education involve the teaching of the same things, in the same ways, by the same sorts of professionals, to the same sorts of children, for the same purposes – just in more attractive and functional buildings? If the emerging debates over the nature, function and purpose of education are anything to go by, this is unlikely. Instead, we may need to consider the possibility that the educational vision underpinning schools of the future may be radically different from those which informed the school design of the 19th and 20th centuries.

At the present time, for example, we are witnessing a radical challenge to the traditional relationship between the educational institution and the individual.

4 See: **www.oecd.org/topic/0,2686,en_2649_34859774_1_1_1_1_37455,00.html**

While still open to some debate[5], the concept of **personalisation** suggests a need to reconfigure educational systems to better reflect the needs of the learner and move away from a one-size-fits-all solution. It implies a new view of the learner as active partner in developing their learning pathways, choices, curricula and experiences, rather than a passive recipient subject to a universally applied educational experience. A call to personalise education suggests a need to create learning spaces which account for the different learning styles, needs and interests of individuals and which offers learners greater choice over what they learn, how they learn it, and even when and where they learn. This new 'educational contract' between learner and education system ultimately forces us to reconsider the relationships and practices that occur within these formal learning spaces. It opens up the possibility of learning across institutions and beyond institutional walls, it requires an engagement with informal learning spaces and the creation of connections between these and formal sites of learning. It opens up the possibility of learning with different individuals and organisations, of searching for relevant expertise and the creation of flexible and changing learning communities that will change throughout a 'learning career'.

In thinking about how educational futures might be configured and how spaces might be designed, then, we need to ask how we might offer learners greater choice over the following:

When they learn – will learners choose to access resources beyond current formal hours, days and term dates? Could they control the pace of what they are learning rather than adhere to the current largely rigid and imposed age–stage expectations?

Where they learn – could learners choose to learn elsewhere other than the school? Could new technologies enable learners to access learning opportunities from a range of locations, such as the home, a community learning centre, a youth club, a university, college, hospital, another school, or indeed in the street? Will learners also be able to access learning from any location within school buildings, including foyers, lounges, common spaces, corridors? Could they also learn in outdoor or remote spaces?

5 For example, see the following for different representations on the concept of personalisation:
Leadbeater, C (2005). Personalisation Through Participation: A New Script for Public Services. London: Demos
Green, H, Facer, K, Rudd, T (2005). Personalisation and Digital Technologies. Bristol: Futurelab.
www.futurelab.org.uk/research/personalisation.htm

What they learn – would individual learners be able to learn a diverse range of skills and subjects? Would diversity be supported, with learners encouraged to be involved in knowledge creation, exploration, authentic and situated learning? Would learners be supported and encouraged to develop their own unique learning pathways?

Who they learn with – can we re-imagine learning spaces that would support learners working collaboratively, not just with peers but with a range of other people, such as other learners in different classes, year groups, schools, other formal and informal education institutions, people from the wider community and experts in the particular field which they're studying?

How they learn – can we design spaces that would give learners choice over their preferred ways of working, including learning style, who they work with, where this takes place, the media they use, the ways and times they are assessed and so forth?

In a personalised system, choice should not just mean offering customised content to teach pre-determined subject materials but rather it should mean working with learners to give them far greater choices and responsibility over the pace, style, content and environment for learning.

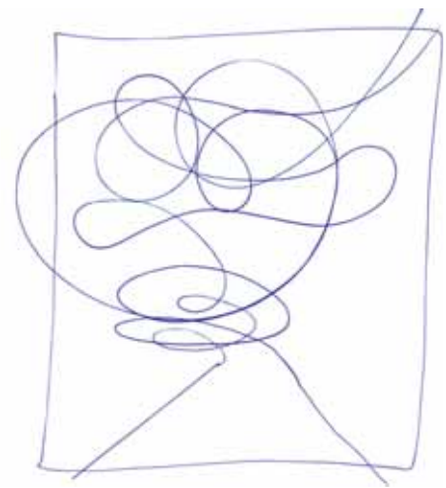
The Government is encouraging all schools to work in partnership to offer 'extended' services[6]. It may be argued that these links are being encouraged as they underpin standards and targets agendas and are largely conceived as a uni-directional means of extending the values of the school into the domestic sphere. In re-thinking learning spaces for the future, should the 'extended school' supposition be reconsidered, with the emphasis shifting to 'extended learning'? If we are to offer a more personalised education system then we need to consider how to offer learners the best and most authentic learning experiences, ones that have relevance and draw on their existing needs and interests and those of other individuals within the community and other organisations.

6 www.standards.dfes.gov.uk/studysupport/impact/extendedschools/

This rethink of educational relationships raises the following question:

To what extent will the design of new learning spaces enable, encourage and facilitate more personalised educational experiences?

At the same time, we are witnessing a growing debate over what children should learn. The question of the curriculum is being re-examined[7] and new experiments in **curriculum design** are emerging both from Government and at local and school levels. We are seeing an emergence of competency-based curricula – cutting across subjects and encouraging team-based teaching[8]. We are witnessing new contracts and principles shaping school provision which override the National Curriculum by defining a new 'holistic' offer to the children in the schools. We are seeing the conflation of existing curricular provision into shorter timescales, and different age groups being taught together. We are also seeing the emergence of 'new' subjects and, with increasing interest in diplomas or the International Baccalaureate, different ways of organising children's routes through subjects. At the same time, increasing interest in emotional intelligence, 'happiness' and 'creativity', alongside a renewed emphasis upon considering the 'whole child' and upon Every Child Matters[9], leads to a rebalancing of the 'pastoral' and the 'academic' in the concerns of schools and communities.



7 See the work of the QCA Futures group which is addressing the question of what a 21st century curriculum might look like.

8 See RSA Opening Minds curriculum (**www.rsa.org.uk**) and Futurelab's Enquiring Minds curriculum (**www.enquiringminds.org.uk**)

9 **www.everychildmatters.gov.uk**

However, as Lippman[10] argues, to date learning environments have principally been developed for "short term information mastery goals" where we largely see:

"...a single adult interacting with many in relatively impersonal social relations in which the social rules, principles, and guidelines govern the activity settings... Furthermore, as learning has been structured around individual activity, the school setting has been organized to control behaviour. Schools, like prisons, have been designed with classrooms adjacent to one another along either single or double loaded corridors. This arrangement limits the types of activities that can occur and symbolically reinforces for children that they have little power to make changes in their daily lives, affect their environment, or opportunities to examine alternative ways of living."

Lippman further contends that in considering future school designs there is a need to move away from the notion that such places need to be organised for moving from one activity or subject setting to another, but rather as places which support knowledge and action so that learning extends across and between settings.

What if learning spaces were designed around a particular function, process or learning goal - would this affect the design? For example, would it be possible to have learning spaces that were designed specifically to develop 21st century skills, such as creativity, innovation, risk taking, collaboration, presentation and performance skills, or to promote health, helpfulness, discovery, concentration, honesty and so on? Steiner schools, for instance, offer an alternative educational approach and many of the spatial designs focus on nurturing young people through a holistic approach to early development by promoting environments that feel 'safe' and comforting. Given the numerous recent fears raised in relation to children's health and wellbeing, might the design of new learning spaces consider embedding tactile, sensory and playful learning tools firmly within the design process, thereby creating both very different and non-threatening environments?

These debates require us to address the following questions:

10 Lippman, PC (2006). Practice Theory, and the Design of Learning Environments. The American Institute of Architects. **www.aia.org/cae_a_20031101_justathought**

To what extent will the design of new learning spaces allow curriculum flexibility and experimentation? How will they enable us to reconfigure resources, expertise and knowledge in different ways to meet the changing educational goals of the 21st century?

Finally, just as the institutional relationships of education and the question of curriculum are being re-examined at the present time, so too are we beginning to understand more about the contexts and practices conducive to supporting learning. We are beginning to develop a clearer picture of the features that might constitute **pedagogy** (or andragogy) in the 21st century. Central to this vision is an awareness of the need for diverse types of learning spaces to offer multiple approaches to the acquisition of different sorts of knowledge or skills, and a greater emphasis on environments that recognise learner-learner interactions as well as learner-teacher interactions.

As Van Note Chism[11] argues, there is now greater emphasis on learners actively constructing knowledge in stimulating environments that encourage the exchange of information, recognise the importance of building on prior knowledge, and offer opportunities for rehearsal and feedback. She further contends that, from a social constructivist perspective, the social setting greatly influences learning and that traditional classrooms tend to be designed on the basis of, "transmission theory whose built pedagogy says that one person will 'transfer' information to others who will 'take it in' at the same rate by focusing on the person at the front of the room".

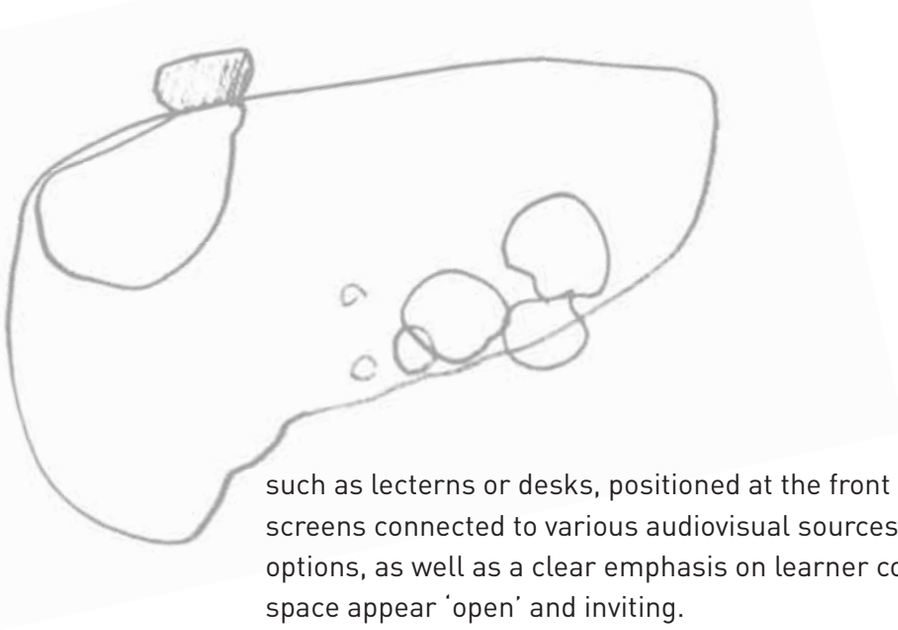
Alternatively, it is possible to design spaces that promote collaboration, innovation and knowledge co-construction[12], challenging existing assumptions[13] about how learning occurs, thus providing crucial components for 21st century learning. Bickford and Wright[14] use the example of a classroom that has embedded some of the design principles that can foster community and collaboration. These include the absence of 'symbolic' teacher-focused tools,

11 Van Note Chism, N (2006). Challenging traditional assumptions and rethinking learning spaces. In DG Oblinger (ed) (2006) Learning Spaces. Washington DC: EDUCAUSE. **www.educause.edu/learningspaces**

12 ibid

13 See CABE. 21st Century Schools **www.cabe.org.uk/AssetLibrary/2201.pdf**

14 See the example of the Marianist Hall. Bickford, DJ and Wright, DJ (2006) Community: the hidden context for learning. In Oblinger, DG (ed) (2006) Learning Spaces. Washington DC: EDUCAUSE. **www.educause.edu/learningspaces**



such as lecterns or desks, positioned at the front of the class, the use of plasma screens connected to various audiovisual sources and different presentation options, as well as a clear emphasis on learner collaboration and making the space appear 'open' and inviting.

On other occasions it may be that an individual study room with silence and darkness is a more useful environment; or a huge hall, that enables hundreds of children to work together may be required; or the use of a mobile, wireless resource in the context of a workplace or field study may be more appropriate. What is clear, however, is that the design of new learning spaces needs to be underpinned by an awareness of the potential for new learning relationships and new interactions between people and resources.

What if, for example, learning spaces were designed to facilitate varied learning styles or 'intelligences'? For example, what might different spaces designed specifically for kinaesthetic, auditory, spatial, interpersonal or visual learning look like? New technologies can also transform the 'feel' of spaces to create safe and stimulating environments for learners. Lights activated by sensors, pre-programmed sounds, pictures, videos or even smells can be embedded in learning spaces and also programmed by those people who will 'inhabit' and use the space. Screens can relay powerful images or text, or become surfaces for manipulation.

Currently most schools are designed with assumptions about the type of relationships that will occur between staff and pupils and the processes learners go through as they progress through the system. But what if these were re-imagined? For instance, would learning spaces be designed differently if they were to be used by all age groups, without existing age or stage divisions or time-related impositions? Alternatively, what if learning spaces were designed to support learners of mixed age, stage and abilities to work together? What if learning tasks were scaffolded by educators but were self-paced and directed and built on existing learner knowledge? What if learning experiences allowed for reiterations and extensions of previous learning and required a degree of knowledge exchange between learners? What if sharing information and mentoring others were fundamental learning activities?

To date, the range and diversity of these sorts of interactions seem under-examined in the design of new learning environments. As a recent JISC report[15] points out, learning spaces still tend to be dominated by designs that are teacher-focused and uni-directional, with the teacher at the front. Whilst there have been many changes and additions within such spaces, little has occurred that has fundamentally altered the design dynamics or that reflects the broader and prevailing pedagogic approaches "towards more active and collaborative learning". As Heppell argues:

"Many of the schools that are being built are unsuited to the changing future pedagogy, curriculum and learner expectations that we can already anticipate. They also lack the agility to cope with further anticipated changes that we cannot yet know in detail."
(Heppell et al, Building Learning Futures, Ultralab[16])

The BSF brief and its exemplars of school design emphasise the need for flexibility to enable different room layouts, adaptable enough to suit longer term "both evolutionary and revolutionary change", such as "developments in ICT" and "innovations in curriculum delivery". However, there is still the inherent assumption that schools will remain largely unchanged, with the average school size[17] and average class size (of around 30) remaining fairly constant. Moreover, the brief points out that, apart from specialist areas, teaching will take place in "standard classrooms" with an allocation of one computer per eight primary pupils, and one per every five in secondary. The brief, moreover, envisages that these rooms can be defined within the following parameters:

"Most teaching rooms should provide a space that is sufficiently flexible to accommodate a broad range of activities and a variety of furniture and equipment. This can generally be achieved by keeping any fixed furniture and equipment to the perimeter and leaving the centre clear for loose furniture."

15 Designing Spaces for Effective Learning: A guide to 21st century learning space design. **www.jisc.ac.uk/uploaded_documents/JISClearningspaces.pdf**

16 Heppell, S, Chapman, C, Millwood, R, Constable, M, Furness, J (2004). Building Learning Futures: a research project at Ultralab within the CABE/RIBA Building Futures programme. **rubble.heppell.net/places/media/final_report.pdf**

17 School sizes are assumed to be 1,150 in an 11–18 school (but a variation allows expansion up to 1,600) and 420 in a primary school, with a further 26 places for a nursery (and again, possible expansion to 630 pupils). See: Primary and Secondary Exemplar Design Briefs. **www.teachernet.gov.uk/management/resourcesfinanceandbuilding/schoolbuildings/exemplars/**

Theoretically learning can – and does – take place in any location, yet most school designs imply learning can take place only in designated places at designated times within particular constraints. As Prakash Nair[18] argues, at the present time:

"The truth of the matter is that school buildings have been and continue to be places to warehouse children. New schools just do it in more comfortable settings."

If we are to see learning spaces created which meet the needs and the potential of the 21st century, then, we need to address the following questions:

To what extent will the design enable learning in a range of sites and in a range of different configurations of people and resources? To what extent will the design enable flexible use of a range of different approaches to learning? To what extent does the design reflect an understanding of how people learn?

2.2 Who needs to be involved in creating an educational vision?

Who is education for? Who is involved, concerned, affected by the design of the spaces in which it takes place? Clearly, the answers to this question (teachers, children, parents, the local community) will shape who should be involved in the design process for new educational spaces. All too frequently at the present time, however, consultation and collaboration with 'users' of educational institutions is overlooked or marginalised in the design process. As Nair[19] points out:

"Schools' most important purpose – learning – and their most important clients – children and the local community – are largely disregarded in the process of their creation."

This oversight may lead to missed opportunities and lost insights for designers and architects. For example, repeated studies of children's ideal classrooms show consistent messages over the last 40 years. Catherine Burke[20] found that pupils in the 1960s and in 2001 demonstrated surprising similarity in terms of

18 Nair, P 'But Are They Learning? School Buildings – The Important Unasked Questions' **www.designshare.com/Research/Nair/Are_They_Learning.htm**

19 ibid

20 Burke, C and Grosvenor, I (2003). The School I'd Like: Children and young people's reflections on an education for the 21st century. London: RoutledgeFalmer

the sorts of opportunities they would want in their ideal classrooms[21]. For example, more opportunities to work cooperatively, to be seated in circles rather than rows, and a more flexible curriculum were consistent messages. What's more, while there is only scant information on children's views, the question of what teachers, parents and a wider community want (users who are more likely to be using school spaces as demographics change and schools take on more roles) remains relatively unknown and invisible.

It is unlikely, we would suggest, that educational institutions will meet the needs and interests and acknowledge the concerns and desires of their primary users without embedding their views and ideas in the design process. As such, we would argue that it is important to consider the following questions:

To what extent has the potential wide diversity of users of the learning space been identified? How fully are the different users and stakeholders in the proposed learning space involved in shaping and informing the design process? How far are they able to set as well as respond to design directions?

2.3 Digital technologies: exploiting the emerging opportunities?

Without wishing to predict the future, it is possible to review our current technological landscape and identify a range of practices and opportunities that are already prevalent outside schools today, which will play a significant role in education if the flexibility and capacity for these practices are designed into our concepts of the 'school of the future'.

Learning in the future will undoubtedly become more connected, with greater access to online information and resources. The ability to work with and learn from a range of communities of interest and practice without the constraints of time and place will open up a whole range of possibilities for reconfiguring learning spaces. The creation of international learning communities will become increasingly achievable, as will opportunities for authentic learning with the increased ability to connect with, share information and learn from others

21 It must be noted that children were responding to questions around the 'school they would like'. Likely responses may be potentially limited by pre-existing notions of what learners perceive schools to be and what is possible to change within the existing model. Working with learners on concept development and vision generation might therefore elicit broader and more radical responses from learners regarding their perceptions of an ideal learning space if it were not based on the existing model of schooling.

within the local community. Opportunities to generate, share, edit and publish materials will continue to grow, as will the emergence of new forms of digital creativity. All of the above will encourage and facilitate greater collaboration, rather than the often misplaced and misguided 'individualist' notion often associated with the use of new technology. Social software, for example, is now part of everyday life for many people. Internet discussion forums, messaging, social networking[22] and social bookmarking tools[23], weblogs[24] (or blogs) and wikis[25] are all growing in popularity and offer huge potential for the self-organisation of learning, and learning through peer-to-peer interaction. Such tools are likely to become more powerful and increasingly offer greater functionality to support the effective development of communities of interest and practice, with shared ownership over rich information and content resources. It will be increasingly important for learners to know how to acquire and build knowledge in social contexts, how to assess its quality and how best to apply it.

Increasingly digital technologies offer opportunities for flexible, distributed learning, which could provide learners with more varied opportunities to engage with learning in diverse environments. The mixing of a range of online or virtual experiences with face-to-face learning opportunities potentially changes the physical space that is required. The potential for this type of blended learning forces us to reconsider what education might look like in the future and how learning might become more distributed and diverse through the use of new digital technologies. Examples such as Notschool[26], which utilised new technologies and developed online support networks of buddies, mentors and

22 See for example:
www.myspace.com
www.livejournal.com

23 See for example:
www.blinklist.com
del.icio.us

24 Free blogs can be started at numerous sites, including Blogger (**www.blogger.com**) or WordPress (**wordpress.com**). See also, Myspace (**www.myspace.com**) and Livejournal (**www.livejournal.com**).

25 See for varied examples:
www.weblogg-ed.com
www.wikiville.org.uk
en.wikipedia.org

26 See: **www.notschool.net/ns/template.php**

experts to support learners in non-formal learning situations, and projects such as Space Mission[27], which enables learners to work collaboratively in teams, using interactive material, video-conferencing and messaging technologies to communicate with one another and remotely based experts, demonstrate the potential for new technologies to foster new and more collaborative approaches to learning.

Space Mission

New technologies also offer greater potential for contextual learning. Developments in mobile technologies can change the ways in which we access information. Increasingly, they are becoming networked and have greater capacity and functionality than ever before. Greater portability and also personal ownership of mobile devices increase the likelihood of learning being able to take place in a range of spaces, with more opportunities to access, capture, manipulate and publish information in these locations. Mobile devices not only allow us to learn in more varied locations, they also enable the transformation of learning experiences to become more inspiring, dynamic, relevant and creative activities[28]. Commercial technology such as GPS, for example, is already increasing the potential for such learning. If the system knows where the user (or learner) is, it can deliver information directly to them. Projects such

27 www.futurelab.org.uk/showcase/space_mission

28 For the purpose of distinction, these approaches have sometimes been characterised as the difference between 'safe' and 'disruptive' learning.

as Savannah[29] and Create-A-Scape[30] enable learning to happen in new places and to 'transform' or 'enhance' the environment through the development of mediascapes. Increasingly technological developments will enable the transformation of located learning experiences, with learners having the ability to learn from, create, change or reinterpret information that can be 'embedded' within the environment.

Savannah

Create-A-Scape

Today, digital technologies are already transforming the ways in which many young people interact with information, connect and collaborate with others. Increasingly they have tools at their disposal which allow them to become consumer, creator, editor and publisher of materials. Boundaries between 'teachers' or 'experts' and 'pupil' or 'novice' can and do become blurred.

In re-imagining learning spaces in the context of new digital technologies, then, we need to ask:

To what extent does the design of new learning spaces take account of how learners are already using digital technologies for learning and life? To what extent do designs for 'future schools' allow for the creation of flexible, distributed and connected learning communities?

29 See: **www.futurelab.org.uk/showcase/savannah**

30 **www.createascape.org.uk**

2.4 Do we still need a 'school'?

The emerging affordances of digital technologies, the changing social role of education in support of lifelong learning, the changing role of schools as resources for communities, are all factors which have contributed in recent years to a set of radical future scenarios for 'the school'. The OECD Schooling for Tomorrow group[31], Ultralab[32] and the Design Council have all been instrumental in identifying provocative alternative futures. Ultralab highlighted four scenarios outlining radically different directions that could be taken and which could influence the design of 'future' learning environments.

The first scenario involves no physical school at all. Learners are based at home, learning online from each other and from experts who can be based anywhere in the world. Major investment in buildings is unnecessary and tutors monitor and support vast numbers of learners, each of whom could be following a highly personalised curriculum.

The second scenario, the 'dissolved' secondary school, operates like a university, with faculty centres spread across the town, each concentrating on a specific area of expertise such as engineering, media or science. This model is a shared resource for the whole community, with learners being of any age, and offers the potential for greater flexibility and a strong emphasis on lifelong learning.

In the third scenario, the 'extended' school is so all-embracing that it is the community. Life is spent on campus and learning can take place wherever and whenever it is needed, rather than following a traditional timetable. It offers almost infinite flexibility but in the extreme could create a 'smothering totality'.

Finally, and distinct from all the other scenarios in its physical starkness, is the 'fortress' school. Here, security is all, and learners are 'protected' from society behind high walls, watched by security cameras and focusing at all times on the business of formal learning until they are ready to be re-introduced to the dangers of society. Inside the school, however, learners have few distractions and are able to engage closely with learning.

31 See: **www.oecd.org/topic/0,2686,en_2649_34859774_1_1_1_1_37455,00.html**

32 Heppell, S, Chapman, C, Millwood, R, Constable, M, Furness, J (2004). Building Learning Futures: a research project at Ultralab within the CABE/RIBA Building Futures programme **rubble.heppell.net/places/media/final_report.pdf**

For each scenario, real-life examples exist that exemplify at least some part of their philosophy. These scenarios exemplify the diversity of potential educational futures – they offer different educational visions (individualised, community-based, vocational), diverse uses of digital technologies (connection, surveillance, delivery), diverse learning practices (situated, collaborative, behavioural). None of them are necessarily 'right' but they offer conceptual tools for exploring how to 'reinvent' schooling to meet the needs, desires and aspirations of diverse communities. They suggest that important questions to consider in designing schools which really will meet the needs of the future may be:

To what extent have we challenged our assumptions about the nature and institutions of schooling? How far are the answers we are coming up with surprising us or challenging our expectations? What sort of school do we really want or need – is it a school at all?

3. Alternative educational visions: WHAT IF...?

Where the previous section of this paper identified a number of questions that we need to consider in creating 'educational visions' for the design of new learning spaces, this section presents a series of questions used to rethink educational assumptions. Some of our hypothetical answers to these questions would be easily achievable in the short term, while others would require a more radical revision of our expectations of education.

All of them are premised on the question - what if we could re-design our education system from scratch?

What if...

...classes had learners of any age?

Lifelong learning itself is now a familiar concept, but is applied mostly to the need to refresh or learn new skills for a particular career path. Currently children and adults are segregated in the learning process, but do they need to be so in all cases? Adult learners in one curriculum area might be a resource in another, so are there potentially more innovative ways of encouraging intergenerational learning? The ability to link to other 'experts', mentors or learners using new technologies opens up further possibilities that could have a significant impact on our perceptions about age-stage approaches to learning.

...we focused on developing an environment learners would feel comfortable in?

Research suggests that learners want a school or learning space that is a size they can relate to; that is safe and welcoming rather than austere and intimidating; that gives them a sense of belonging not just to the school itself but also to a 'family' or community grouping with which they can identify; and a place in which their views and needs are valued, listened to and acted upon so that they feel empowered. Learners may also want to have a fixed base and want an area that they can customise and make their own. Would it be possible to create a flexible and responsive environment that allowed learners to manipulate it and which responded to their needs?

...there were more teachers in the classroom?

The model of one teacher per 20 to 30 pupils, with or without an assistant, is so familiar that we rarely think of alternatives. Is there any evidence that these are the most suitable ratios for effective learning or teaching? Are financial restrictions the reason these types of ratio exist? Changes to these ratios would likely influence the design of learning spaces.

There is broad expertise in society as a whole and perhaps there is a greater need to exploit this resource rather than ignoring it. We have declining birth rates, which in itself is very likely to have an impact on what is done with existing learning spaces. We also have an ageing population who generally will remain healthier longer, many of whom will feel they were 'forced' to retire early, despite their skills. Could these demographic changes be levered to reshape educational possibilities? Using other adults to supplement the teaching force could also help to create a more practical form of education.

...we designed learning spaces to maximise learner control of resources?

Developing learner voice requires a process of cultural change to support deeper engagement and active participation of learners. It also requires that learners develop greater control over their learning. Increasingly new technologies are facilitating ways to 'customise' learning content, store data and records in more malleable and adaptable formats, enable access to a broader range of resources, connect to other people, organisations and knowledge sources, and to provide feedback and so on. Currently, many of the processes associated with the use of these technologies for learning purposes are regulated and controlled by the school and teachers. Access is generally timetabled and even the more commonplace technologies are not seen as a core tool for 21st century education. Yet to many learners, these tools are as important and familiar as pens, pencils and paper. In thinking about designing learning spaces to facilitate greater learner voice in a personalised system, we need to think about the question of who owns and determines access to the resources needed for education. We need to explore how learners can be enabled to manage their own tools and resources; how we enable learners to communicate with experts, advisors and collaborators when required; how they

connect, share knowledge and begin to develop their own knowledge networks, spaces, resources and communities of practice; and what effect this might have on the design of learning spaces, the tools needed and the relationships that need to be established.

...we could choose when to have our formal education?

We are also used to the idea of formal education starting around the age of 5 and continuing until at least 16. But should all 11 years of formal schooling be before the age of 16? If we have an entitlement to 11 years of schooling, could the system, once we have mastered basic skills, enable us to choose when those years will be?

...time and space boundaries were flexible?

Learning spaces and experiences might be very different if learners were not restricted by finite time limitations but, instead, the time that was spent undertaking any activity in a particular space was determined by how long learners needed to complete a particular learning task. Moreover, could learners learn in a range of other locations or spaces depending on the tasks they needed to achieve, including community-based spaces, at home or even in workplaces in order to embed learning in 'real world' contexts? Virtual or remote learning already exists for many learners, including pupils who are out of school for medical reasons, as well as others who wish to learn online. If people learn online, they are not necessarily restricted to using only the resources in the classroom.

...school was optional?

What if school wasn't compulsory but had to attract people who didn't legally have to be there? How would learning experiences and spaces change as a result? What sort of opportunities and experiences might learners encounter and how would they differ from what is currently available? If school was optional, who would it seek to attract and what sort of decisions would be made about the organisation of education? What if formal learning was optional or flexible in terms of attendance, length of study periods and so forth?

...we could be taught by remote experts?

We can already augment teaching resources if we look beyond the classroom and even the school, and use ICT to link to other 'experts'. Schools could widen curriculum choice if they used video-conferencing to support small groups of disparately located learners. The use of online learning enables learners to access resources at a time that suits them. There is growing potential too for using virtual teachers or online avatars who can respond to set questions and can thus be created for almost any topic. Learning spaces, however, would need to be very different from the traditional classroom to support these types of activities.

...most learning was collaborative?

Some of the most powerful learning occurs when pupils are involved in purposeful group activities, collaborating on problem-solving tasks. Many jobs also depend on problem-solving skills and teamwork, however much of our formal education still focuses on individual learning and individual assessment of learning. If learning spaces were designed to promote more collaboration, what might these spaces look like and what sorts of resources would be required?

...informal learning was valued as much as formal learning?

Learners' existing skills and knowledge are not automatically valued or built upon in formal education. For example, the ICT skills of many learners, such as their ability to e-mail, text, find websites, download pictures and music, transfer files from one format or device to another, are rarely acknowledged and incorporated into formal learning. Learner skills, interests or community resources are seldom used as the basis for developing schemes of work or curricula for learners. Learning that occurs in a range of other situations and contexts often counts for little in formal contexts. So, how might spaces be organised and resourced if they were to incorporate and value the resources, skills and knowledge that learners could bring into the formal educational environment from outside?

...school educated children for 'present needs not future jobs'?

What if children experienced an education that was based on their current needs - as defined by the child at that time – rather than based on assumptions about their training needs for the future workplace? What if the key purpose of school was the self-transformation of the individual?

...schools were based on new relationships between adults and children?

Could learning spaces be designed to foster the development of relationships between people of all ages and reflect changing adult-child relationships? Relationships between learners and mentors for example are not the same as those between teachers and pupils, and these may require a different type of spatial organisation and design. In today's, or rather tomorrow's society, should we expect to impose through design the same longstanding relationships that have been present in schools for over a century?

...school was somewhere else?

Whilst we constantly learn in context, in and from the environment around us, little formal learning is undertaken outside the classroom. Experiential or contextualised learning is seen as extremely powerful. So how might we exploit spaces other than the formal classroom as spaces for learning? How can new learning spaces be developed that will promote the importance of first-hand experience as part of learning? Could we devise more learning experiences that have greater relevance to those being taught and represent authentic learning opportunities? Could we provide the type of environment and experiences that allow learners to experience things that they currently cannot? Moreover, could more be done to pursue community or culturally-based learning and information exchange in order to increase the relevance of learning experiences?

...we designed spaces for learning competencies as well as content?

Rather than organising schools around 'subject areas' or 'faculties' as many now do, learning institutions could be organised around different ways of working – from team working, to reflection, to accessing information. At the same time, teacher's spaces could change to enable them to work flexibly and

collaboratively across the school with colleagues from different disciplines and with different forms of expertise. Project spaces allowing collaborative working between adults and children, public spaces allowing presentation and consultation with the community, ideas spaces allowing exploration of new resources and experimentation, might all be developed. These might become organising principles for school spaces rather than subject-based organisation of schooling.

...schools were part of learning 'satellites' or hubs?

Rather than being the main or 'sole' site for learning, what if schools were connected to other learning institutions in local communities, and provided opportunity for greater diversity by enabling learners to find appropriate resources, people and networks to support their learning? What if educators had to work more closely with learners and local communities to identify appropriate learning pathways, draw better on the resources already within local communities and situate learning in a broader social context? How would we then have to reconsider the design, furnishing and resourcing of learning spaces?

What other 'what if...' questions should be considered? What have we missed? What 'what if...' questions are important to the children, teachers, communities you work with?

4. Future scenarios:
WHAT IF WE MADE THE TECHNOLOGY DO WHAT WE WANTED?

This section presents a set of future scenarios outlining the sorts of learning spaces, digital tools and practices we might want to envisage in the 21st century. In some cases these are deliberately fanciful in the hope of provoking thought. Others, however, simply require commitment and energy (and market demand) to be built.

Before these scenarios are dismissed out of hand as unachievable, however, it is worth thinking about the pace of technological developments and the impact these have had on our lives in recent years. To put this in some sort of context, just consider how many of us had a home PC 15 years ago? As little as 10 years ago, how many schools had desktop PCs that were regularly accessed by children? And how long ago was it since the internet became a commonly used tool in classrooms?

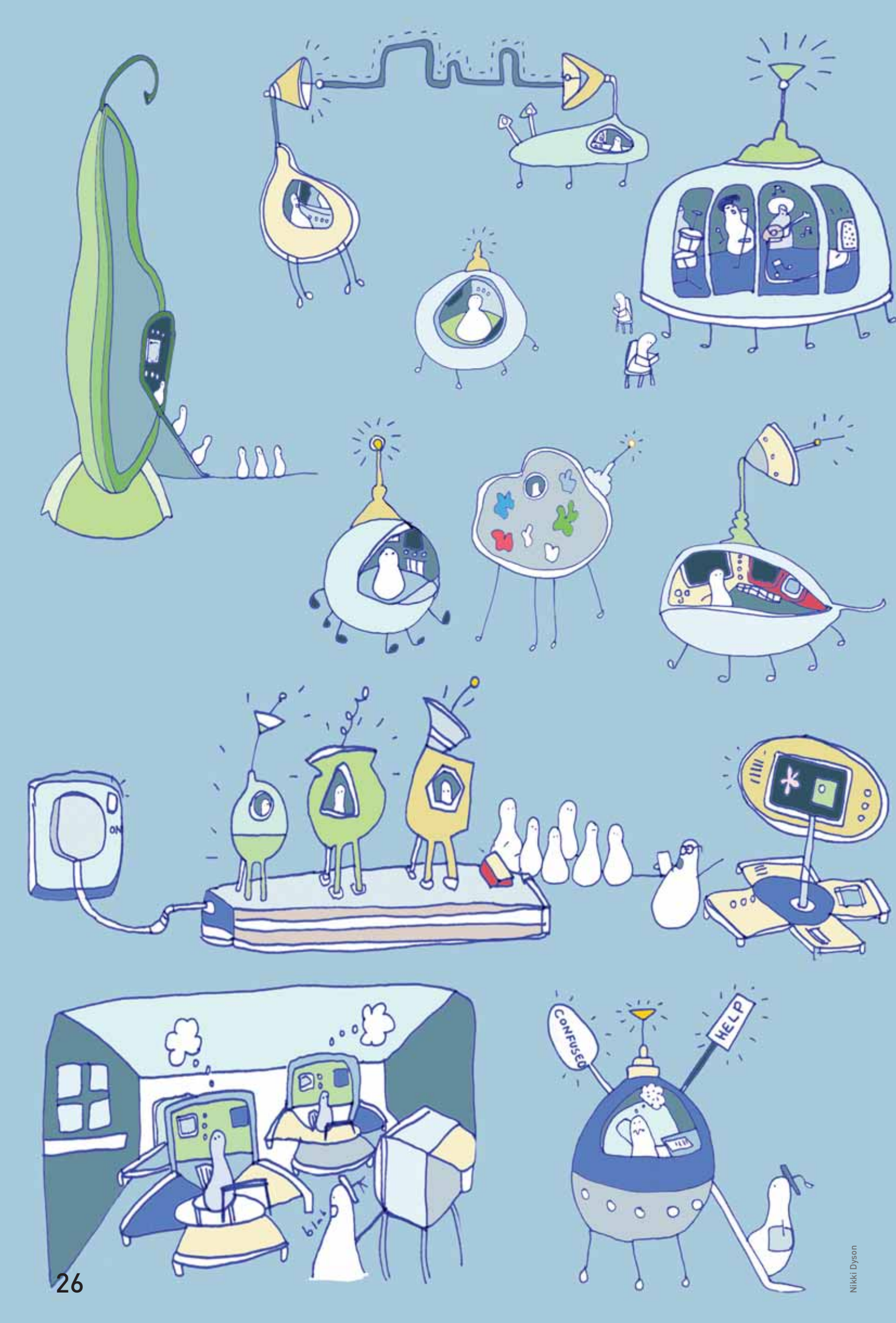
It is worth noting that 2006 marked only the 15th anniversary of the release of the software that enabled the development of the world wide web[33], and today we are already seeing the emergence of a range of new tools, often referred to as 'Web 2.0', that are beginning to significantly change the way we use this huge and rich resource, offering learners the chance to create, edit, share and publish knowledge and information amongst communities of interest and practice. Similarly, we have seen the explosion of mobile phone ownership. Whilst just one in 10 of us owned one in the mid-1990s, penetration in the UK market has now exceeded 100%[34]. Five years ago, the market for a portable, personal music player that could hold thousands of tracks downloaded from the internet may have appeared limited. Yet more than 5.3 million iPods were sold in just three months in 2005[35].

Without wishing to suggest that the path to future technologies or future learning environments is either predictable or linear, what we want to suggest is that some of the following ideas may be less fanciful than many may think. We present them as a stimulus to thought and an encouragement to experiment...

33 See: **www.uua.org/news/2006/060806_www15.html**

34 Mobile penetration in the UK rose to 101 per cent, largely due to customers with more than one phone. See: **www.vnunet.com/vnunet/news/2127294/uk-mobiles-people**

35 See BBC News website, 13 April 2005: **news.bbc.co.uk/1/hi/business/4442775.stm**



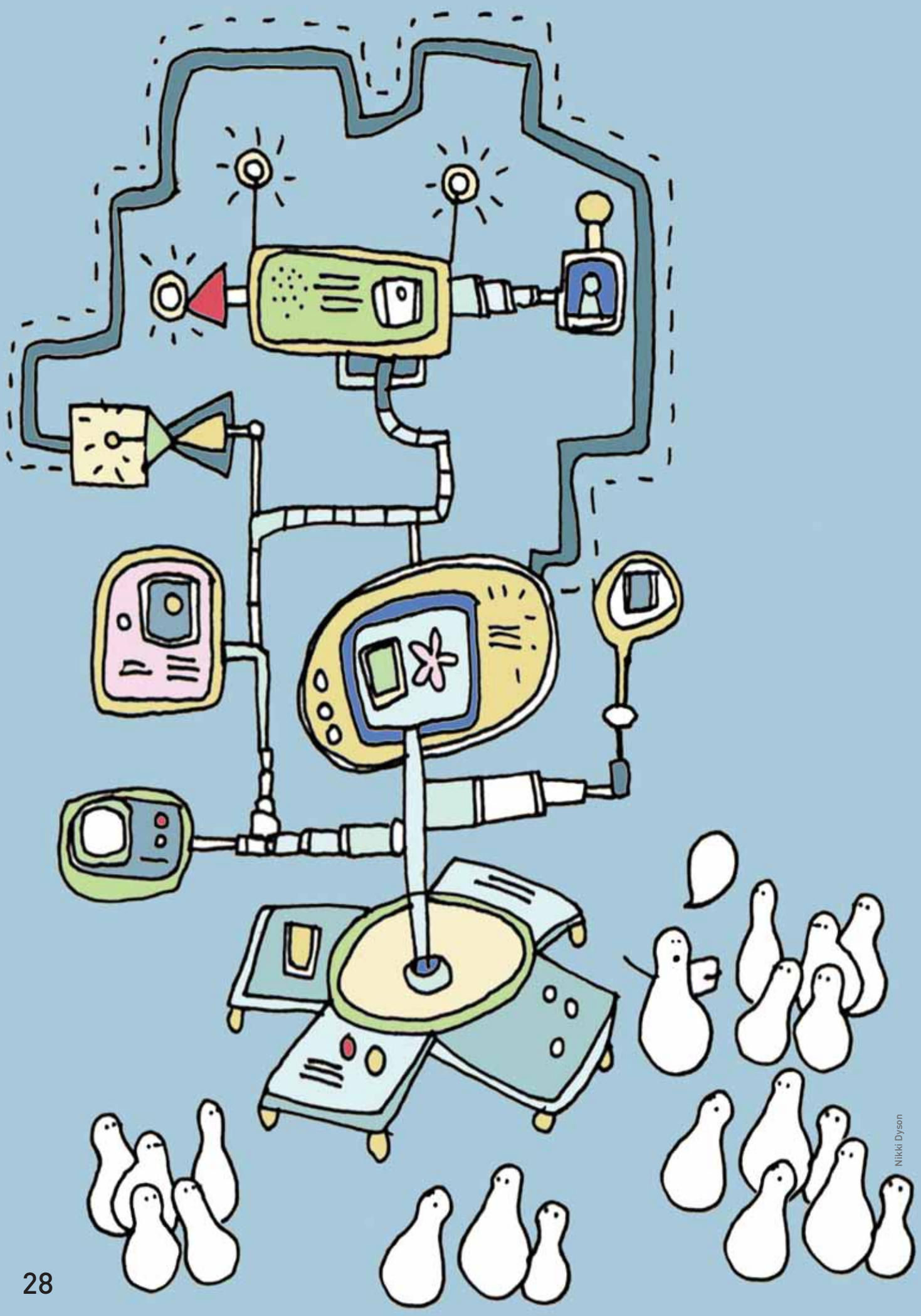
Nikki Dyson

Future scenario: The 'personalised pod'

What if... every learner within the 'school' had their own personalised work or 'office' space (pod) with the appropriate tools and technologies they needed for accessing, creating, editing, publishing and communicating information and knowledge? This space would be 'owned' by the learner and could be customised and designed to express their interests and identity, and would be a space that remained with them throughout their time at the school.

The space would be 'mobile' and could be moved around the room, or indeed the school, and would have retractable sides so that pods could be physically connected to one another to form bigger and more collaborative environments. The walls of these spaces could also be opened out and flattened, with the pods then being moved to the outer walls of larger and more 'traditional'-looking learning spaces when required. Learners would discuss and come to decisions with educators about how much time they spent in these pods as opposed to other environments.

Each space would be sound-proofed, have doors that could be closed (possibly transparent), adjustable lighting and heating, lockers and so forth. The furniture inside the pod would be ergonomically designed and adjustable to meet the learner's changing physical needs and ensure they worked within suitable health and safety and comfort requirements.

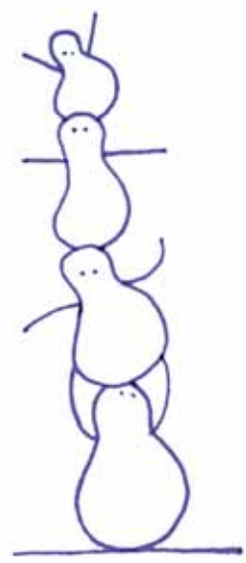


Nikki Dyson

These spaces would have communication tools and software, and tele- and video-conferencing tools so that learners were always connected to, and in dialogue with, other learners and educators. They would also have a 'docking station' and charging facilities for the learner's own personal mobile device. This personal space would be supplemented by a range of other learning environments into which learners could plug their personal device and access their own work. This device could also wirelessly connect to learning networks to enable learners access their own online space from anywhere in the 'school building', or indeed from outside.

The walls of these spaces would be programmable so that they could externally signify to educators and others the immediate needs of the learner. For example, by using lights to externalise when learners need support, other resources, technical advice etc, or perhaps even their physical, social and emotional requirements at any given time. Moreover, the 'walls' of these pods could be screens onto which learners could present their favourite images, or their own work to be shared with others.

If we consider the possibilities that could arise from Web 2.0 developments and the potential uses of social software, we immediately start to think of new educational possibilities and relationships. Not only could learners link to others, they have the tools to develop, share and publish their work and develop their own 'voice'. If these tools were to be used more extensively, the role of the teacher might change but theoretically the learner could access many more 'educators' and experts. Similarly, curricula and the delivery of subject-based content may change but learning pathways are transformed and become negotiated, with learners and educators engaging in dialogue about what might be learnt and how best this can be assessed.



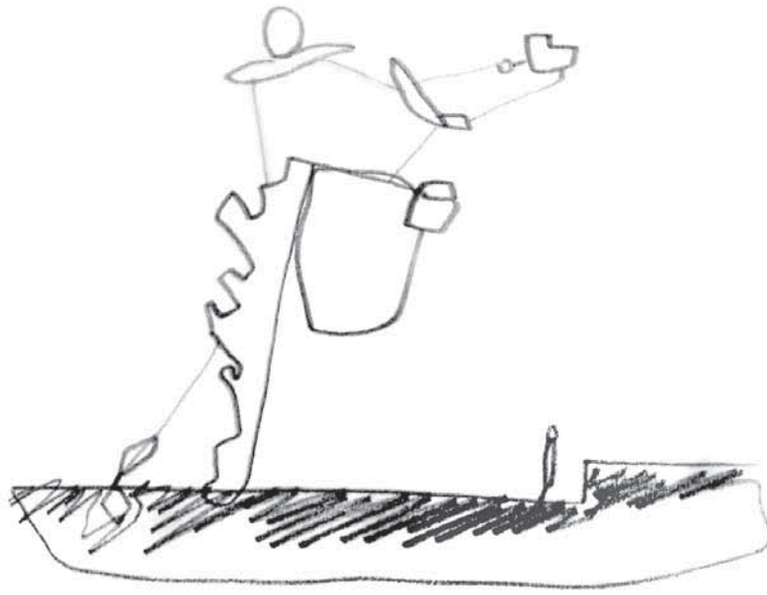
Tomas Whitecross

Future scenario: Zoned workflow spaces

Imagine a new learning space. This space is not designed around existing or traditional notions of schools or how they are organised. Instead this space is designed and 'zoned' around particular types of broad activities, or more specifically, workflows.

Learners are free to enter each 'zone' and can spend as much time there as needed and do not necessarily have to progress through each one in a linear fashion. Each zone reflects and utilises the sorts of tools, competencies and problem-solving skills that would be used to turn an idea into a reality. The space is completely wireless and furnished with a range of other specialist technologies. Technology experts move around the whole environment, whilst educators are on hand to offer support, ask questions regarding the focus and purpose of the activities being undertaken, and engage learners in reflective dialogue about the quality of their learning. It is a community-'owned', intergenerational learning space and working relationships are also fostered with local businesses and other educational institutions. The principles behind the design of this space are to encourage collaborative work and create new knowledge and outputs from the educational pursuit.

The first zone people come to is the 'research' zone. Here learners identify the specific area of study, identify resources needed, outline and agree their objectives with educators and start pulling together 'project teams'. Learners can also meet and discuss their projects with teachers and other learners and find out and build upon what has been done before.



The next zone is the 'absorbing' zone. This computer-free zone is a communal and largely social space. It is a café-style space where people find respite from their work and meet new people, however, there are also informal project-focused message and dissemination boards.

The third zone focuses specifically on 'ideas development'. It has a number of meeting rooms and is full of the appropriate tools to promote brainstorming activities, creative thinking and project planning. Educators are on hand to facilitate discussions about setting learning goals and putting together plans to assess learning.

The next zone is the 'production' zone. This is the largest space and houses all the resources required to develop projects, whether these are media resources, information sources, materials or 'practice' spaces. In this area learners also get the opportunity to work with educators to reflect upon and refine their work.

Finally there is a 'presentation' space. In here, learners display or present their work and get feedback from others. They talk through all aspects of the learning process and share insights and information. In this zone, learners have the opportunity to learn from one another and identify those individuals who might support them and who have the skills that they wish to learn or use. Educators then work with learners to develop short mentoring relationships and knowledge exchange. The ability to identify mentors and also to teach others are well rewarded and embedded within the whole assessment criteria. This provides a mutually supportive environment where the ability to teach becomes a core skill and blurs boundaries between learners and educators, with helping others to learn being regarded as a core skill.

Alternatively, if the school was not seen as the main or sole site for learning, a different model could develop, whereby various spaces throughout the community might house the different 'zones' or activities. Similarly, different spaces within the local community might be geared to a particular subject or aspect of learning. For example, one community learning space might focus particularly on art, attracting other members of the community to participate, exchange skills and forge links with artists all over the world. Perhaps different community spaces could instead house certain technological tools to perform particular functions, such as editing suites, recording studios, radio stations, communications tools, or perhaps high specification video-conferencing to allow learners to learn from other experts delivering lectures, practical demonstrations or workshops elsewhere.

Helen Piggott

Future scenario: The learning landscape

Using locative technologies and portable devices, individuals could use software to place media files containing audio, image, text, video and also (wireless) 'livelinks' at certain locations within the environment. When others pass these areas, the information could be triggered and played on their personal device. This information could be local knowledge, local history, a personal narrative, a fictional story and so on. Learners might be able to choose the information they require which would be accessible in a range of formats and through various devices. This information could also be authored, embedded and tagged in the environment using mobile devices, or alternatively this could be done remotely from other machines. 'Mediascapes' would be developed and learners could add these to their own libraries, even developing and editing material in situ to ensure it is customised, up-to-the-minute and relevant. Developing these mediascapes would be a free or low-cost activity.

By pointing their portable device at other objects in the environment, the learner would be provided with a range of information about that object, or receive information triggered by it. The more buildings and objects are tagged with information the more likely it will be that they can be used as coordinates, offering new physical signposts that would represent 'psychological cues', developing expectations that such objects will have data attached. Learners could also add to the 'tapestry' of located knowledge and place their own information in the environment, and other contributors would be informed when new information was added to a particular location. These mediascapes would build to produce 'learning landscapes' that visitors to an area could choose based on the type of information they wanted. For instance, a tourist might seek factual and historical information, whilst local people might be more interested in local history, or other local people's narratives and stories.

These mediascapes could piggyback and build upon existing social software tools to provide a deeper set of relationships between users of such information. Other objects might have smart technologies embedded within them, which would be triggered and beamed to learners based on their preferences and interests, which would be stored in wearable technologies. In other areas the technology would be almost invisible and could be representative of something else, for instance, the movement of an object could represent information about the weather, the location, or even the natural environment.

This sort of 'learning landscape' could be developed in a range of locations and use different embedded or located technologies to develop information 'branches' that visitors might wish to follow.

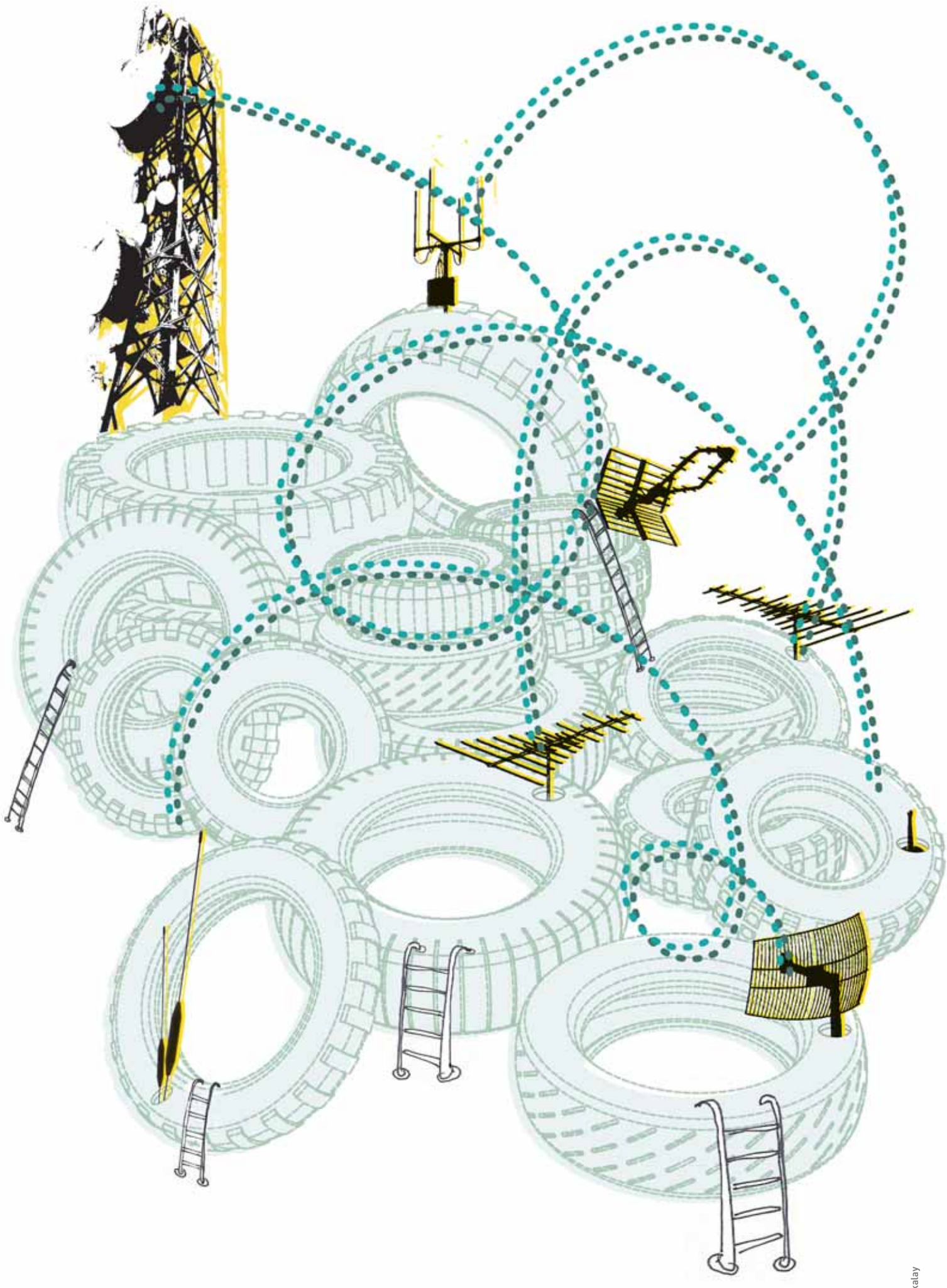
Øivind Hovland

Future scenario: Old place, new space

Whilst many new learning spaces are being designed to replace older schools, there are also numerous ways and purposes for which old, perhaps disused spaces, might be redesigned to offer alternative learning experiences.

Imagine for instance that a Victorian classroom was going to be re-designed as a space for promoting inquisitiveness and perceived as a learning space 'owned' by children. In the re-design there was also to be an acknowledgement and restoration of the original architecture.

Perhaps clear screens could be placed over the long arched windows. These could be information touch screens, or screens manipulated by intuitive touch pads. 3D sound could be use to create audio landscapes, working with the natural acoustics of the space. The walls might be covered with other interactive screens, one of which might be programmable and enable learners to be creative and change their environment. Another might act as a message board for the learners, allowing others to click on their names and leave information. Another might be a more 'traditional' interactive board, whilst the other might be a 'receiver' screen where other stimulating information or images would be piped into the classroom by teachers or other learners. What work surfaces there are would also be touch screens, fully interactive and also compatible and linked to the individual's own mobile device. These would be intelligent screens that could be linked to one another to provide a larger board-space for more collaborative exercises. They would also function as screens for video-conferencing with others.



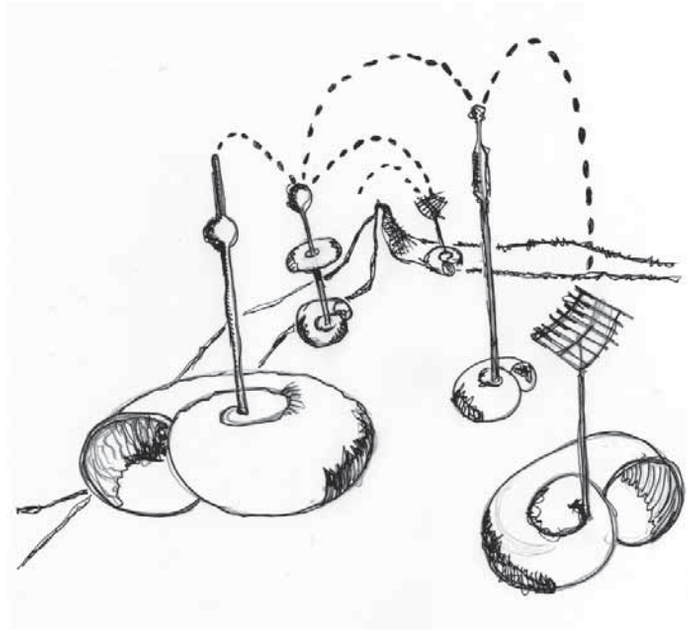
Shay Alkalay

Future scenario: Disused place, new space

In contrast to the above redesign of existing places, the following scenario maps out where and how new spaces might be established.

Built on commonly owned, disused or under-utilised land, a series of, possibly temporary, community built and 'owned' spaces could be quickly constructed. They might be constructed partly as a base for the redevelopment of the disused space and for the protection or regeneration of habitats, but simultaneously and ultimately, as places for learning.

Each new space could be linked to others in the local community through wireless networks, video- and tele-conferencing, online spaces and other communication tools, for the purpose of knowledge and resource exchange. Learners and educators would develop resources of relevant information about the local environment, the habitat and methods for regeneration, whilst it would also be possible to gain hands-on, practical experience putting knowledge and skills into practice. Learners would use simulation packages to see what impact their plans for the local area might have and how these would develop over time. Learners would be acknowledged and accredited for their input and assessed in terms of their skills, knowledge and ability to convey lessons learnt to others. Building a greater sense of local community development and environmental issues, this learning space would offer a more organic development of information, knowledge and skills to support regeneration, which would fit in with a range of other subject knowledge.



Kate Andersen

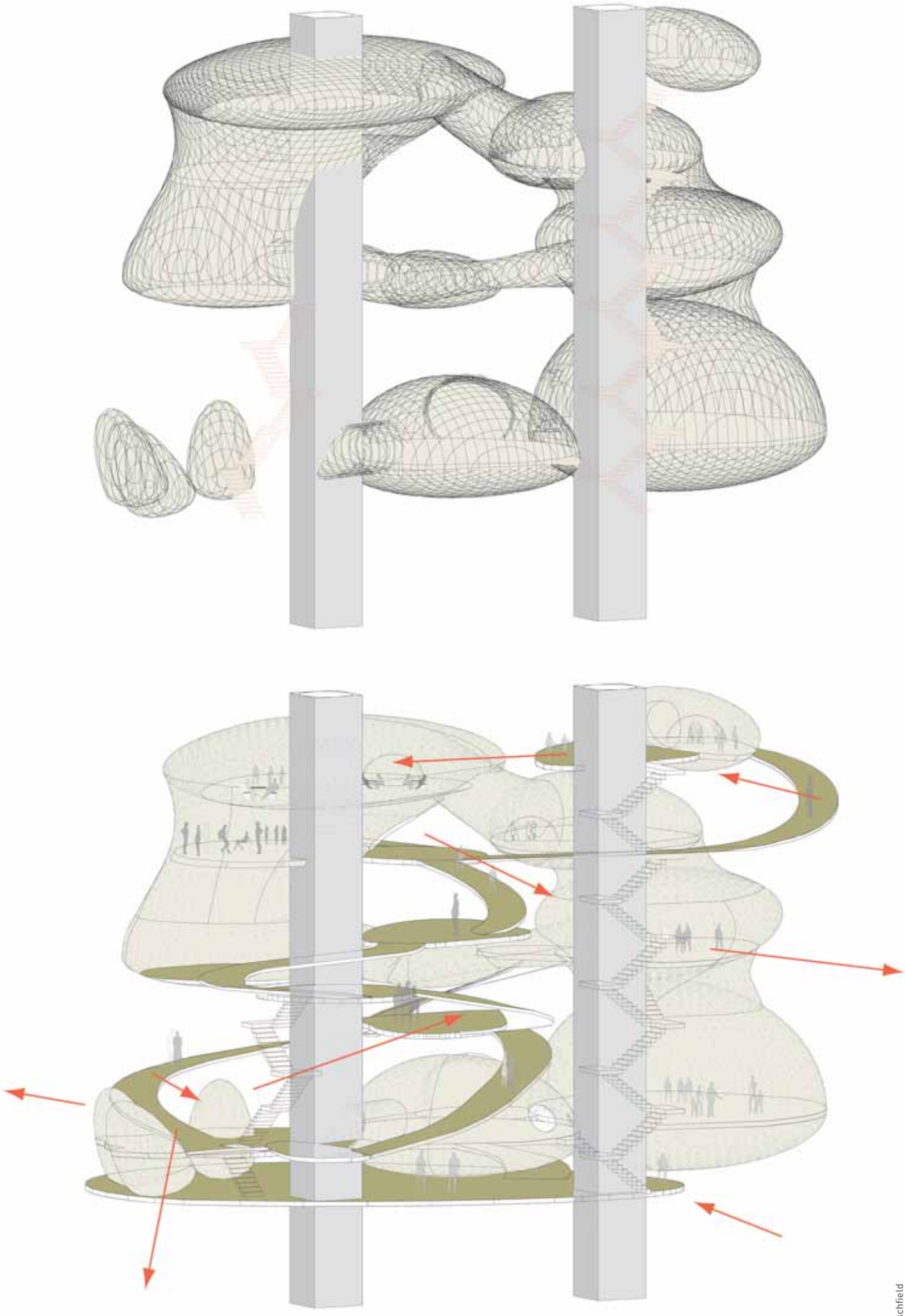
Future scenario: Mobile production hubs

What if... some learning experiences were mobile and came to the learner? What if some of the most interesting experiences arrived in a van?!

Imagine a van, with wireless connection, rich in communication capability and with inbuilt digital production and editing suites. Packed into the back of the van in numerous flight cases (which themselves double up as seats and workspaces) is a malleable, collapsible or possibly even inflatable 'production' hub, which could be placed in any available space. The very fabric of this 'hub' acts as a screen and has in-built speakers.

Within the hub there is another editing and compositional space with an intuitive 'gestural' interface. Learners work with the hub's technical experts and educators to develop a display or performance to be carried out in the hub. The performance will focus on a crucial community-based issue and is one means of ensuring learners are involved and active in local issues, developing a better concept of citizenship in action. This is supplemented by information being collected in the community, with concurrent online and offline activities being held around the issue within the learning institution. These sessions focus on providing a mechanism for empowering people within the community. Learners develop their own content for the performance, creating media files using portable devices, capturing information about, and from within, the local community. They learn editing and production skills and consider aspects of information literacy and critical thinking skills, as well as engaging in broader learning activities underpinning the wider debates.

Members of the local community are invited to the final 'performance' and the community validate or assess this on a range of measures, such as content, quality, clarity, emotive qualities, relevance and so forth. Whilst the learning hub provides a rich technical and educational resource, the emphasis is on learners actively involved in the process of knowledge creation rather than using pre-existing content to produce the end performance. The final presentation is simultaneously projected on the screen both inside and the outside of the hub to an external audience.



Robert Hirschfield

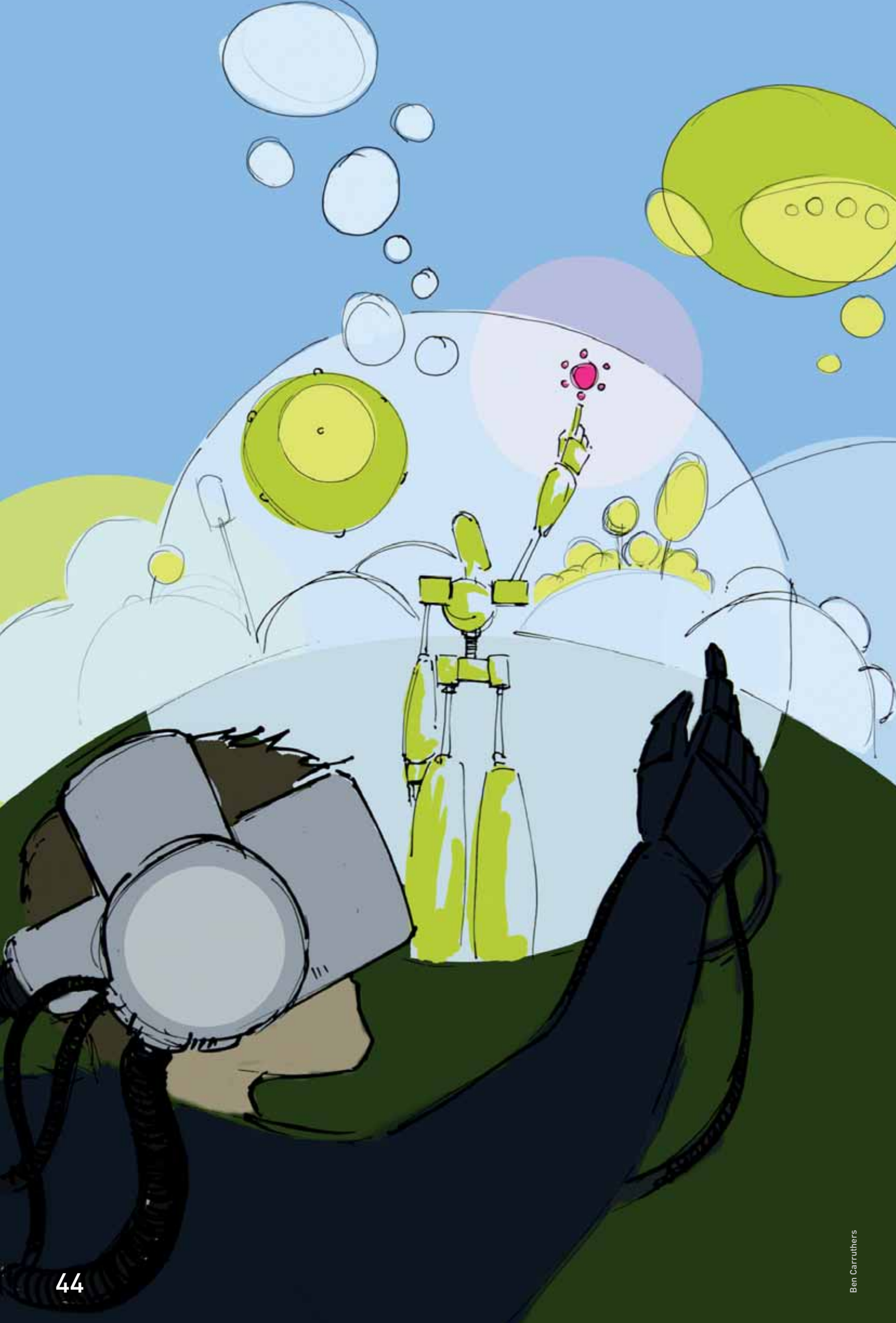
Future scenario: Augmented reality (AR)

Future developments in augmented reality are likely to lead to changed educational experiences through the merging of real and computer-generated worlds. Huge potential exists for overlaying computer-generated images onto real environments, and developments in screen technologies also enable greater possibilities to learn in situ. Whilst the film industry continues to utilise computer-generated graphics and images overlaid onto video, research and development work is being undertaken in other fields around the possibilities of using sensors, cameras and screens to trigger images and events in the environment.

These types of developments hold numerous possibilities to transform existing environments and to create very different learning experiences. Such developments will enable people to interact with, and take part in, 'live' performances with others who need not necessarily be physically present. In the future, perhaps there will be the possibility of learning spaces and experiences that allow people to play a real musical instrument with a virtual band, or learn from or with 'live' virtual dance performers.

Alternatively, what if people could look through clear screens positioned in the environment but see information and images that were generated and overlaid onto the real world, creating a vastly different experience? What if people could produce their own material for this purpose, for example developing local histories, environmental information or scenarios, personal narratives or just develop fictional representations onto the landscape?

Augmenting the real world could make learning experiences much more powerful, rich and creative, and could also enable more dynamic situation-based learning. The ability to be immersed in augmented or 'virtual' environments, and to experientially learn in and from simulations is already becoming a reality, so what possibilities will there be 20 or 30 years from now?

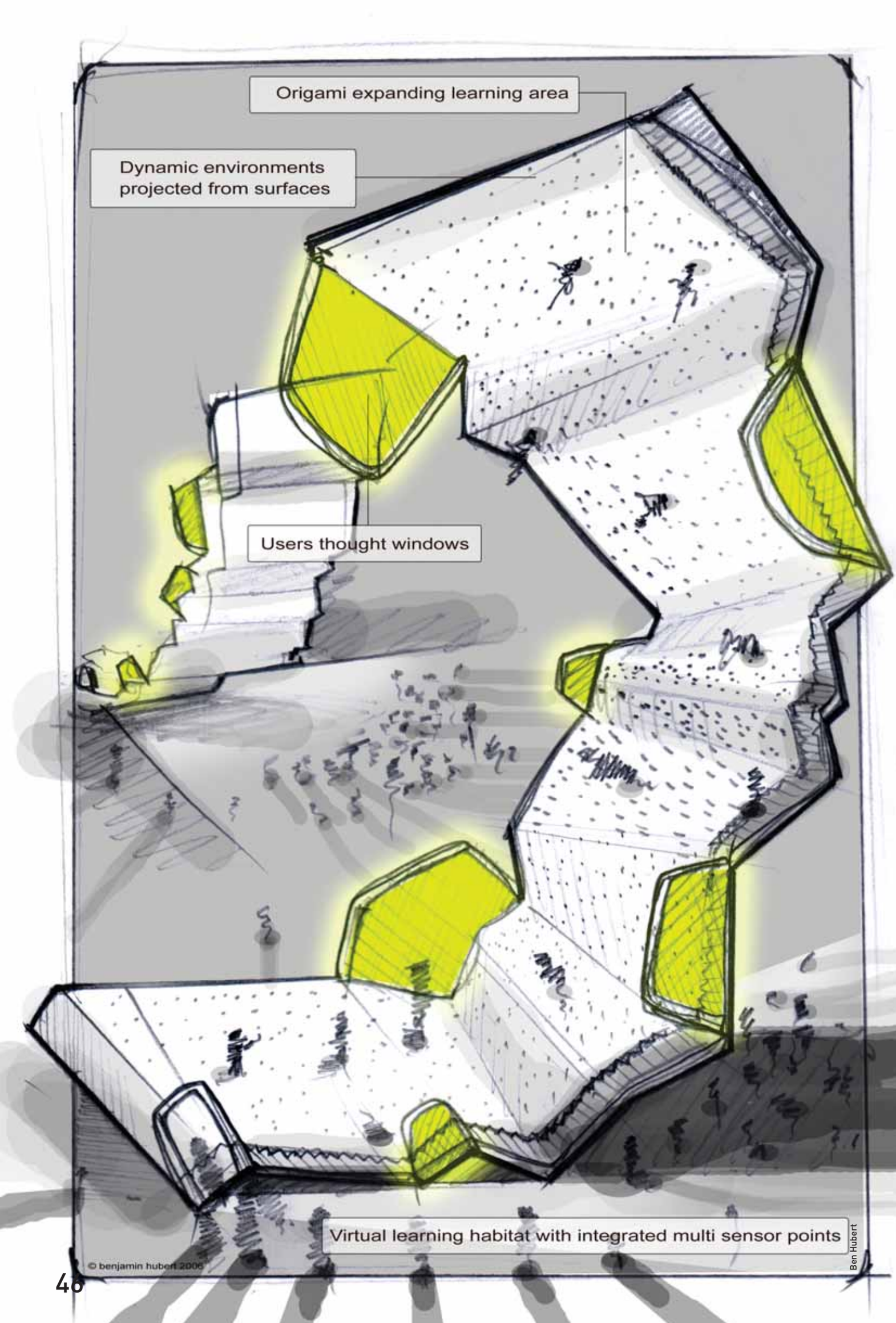


Ben Carruthers

Future scenario: Virtual reality (VR)

Rather than augmenting what occurs in the real world, virtual reality enables users to interact directly in environments that are computer-simulated and immersive. A range of 'real world simulations' have already been developed, and current work is being undertaken to advance the potential of visual, screen and display-based technologies, audio feedback and immersive 'sound'. However, a range of other possibilities are also being explored in order to develop more convincing and immersive digital environments. These include enabling users to 'enter' games and fantasy worlds and to interact with virtual and simulated worlds through the use of a stylus, gloves, treadmills, moving surfaces and suits 'wired' to the virtual environment. Haptic technologies enable users to interact with computers through tactile feedback, enabling greater manipulation and a more 'authentic' experience for the user.

Potentially, developments of these types of technologies could lead to all sorts of different learning experiences and environments. Totally immersive environments and simulations could offer unique, and paradoxically much more 'real', learning experiences. These could present learners with a whole new set of situated learning experiences, occurring in settings virtually identical to those in which the activities would occur in the real world.


Origami expanding learning area
Dynamic environments projected from surfaces
Users thought windows
Virtual learning habitat with integrated multi sensor points
© benjamin hubert 2006
Ben Hubert

Future scenario: The 'Trans-porta cabin'

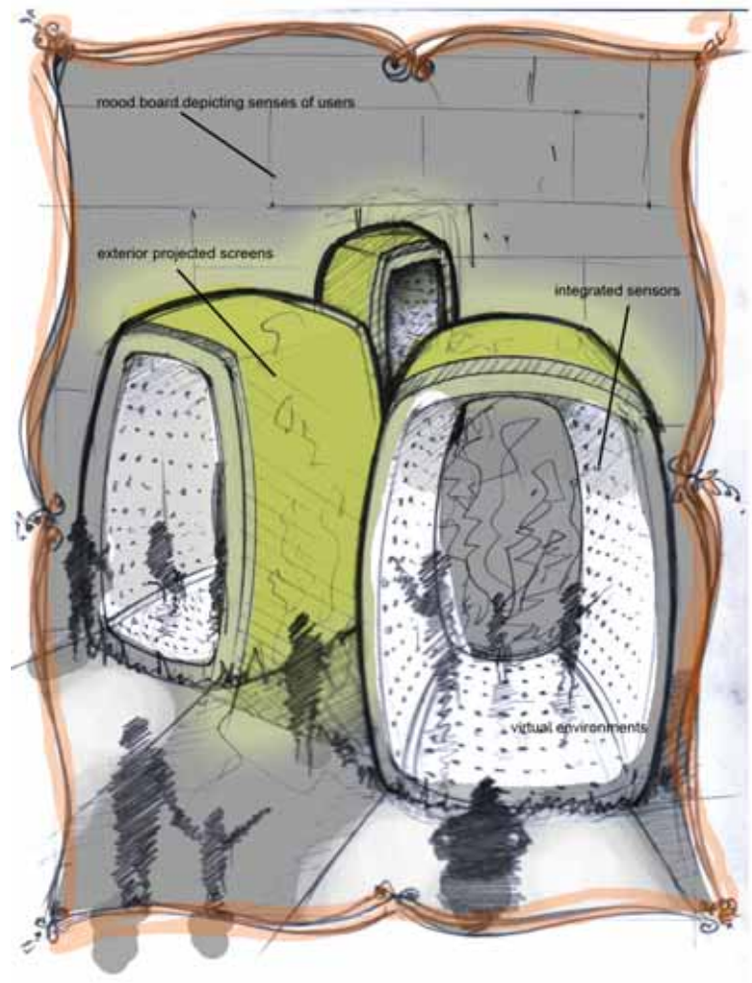
Imagine an experimental, experiential cabin that would serve as both a showcase but also as a place of escapism and a sanctuary for learners. This cabin could be mobile, being located at certain places for periods of time, yet it would remain an accessible place for learners and a permanent feature within the immediate designated geographical location. The focus of the cabin would be to 'transport' the learner, to act as a place of escapism, to simulate environments that are not otherwise accessible and to stimulate the senses, fostering creative thought.

Furniture in the cabin would be minimalist, with the displays and aspects of the design inside stimulating the senses. The size of the walls, floors and ceilings could be adapted, depending on numbers and the focus of the experience. Learners could interact with a range of tactile designs and installations and the cabin might also contain a 'holodeck' generating holograms and images. 'Intelligent' technologies would respond to data provided by those within the cabin, ensuring that the experiences were unique to each individual and never the same twice.

Programmable audio with immersive sound systems and splitter software could be used to create different atmospheres and environments within the space and programmed and programmable visual displays could be developed that would focus on creating various moods. Other aspects of the environment such as the temperature and lighting could be manipulated and even aspects of the cabin's external appearance could be changed. This could be done by manipulating programmable software that would project images onto an externally-facing

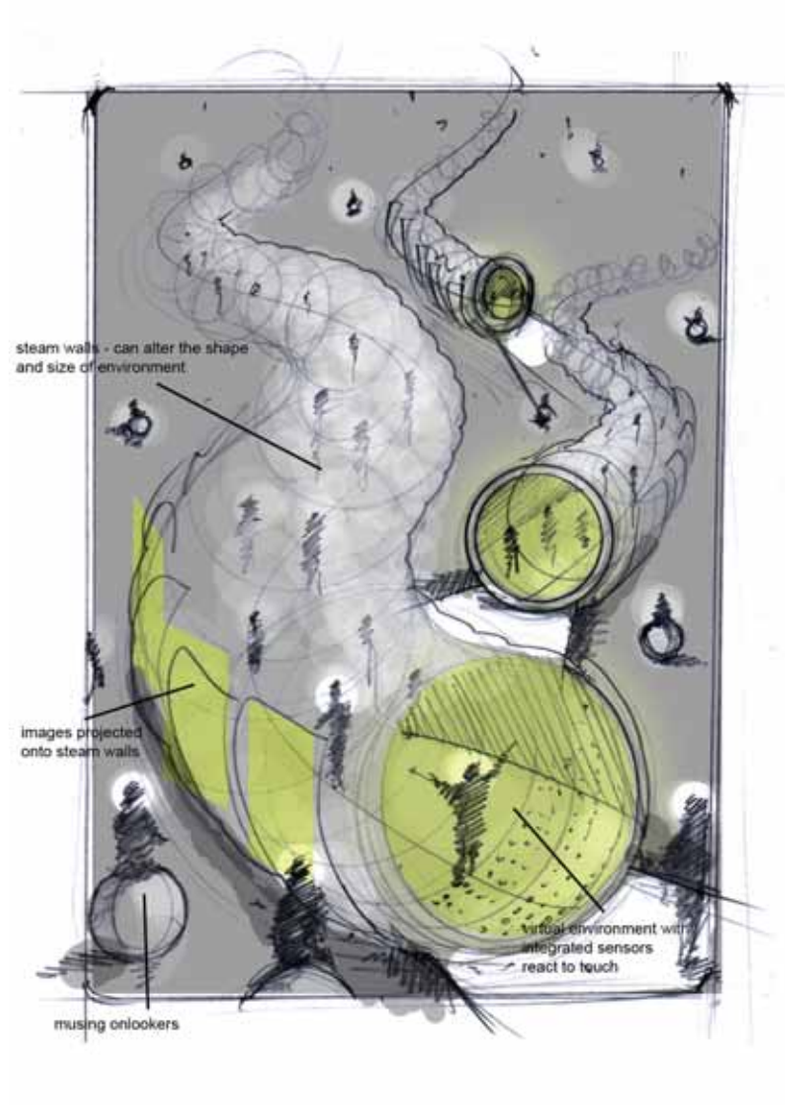
'presentation' screen, which makes up another of the other cabin 'walls'. This would allow those outside of the cabin to take part in intriguing and changing experiences. Learners could choose to interact with the various technologies and displays, write, talk about or record their experiences, or simply be passive recipients of the 'event' occurring within the 'trans-porta cabin'.

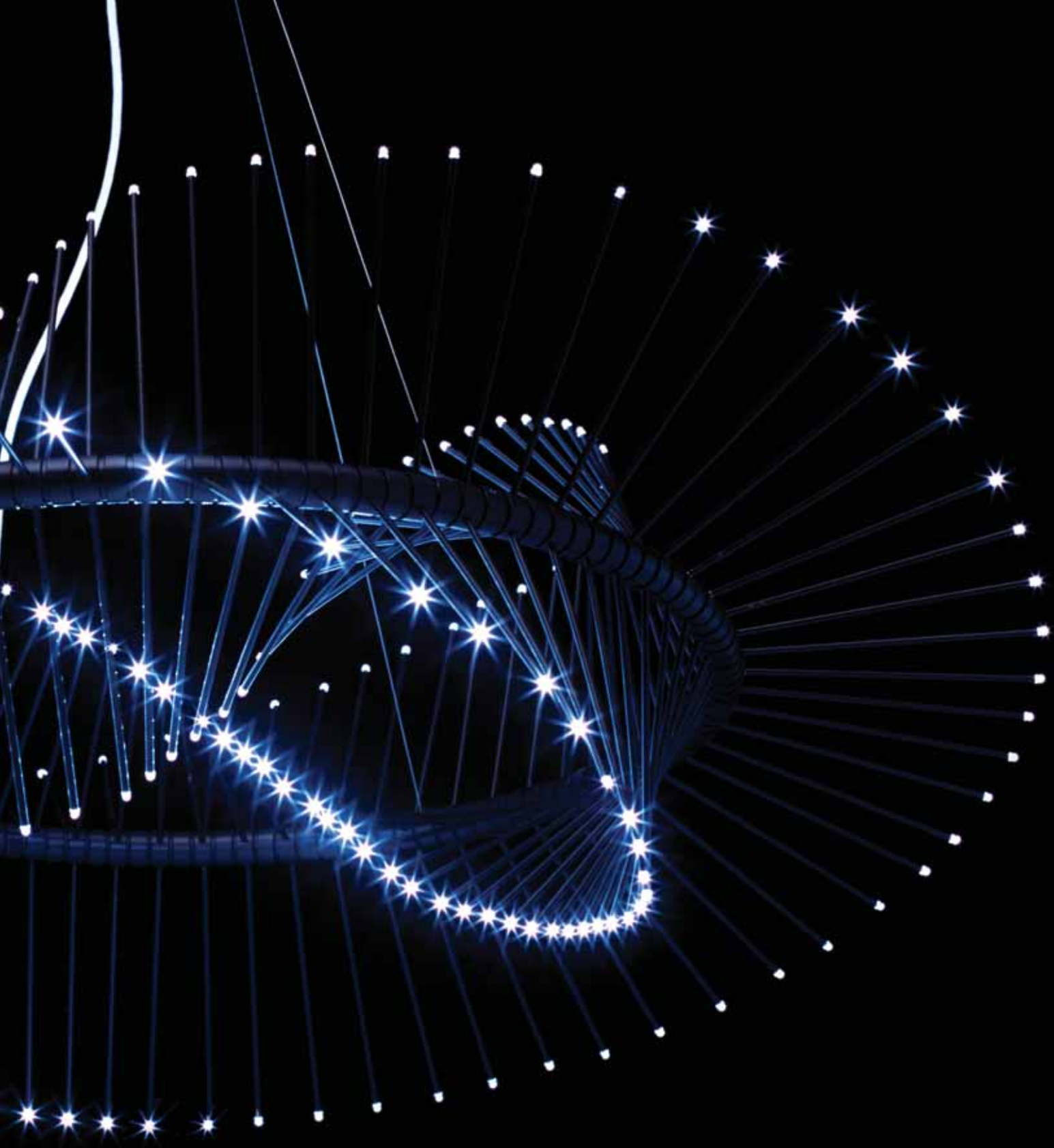
Alternatively the cabin could become a totally immersive environment, transforming the learning space through simulations into environments learners could not visit or interact with in reality. For example, learners could be inside a volcano, flying over the polar ice cap, on the surface of the moon, or perhaps immersed within complete fantasy worlds. Using sensor and wearable computer technologies, the learner could explore the simulated environment and manipulate aspects within it.



This immersive virtual environment could be programmable by users, and the programming, modelling and informational aspects underpinning the simulation could also form part of much broader learning experiences.

Whilst augmented and virtual reality have the potential to provide new and unique learning experiences and different learning environments and simulations, ubiquitous computing is embedded within everyday objects, facilitating more 'natural' interaction.





Robin Carpenter

Future scenario: Ubiquitous, ambient and pervasive technologies

These three, interconnected terms relate to current developments that make us reconsider what learning spaces of the future may look like. The possibilities that arise from ubiquitous, pervasive (in everything) and ambient (part of the constant background) technologies potentially change the ways in which learning may occur[36].

Ubiquitous computing is said to represent the beginning of a 'third wave'[37] of computing where technologies are intuitive and embedded in everyday objects within the environment rather than being distinct objects themselves. Because they are embedded they pale into the background, allowing people to interact with them more naturally, wherever they encounter them. Weiser[38] suggests that such technologies should help people to 'do something else', be intuitive and are best when they are 'invisible servants'. Already we are presented with ever-increasing options to connect wirelessly, invisibly and constantly to information sources, and the potential to embed intelligence into the environment and everyday objects presents us with a much broader range of possibilities in terms of the when, how, where and from 'what' we learn.

The use of sensors and computational technologies integrated in the environment could mean that accessing powerful information networks could be seamless and invisible, allowing for greater flexibility and responsiveness to learners' needs and facilitating learning in multiple locations. What if many aspects of the environment had embedded intelligence from which people could learn, and what if learners could interact with this technology and manipulate it to convey something about their moods, needs, interests and so forth? What if future environments had emotional intelligence? Developments in artificial intelligence will increasingly produce intelligent computer-based systems, objects and environments capable of giving more and more precise feedback and responses in light of individual input and actions, potentially changing the ways in which people learn with technology.

36 The following provide examples of current developments:
www.specknet.org
www.smartextiles.co.uk
www.intel.com/research/exploratory/motes.htm
alumweb.mit.edu/opendoor/200309/
www.ercim.org/publication/Ercim_News/enw47/sleep.html

37 From this perspective we have passed through the 'first wave' of mainframe computing and are currently in the 'second wave' of personal computing.

38 For further information, see the following:
www.ubiq.com/weiser/
www.ubiq.com/hypertext/weiser/SciAmDraft3.html

5. Time for a wider debate?

Great opportunities exist today to create a new education system for the 21st century. There are substantial resources available for redesigning and rebuilding educational institutions. There are also the beginnings of a radical questioning of the goals and nature of education in a time of social, economic, cultural and technical change. With these resources and with a weakening in the orthodoxy surrounding education, now is the time for educators, communities, policy makers and children to engage in a wide-reaching debate over the future of learning in the UK and the sorts of learning institutions, spaces and resources we want to see to support this vision.

Our concern, however, is that this opportunity is already being missed. In many cases, debates over the new curricula needed for a new century seem strangely divorced from discussions at school and local level over the needs of learners in the community. Innovations in the use of digital technologies are frequently ignored in the design specifications of new schools. In other cases, evidence of effective new approaches to teaching and learning are overlooked in an unimaginative reliance on the classrooms and corridors of the 19th century.

The learning spaces created over the next 10 to 15 years will symbolically and physically 'shape' our vision of education for the next century. The spaces that are created will either encourage or constrain new approaches to learning; they will either facilitate or militate against the full exploitation of digital and other resources for learning; they will either offer flexibility and responsiveness to new forms of curriculum or tie down learners and educators to one form of practice; they will either encourage openness and interaction with communities and informal learning, or reinforce the barriers between schooling and society.

Our aim here is not to suggest that there is only one sort of learning space which will meet the needs of the next century, nor to imply that there is only one way of exploiting technology for learning in the future. Instead, our aim is to argue that this opportunity to rethink educational spaces (and hence educational practices, relationships, methods and tools) should not be squandered.

For this opportunity to be fully exploited, we need to open up the scale and ambition of educational debate; to play, explore and experiment with the tools that a new century has offered us; and to engage learners, communities and educators in the imaginative, optimistic and challenging process of re-imagining learning communities for the next 100 years.

We need to start by asking
‘what if things could be very, very different...?’

6. Other useful resources

Oblinger, DG (ed) (2006). Learning Spaces. Washington DC: EDUCAUSE.
www.educause.edu/learningspaces
This excellent edited collection of chapters, debates, examples and case studies illustrates the ways in which we can rethink learning spaces. A must for anyone about to embark on re-designing spaces.

Design Share
www.designshare.com/index.php/awards/2006/commentary
This site offers a range of examples of new and unique learning space design.

Commission for Architecture and the Built Environment (CABE)
www.cabe.org.uk

Design Council
www.design-council.org.uk

Architecture.com (RIBA)
www.architecture.com

This publication is available to download from the Futurelab website
www.futurelab.org.uk/research/opening_education.htm

Also from Futurelab:

Literature Reviews and Research Reports
Written by leading academics, these publications provide comprehensive surveys of research and practice in a range of different fields.

Handbooks
Drawing on Futurelab's in-house R&D programme as well as projects from around the world, these handbooks offer practical advice and guidance to support the design and development of new approaches to education.

Opening Education Series
Focusing on emergent ideas in education and technology, this series of publications opens up new areas for debate and discussion.

We encourage the use and circulation of the text content of these publications, which are available to download from the Futurelab website – **www.futurelab.org.uk/research**. For full details of our open access policy, go to **www.futurelab.org.uk/open_access.htm.**

About Futurelab
Futurelab is passionate about transforming the way people learn. Tapping into the huge potential offered by digital and other technologies, we are developing innovative learning resources and practices that support new approaches to education for the 21st century.

Working in partnership with industry, policy and practice, Futurelab:

- incubates new ideas, taking them from the lab to the classroom
- offers hard evidence and practical advice to support the design and use of innovative learning tools
- communicates the latest thinking and practice in educational ICT
- provides the space for experimentation and the exchange of ideas between the creative, technology and education sectors.

A not-for-profit organisation, Futurelab is committed to sharing the lessons learnt from our research and development in order to inform positive change to educational policy and practice.

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