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Research on Universal Design of Shared Educational Campuses

Key Research Findings & Recommendations Report
29-09-2014

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Revision History

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Go raibh míle maith agaibh go léir.

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Executive summary and key recommendations

"The direction in which education starts a man will determine his future in life" (Plato)

Executive Summary

In response to the future use of the shared educational campus (SEC) approach in Ireland, a research study was carried out into the SEC model on behalf of the Centre for Excellence in Universal Design at the National Disability Authority. Based on an in-depth review of international best practice supported by interviews and workshops, the study found many benefits and equally many challenges facing the SEC concept.

The main issues emerging from the research include: firstly, the suitability of the SEC in terms of educational provision as opposed to individual schools; secondly, the location of an SEC and its integration with the community; and thirdly, the difficulties encountered finding suitable solutions to the integration of different educational and social communities on one campus. The fourth issue emphasises the importance of an engagement process that brings together key stakeholders across all sectors and at various spatial and administrative scales in a strategic and integrated planning approach that takes a long term view. The final issue focuses on how the Universal Design (UD) approach can be used to frame an integrated response to the previous issues in terms of strategic spatial planning at a macro scale, and spatial masterplanning and the design of specific features at a site level.

The integration of organisations can often depend on developing a fundamental understanding of the cultural, historical, economical, managerial and geographical dimensions that currently exist for the separate communities before an integrated solution can be identified. To achieve this understanding a great deal of investment is needed in both time and resources to develop an accurate design brief before preliminary planning or design takes place. Otherwise there is a danger of creating an unworkable solution.

On the positive side many stakeholders pointed to certain benefits such as greater integration across age groups and between mainstream and special educational needs, or the efficiencies achieved through integration of services on one site.

The Universal Design approach was investigated as a systematic framework for developing an empathetic method to understand the community context, and where the SEC is deemed appropriate, in helping to create an SEC that was accessible, understandable and useable for cross-generational users from primary school children up to grandparents, regardless of size, ability or disability.

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The findings and recommendations are based on feedback from an extensive set of stakeholder interviews and parallel workshops. The main message was not to underestimate the time and resources required to understand the fundamental needs of the different stakeholders and communities before considering any planning or design response.

This research examines the UD SEC in the context of 'strategic spatial planning' at the macro scale (city or county level), and 'spatial masterplanning' at the meso scale (neighbourhood and campus layout) and micro scale (landscaping features, finishes etc). The UD approach must ensure that the SEC is accessible, usable and easily understood at the Macro-level (in terms of location, access, transport etc.), at the Meso-level (in terms the local public realm, boundaries, on-site circulation, etc.), and the Micro-level (onsite physical features, way-finding, signage etc). This systems approach drawing on both strategic spatial planning and 'spatial masterplanning' will facilitate a more integrated, people-friendly and sustainable design solution that:

- Facilitates an engagement and design process that operates across all spatial scales and includes input from, and interaction between stakeholders at all levels

- Is based on integrated & strategic long term planning that operates across various spatial and temporal scales and considers how the physical journey from home to classroom caters for student 'access, participation & progress' within the education system

- Enables integration with the local community to achieve accessibility and usability for all local users

- Provides better integration between mainstream and special schools, and between mainstream students and SEN students

- Integrates with pedestrian, cycling and public transport networks

- Provides a UD masterplan to encourage maximum inclusion for all students, including those with special educational needs, and the public

- Provides a UD masterplan to ensure optimum relationships between the various schools, campus users and the local community

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Summary of key Recommendations

Following a review of international and national literature, stakeholder interviews, workshops, and the examination of various case studies, a set of key findings were drawn out from the research process. Overall, these findings address the main concerns expressed by the stakeholders and present some of the key planning and design approaches encountered in the literature. While there is substantial overlap between some themes (e.g. 1 and 2), the decision was made to create certain independent themes to distinguish subtle differences and to emphasise the importance of these sets of findings. Based a these findings a number of key recommendations have been developed to identify the main opportunities for implementing the findings.

In addition, these themes have been organised in a sequence (See Figure 42 below) that progress towards, provide objectives for, and underpin the seventh and final theme titled 'UD & key spatial and physical dimensions of an SEC'. This last theme outlines the main planning issues and a range of practical design features that should be examined as part of a UD SEC.
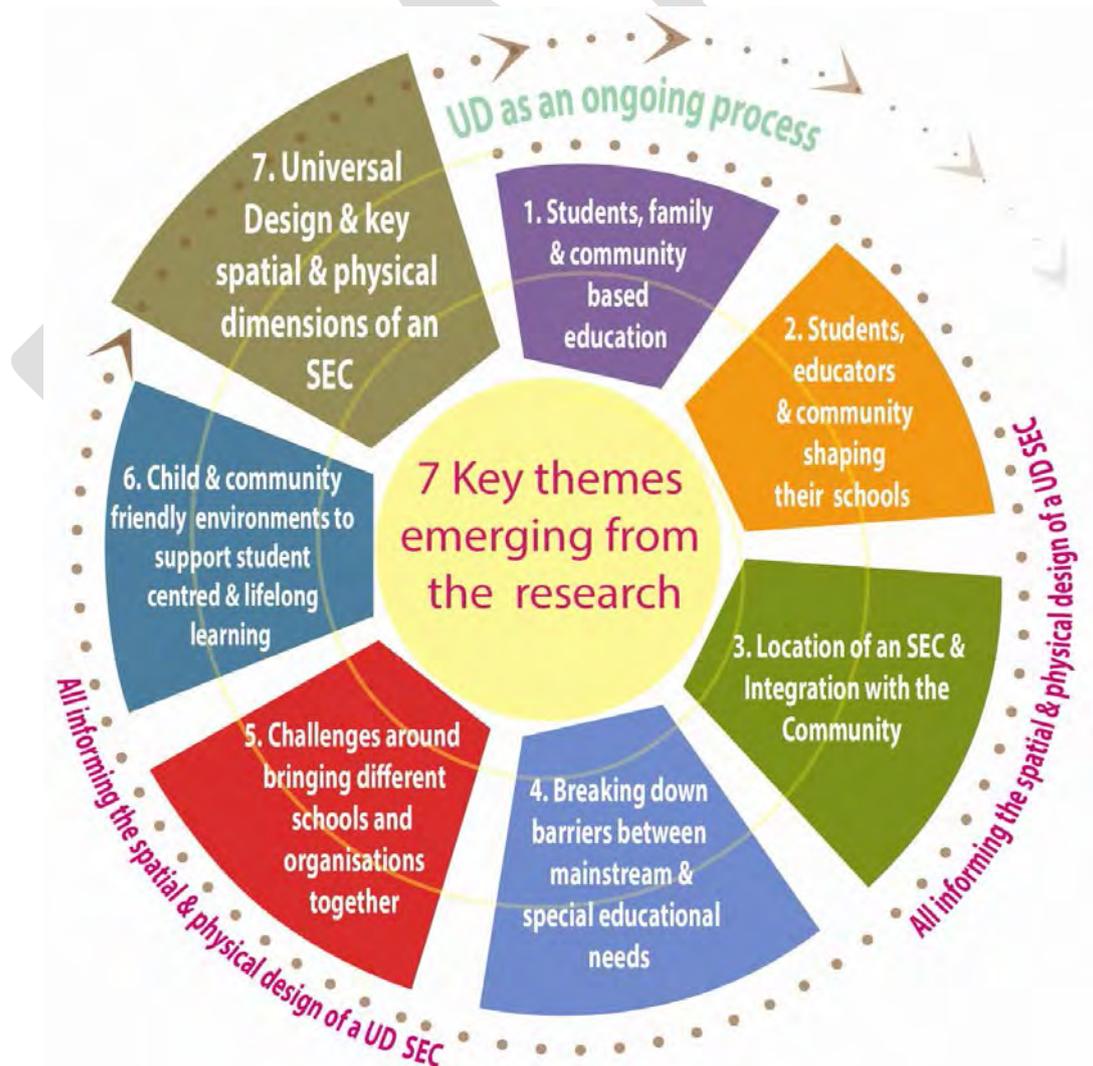
Student, family and community based educational provision

Key recommendations

- Use the UD approach to identify a community based stakeholder engagement process to determine the best long term educational strategy for the community.

- Develop a national policy framework around the SEC approach to help define the campus approach, establish policy objectives, set out a framework to engage with key stakeholders, and provide further planning and design guidance for the relevant departments and local authorities.

Students, educators & the community shaping their own schools

Key recommendations

- Develop a UD briefing process to facilitate stakeholder participation throughout the planning and design process which creates specific roles for community forums and student, parent and staff design champions.

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Location of an SEC & Integration into the Community

Key recommendations

- Examine ways to commence a dialogue about school provision and the community values that should inform how schools are located, designed and managed.

- National and local development policy must ensure that SECs are located centrally within the community to ensure community integration and ease of access for pedestrians, cyclists and public transport.

- Consider the benefits of locating schools within compact, mixed-use, and diverse communities to mitigate the effects of residential lifecycle and the associated impact on the lifecycle of schools. Schools located in lower density suburbs with homogeneous households are at greater risk from the negative effects of residential lifecycles which can result in cycles of high demand and decline due to homogeneity of household composition and child age groups.

- At a local authority level, suitably located sites with the right onsite conditions must be identified as a development priority.

- All relevant school location policy pertaining to local authority Development Plans, Local Area Plans or those contained within the various national urban design or planning guidelines must be implemented. If necessary additional measures must be put in place enforce these policies.

Breaking down barriers between mainstream & special educational needs

Key recommendations

- The SEC model should be used to integrate mainstream and special educational needs students who share appropriately designed external spaces. This could be helped by a shared management structure as outlined above.

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The challenges around bringing different schools & organisations together

Key recommendations

- Identify appropriate new structures for overall campus management to facilitate meaningful onsite and community integration.

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- Examine legislation, liability and insurance issues to enable healthy physical activity and greater interaction between children of various ages and abilities.

Creating child & community friendly educational environments to support student-centred & lifelong learning

Key recommendations

- Adopt the UD approach to ensure that any national level strategy for SECs fully consider human diversity in terms of age, size, ability or disability

- Use the UD approach to create a balance between age appropriate design and design for the whole community. This will ensure a child friendly, and more generally, a human friendly educational setting.

Universal Design & key spatial & physical dimensions of an SEC

Key recommendations

- Develop a set of national Universal Design guidelines for the planning and design of SECs in Ireland which may form part of the Department of Education and Skills School Design Guidance.

- The UD guidance should refer to issues such as: stakeholder participation and the briefing process, suitable site and sustainable location and site conditions; community access; approach, boundary conditions and entry/exit; campus size, layout and design of external spaces; campus circulation; ICT; and sustainable design.

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1. Introduction
Research context, aims and objectives

"The direction in which education starts a man will determine his future in life" (Plato)

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1.0. Introduction

This research is being undertaken by TrinityHaus and A&D Wejchert & Partners Architects, on behalf of the Centre for Excellence in Universal Design (CEUD) at the National Disability Authority (NDA). The aim of this project is to carry out research into contemporary national and international best practice in relation to Shared Educational Campuses and to engage with key stakeholders in order to investigate how Universal Design can inform the planning and design of such campuses in Ireland for people of any age, size, ability or disability.

The nature of a Shared Educational Campuses (henceforth referred to as SEC) creates the prospect of a wide range of people of various ages, abilities and educational needs sharing the campus at any one time. The design of this campus must therefore reflect this complexity and multiple needs and will therefore benefit from a Universal Design (henceforth referred to as UD) approach defined as;

Universal Design is the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability. This includes public places in the built environment such as buildings, streets or spaces that the public have access to; products and services provided in those places; and systems that are available including Information Communications Technology (ICT). Disability Act 2005 (http://www.universaldesign.ie/)

In the context of this research the current working definition of a 'Shared Educational Campus' is as follows;

A shared educational campus exists when two or more schools share an existing or new site and facilities in a meaningful manner. The site or facilities will also be typically be shared with, or co-owned by the local community.

This research primarily focuses on the UD SEC in the context of 'strategic spatial planning' (Albrechts, 2004, Cremer-Schulte, 2014) at the macro scale (city or county level) and 'spatial masterplanning' (CABE, 2004b, Foley, 2008) at meso scale (neighbourhood and campus layout) and micro scale (landscaping features, finishes etc). The strategic spatial planning issues largely relate to location and community accessibility and focus on relevant planning policy, stakeholder interests, optimum geographic location; access from the adjacent and wider community, and other similar broad, process driven aspects of the SEC. At the site or campus scale, spatial masterplanning concentrates on specific site-planning issues at the meso and micro scale, looking at: site layout and relationship to the adjacent community; access and boundaries; open space, and other planning and design features that may contribute to the SEC. At all scales the UD approach, inclusive education, and sustainability help to frame the overall research.

In carrying out this project the research team took cognizance of the current school building programme and it is hoped that the findings will bring added value to the relevant existing or proposed Department of Education and Skills (DES) design guidelines to ensure that school campuses and associated facilities are designed through a UD approach. The DES was consulted at the inception of this project and they have helped shape the scope, aims and objectives of this project which are outlined in Section 1.2 of this report.

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1.1. Research Objectives

The aim of this project is to research contemporary national and international best practice on SECs, investigating how UD should inform the design of such campuses in Ireland for people of any age, size, ability or disability , and produce with key recommendations on the direction that Ireland should take with regard to a UD approach to shared educational campuses.

A UD approach to SECs can provide well designed, multipurpose, local educational facilities at Pre-School, Primary, Secondary, and Further Education level in Ireland on the one site. SECs may also provide opportunities for adults to upgrade their skills and qualifications in line with current trends on the same campus as all other learners. Additionally, the site can be used as a resource by the local community.

This research will engage with a wide range of stakeholders to provide key findings and recommendations to support a UD approach for SECs in Ireland by addressing the following;

- Examine the emergence of SECs internationally and outline some key examples.

- Investigate the key drivers of educational design and campus design nationally and internationally as an overall context for the research.

- Examine the UD approach in the context of current international and national pedagogical practice and educational design. As part of this examine the needs of various users in the context of an SEC.

- Investigate the key strategic planning and spatial masterplanning issues around SECs through a Universal Design approach including: appropriate campus location; local access and integration with the local community; and campus masterplanning.

- Explore the convergence of the UD and the SEC approach with sustainable design.

- Examine the use of current and emerging technologies for UD SECs in terms of way-finding or assistive technology.

- Produce a report outlining a set of key findings and recommendations in relation to UD SECs in Ireland as part of a stakeholder engagement process. This report will support any future UD SEC Design Guidance that may be produced by CEUD/NDA for Government Departments, Local Authorities, built environment professionals and education stakeholders in Ireland.

1.2. Rationale for the study – Diverse users and the Universal Design approach

According to the current Irish 'Programme for Government' (Irish Government, 2011) the idea of 'Shared Educational Campuses' is seen as the preferred approach for the provision of future school building projects and declares that "In areas of demographic growth, Shared Educational Campuses will be the preferred model for future development of educational infrastructure. New schools will be built to grow with their communities and to provide for more interactive, child-friendly model of education".

In line with this proposition the 'Monaghan Educational Campus' has been recently completed as an example of one type of the shared educational campus where the campus provides new school buildings and facilities at primary, post-primary and further education levels all on the one site. While the Monaghan project is an exemplar, the provision of primary and post primary schools on the same site is a common occurrence in Ireland and a brief examination of the five year major project list (Department of Education and Skills (IRL), 2012c) shows examples of where a number of schools will share the one site. Examples include the provision of three new primary and one new post primary schools in the Carrigtwohill / Middleton area of Cork, or the amalgamation of Galvone National School with Southhill Junior School to form a new school in Limerick City. There are also other notable examples such as Farranferris educational campus in Cork City, Lisanelly SEC or 'Educational Village' in Omgh in Northern Ireland or the shared campus of Scoil Oilibhéir Naofa and Educate Together's Ballymakenny College in Drogheda.

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This shared educational campus concept must be considered in the context of the current school building programme which would result in the construction of 275 major school building projects , composed of both new schools and extensions to existing schools (Department of Education and Skills (IRL), 2012a). In some instances this will result in a number of schools and community facilities sharing the one site as an SEC, similar to the 'Monaghan Educational Campus'. While in other cases it may simply entail the construction of a new school adjacent to an existing school where certain facilities such as playing fields or a PE hall are shared.

Another development relevant to the SEC concept is the 'Fingal Schools Model' which was developed between the DES and Fingal County Council (Department of Education and Science (IRL), 2006). This agreement implements an integrated approach to the delivery of enhanced education and community facilities, which are over and above standard DoES requirements and including amenities such as full-size sports halls, stage and dressing rooms, community meeting rooms, all-weather pitches and playgrounds. The aim is to maximize investment by combining educational and community facilities which are integrated into the community and available to the public outside school opening hours.

Further to the SEC and Fingal models, the 'Education for Persons with Special Educational Needs (EPSEN) Act 2004' (Irish Government, 2004) legislates for children with special educational needs to be educated in an inclusive environment with mainstream children. The act seeks to provide maximum integration and inclusion for children with special needs in mainstream schools and therefore increases the requirement of schools to cater for greater student diversity in schools.

Whether a school project aligns with the SEC approach, or the Fingal model, the reality is that the site and associated facilities will be shared by a wide range of school users, both students, staff or parents. When the facilities must cater for special needs students in the mainstream classroom, in special education units within the school, or a special education school on the site, then a greater spectrum of physical, sensory, cognitive and behavioral difficulties must be considered in the design. If the school is open to the local community for evening classes, sporting activities, or community events, the challenges are complicated further as the facilities must also cater to the public and the diversity that entails, including

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increasing numbers of older people in our changing demographics. In addition, the facilities will also be used day and night, over the weekend and all year round.
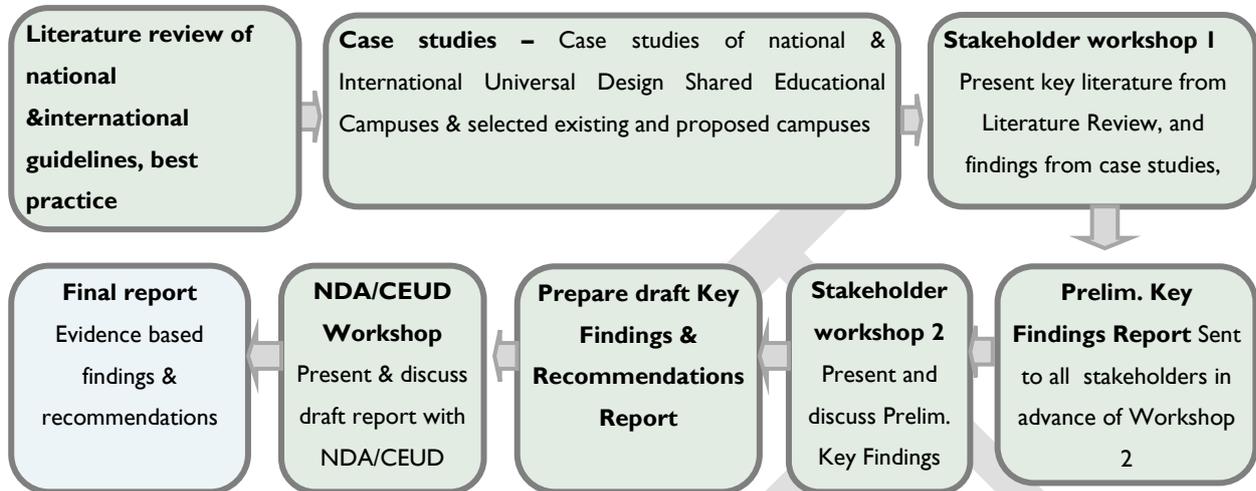
Catering to the diverse range of users as outlined is merely a reflection of society and presents a more realistic and socially balanced environment for the education of children. The principle of UD is already incorporated into DES guidance which states that "All new schools and school extensions should be designed to cater for persons with varying ranges of physical ability and they must not be disadvantaged by design limitations". In relation to external space, the guidelines specify that "[p]rovision should be made for disabled access from the site perimeter to the school, with universal access routes to all main building entrances" (Department of Education and Skills (IRL), 2012b.p17). However beyond this, there is little detailed guidance around designing for a wide range of users, their needs and their preferences. The UD approach provides an internationally established framework to identify these needs and to provide campus design for all people regardless of age, size ability or disability.

In addition to onsite conditions, the location of school facilities is critical in terms of serving the local community and providing opportunities for children and their parents or guardians to walk, cycle or use public transport. School location and accessibility from the local community is central to the UD approach for SECs and supports the idea that "Universal design is not just about access to individual buildings, it is also about how easily people can get around and to where they want to go" (Center for Excellence in Universal Design, 2012p.26). UD at a strategic scale is fundamental and should inform planning decisions in "assessing systematically the distances from neighbourhoods to places of work, healthcare facilities, education, convenience retailing and social facilities" (p.27).

The various approaches and proposals outlined above present both opportunities and challenges to the provision of schools in Ireland. Addressing these issues through the UD approach provides a framework to identify situations where the SEC is appropriate, and to ensure that SECs can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability.

1.3. Research Methodology

The research methodology set out to address all key issues through direct and ongoing consultation with a diverse range of users, designers, providers, managers and regulators. This will helped to inform and ground the entire research process.

Literature review of national &international guidelines, best practice	**Case studies –** Case studies of national & International Universal Design Shared Educational Campuses & selected existing and proposed campuses	**Stakeholder workshop 1** Present key literature from Literature Review, and findings from case studies,

Final report Evidence based findings & recommendations	**NDA/CEUD Workshop** Present & discuss draft report with NDA/CEUD	**Prepare draft Key Findings & Recommendations Report**	**Stakeholder workshop 2** Present and discuss Prelim. Key Findings	**Prelim. Key Findings Report** Sent to all stakeholders in advance of Workshop 2

The key components to this research project include:

- A review of the literature: this involves undertaking an extensive review of the existing literature, which broadly addresses the following two questions: (1) What is known from the international literature about the design of SECs and (2) How is the UD approach being used in the design of educational campuses and how might it be used to inform research findings and recommendations commissioned by CEUD at the NDA.

- Case studies of shared educational campuses or similar in Ireland and internationally

- Stakeholder engagement: A central component of the research was the engagement with a wide range of stakeholders. This was to ensure that the research and recommendations addressed the actual needs of people who would use an SEC and to understand the complex issues associated with SECs. This involved one-to-one interviews with a range of individuals and key stakeholder organisations. The findings from the literature review and the interviews were presented at stakeholder workshops to inform attendees about the main issues and capture feedback

Part A
Literature Review

2.0. Background

The issues influencing shared educational campuses

"As the community centre of the neighbourhood it would provide for the whole man, and abolish the duality of education and ordinary life. It would not only be the training ground for the art of living, but the place in which life is lived……" (Morris, 1925- The Village College)

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2.0. Introduction

Henry Morris, in the above quote, was proposing that the 'village college' could bring together all the various, but isolated activities in the village –the school, the village hall, the reading room, the evening classes, the boys scouts, girl guides, library, athletic clubs and more (Jeffs, 1998). Morris's 'village college', or the school as the centre of the community, aligns well with the Shared Educational Campuses (henceforth to be referred to as SEC) concept. Furthermore, as discussed in the rationale for this research, SEC as promoted by current Irish 'Programme for Government' (Irish Government, 2011) or the Fingal Schools model are already starting to provide a greater level of integration between schools and communities through shared facilities.

The idea of breaking down the barriers between the school and the local community is supported across various sectors in Ireland. 'The National Action Plan for Social Inclusion 2007-2016' (Office for Social Inclusion (Ireland), 2007) emphasises education at every stage of the lifecycle including children, people of working age, older people and people with a

disability. It highlights the importance of community facilities in achieving education across the lifecycle and calls for investment in childcare, community training centres, second chance education, and lifelong learning for older people. In relation to people with disabilities, the plan sets goals for equity of access to education and the built environment in general. Other national documents such as; 'DEIS: An Action Plan for Educational Inclusion' (Dept. of Education Science Ireland, 2005) or the 'National Development Plan 2007-2013' (Irish Government, 2007), also highlight the importance of an integrated, lifetime approach to learning while involving and utilising the local community. An SEC, if properly implemented, will support these goals, where a Universal Design (henceforth referred to as UD) approach ensures the inclusion of everyone, regardless of age, size ability or disability.

Internationally the SEC concept is growing in various forms. Sir Cyril Taylor, writing in 'A good school for every child', argues that schools should become the centres of their communities, constantly used by both children and adults, pointing out that shared use of school facilities would help break down divisions in society (Taylor, 2009). In the US, publications such as 'Schools as Centers of Community: A Citizens Guide to Planning and Design' not only highlight optimisation of schools as a resource, but also the integration with the community and the importance of engaging all stakeholders in the planning and design process (Educational Resources Information Center, 2000). In Australia, the New South Wales Department of Education, has implemented the Schools as Community Centres (henceforth referred to as SaCC) programme which uses local public schools to support families raising young children, in partnership with local human service agencies, the local community and the school (Families New South Wales, 2012)

The SEC concept creates a better relationship between pre-school, primary, secondary, and lifelong learning, for the whole community, and for people of all ages. "Schools should be a point of unity, not division, between and among generations" (Sullivan and National Clearinghouse for Educational Facilities, 2002). Lifelong learning and wider community participation are central tenets of the Irish 'National Strategy for Higher Education to 2030' (Higher Education Strategy et al., 2011), and this report stresses the need for new structures to cater to diverse learning requirements, which will in turn support a more equitable third level education guaranteeing wider access to education in society.

The following two sub-sections look briefly at the typical definition of a campus, and some international examples of shared educational campuses or similar, before going on to examine some of the drivers of shared educational campuses here in Ireland and internationally.

2.1. Campus definition

A campus typica*lly refers to a single site or* grounds which contain a number of buildings which share a common purpose such as medical or educational facilities. This definition is based on some accepted definitions such as that found is the Merriam-Webster Dictionary where a campus is defined as;

> **cam pus -** *noun, often attributive* \ˈkam-pəs\
>
> ; the grounds and buildings of a university, college, or school
>
> ; a university, college, or school viewed as an academic, social, or spiritual entity
>
> ; grounds that resemble a campus <a hospital campus> <a landscaped corporate campus> (http://www.merriam-webster.com/dictionary/campus)

To consider one common perspective of a campus it may be worth looking at Wikipedia which provides the following definition;

> "A **campus** is traditionally the land on which a college or university and related institutional buildings are situated. Usually a campus includes libraries, lecture halls, residence halls and park-like settings. The definition currently describes a collection of buildings that belong to a given institution, either academic or non-academic" (http://en.wikipedia.org/wiki/Campus)

While in the traditional American context, the campus is viewed as follows;

> "The campus is a park. It is a cultural center and meeting place. It is a symbol for the college, the town, and, in the case of public institutions, the state. College officials use the campus and its attractions to promote the school, recruit students, and build goodwill with alumni, residents, benefactors, and government officials. The characteristics of campuses at U.S. colleges and universities, particularly those located in small cities and towns, stand in sharp contrast to the role physical

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facilities play at higher education institutions in other countries. The campus is very much a public space and its status as such is one of the defining traits of the American college town." (Gumprecht, 2007)

Although these definitions largely consider the campus as a single site within a definable boundary, there is some flexibility in this definition that might also suggest that a campus may also constitute a more open or distributed spatial structure. A stated by Gumprecht above, the US campus is often a more open and public space without any real discernible break from the community. In the UK this approach is witnessed in Oxford and Cambridge where each University is composed of over 30 colleges distributed throughout the respective town. In Ireland the Dublin Institute of Technology (DIT) currently operates as a distributed campus, and while DIT is to be amalgamated onto a new campus in Grangegorman (Grangegorman Development Agency, 2014), this will be part of an urban quarter and will share the site with housing, health facilities and local schools.

However, as outlined in the introduction this research will focus predominantly on single-site campus approach with working definition of an SEC as follows;

A shared educational campus exists when two or more schools share an existing or new site and facilities in a meaningful manner. The site or facilities will also be typically be shared with, or co-owned by the local community.

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Notwithstanding this, the authors acknowledge that a distributed campus approach may provide benefits and where relevant this approach is examined in this research. It is also possible that such an approach may prove advantageous in urban locations where large sites are unavailable, or in situations where greater community integration may be achievable through the distributed campus approach.

2.2. Shared Educational Campuses – Various International forms

Internationally the concept of sharing educational facilities on one campus is gaining in popularity with various terms being used such as;

- Shared Educational Campuses (Ireland) - As described earlier and as set out in the Irish Programme for government (Irish Government, 2011)

- Fingal Schools Model (Ireland) – As described earlier (Department of Education and Science (IRL), 2006)

- Shared Educational Campuses (Northern Ireland) – Northern Ireland's Education Minister has recently launched the Shared Educational Campuses Programme which proposes ten shared educational campuses in the north. The programme is aimed at funding projects with; "Shared facilities – where new facilities are built to allow for shared use by all schools within the model." "Enhanced facilities – where current facilities are improved to allow for shared use by all schools within the model." "Shared Campus – where schools are co-located and share infrastructure" (Department of Education (NI), 2014).
  The first project being developed is the "Education Village" and it is being proposed for Armagh. The project, which provides a shared campus, will bring a number of Protestant and Catholic post primary and further education schools together on one site (The Educational and Community Village Consensus Armagh, 2014). Each school will have its own building and maintain its identity and independence but will share a range of onsite facilities.

- Extended Schools (UK) – The Department for Education and Skills (henceforth referred to as DfES) in the UK has developed a model where primary and secondary schools are funded to provide extracurricular services to students and the wider community. "Extended schools provide a range of services and activities, often beyond the school day, to help meet the needs of children, their families and the wider community" (DfES (UK), 2005.p.7)

- Full Service Community Schools (USA) – Discussing how 'Full Service Community Schools' grew out of the 'Full Service Schooling' model, Smith (2004, 2005) refers to a definition provided by Dryfoos (1994);

> "A full-service school integrates education, medical, social and/or human services that are beneficial to meeting the needs of children and youth and their families on school grounds or in locations which are easily accessible. A full-service school provides the types of prevention, treatment, and support services children and families need to succeed.. . services that are high quality

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and comprehensive and are built on interagency partnerships which have evolved from cooperative ventures to intensive collaborative arrangements among state and local and public and private entities" (p.142)

In their current format 'Full Service Community Schools' extend the services provided by community schools and become community centres providing after school services, real world learning opportunities, early childhood education, and health services for children and adults in the community

> "They provide services designed to remove barriers to learning, make community assets fully available to address the needs of learners, and build bridges between schools, families, and communities based on mutual investment in the comprehensive well-being of communities" (Varlas, 2008.p.1)

- Multiplex Schools or co-located educational facilities (USA)- This approach typically involves a number of smaller schools sharing a site where each school is operated independently, and having its own principal and teaching staff. Jacobson (2013) points out that these multiplex schools are driven by the desire in the US for smaller schools which create a more personalised environment, but also by the efficiencies and cost effectiveness possible by the sharing of facilities, in terms of construction and operation.

- Multiple level institutions (Internationally) – Many of the exemplar schools described in the 'Designing for Education: Compendium of Exemplary Educational Facilities 2011' (OECD, 2011a) are based on this shared principle. In this document they are categorized as "multiple level" facilities which are institutions that cater for a range of educational levels and age groups on one site.

2.3. Shared Educational Campuses – Key influences

As outlined above, the SEC approach is gaining ground internationally. The reasons behind this are multiple and vary from school to school and from country to country. In some cases it comes about quite naturally when there is the need to build more than one school at one time in a community. In this case the automatic response from the schools, local authority and community might be to build them on the one site. In other cases there are more specific

reasons, such as government policy, which, as previously outlined in Section 1.2, has an influence in Ireland. Other drivers may include educational approaches or a pedagogical philosophy, sustainable design, or economies of scale. Some of these key drivers are now discussed below in an effort to understand some of the motivations that lay behind the SEC approach.

2.3.1. Education in the 21st Century – Learning environments, integration and lifelong learning

Integrated learning environments

The concept of sharing different educational facilities across a wider range of age groups on one campus is gaining in popularity internationally. Blyth (2011a) reflects on the evolution of learning environments and questions how shared educational spaces will handle mixed student populations:

> "Whilst primary, post primary and higher education are seen as distinctly separate, the closer engagement between universities and upper post primary schools, for example, and their use of shared teaching spaces, raises intriguing questions about how university facilities for the future will need to accommodate increasingly mixed populations." (p.17)

In discussing effective learning, Atkins points to the need for cross-sector collaboration, co-ordination and integration, and stresses the need to "maximise integration and shared use of educational, wider community and recreational services and facilities through co-location and collaborative approaches to management and shared use agreements" (Atkins, 2011). In terms of pedagogy or 'the science and practice of teaching' model of teaching children is evolving away from the practice of distinct and clearly defined separate classrooms with the teacher as the deliverer of education to pupils in a very didactic fashion. Team teaching and group learning-through-doing in a more open and inclusive environment is now becoming common place and there are some examples of open plan schools without the traditional, clear structural delineation between classrooms that was once common place. In this environment the needs of the student shape the educational process to a greater extent thus engendering a more child-centred approach. Further to this, greater interaction with the local community is

considered important in terms of grounding education in the real world issues of the community.

Inclusion – breaking down the barriers between mainstream and special needs

In 2004 the 'Education for Persons with Special Education Needs' (EPSEN) Act (Irish Government, 2004) was enacted to make further provision for the education of students with special educational needs, stating that:

> "A child with special educational needs shall be educated in an inclusive environment with children who do not have such needs unless the nature or degree of those needs of the child is such that to do so would be inconsistent with;
>
> (a) the best interests of the child as determined in accordance with any assessment carried out under this Act, or
>
> (b) the effective provision of education for children with whom the child is to be educated."

The National Council for Special Education (NCSE, 2011) henceforth to be referred to as NCSE) acknowledge that both special classes and special schools will be needed for children with complex special educational needs(NCSE, 2011). However they stress the value of linkages between special and mainstream systems pointing to a report (Ware et al., 2009) which raises the possibility of special schools providing "out-reach and in-reach support" for mainstream schools.

In terms of the location of special schools, the NCSE argues for bi-location with mainstream schools.

> "Council is also of the opinion that, in the spirit of the EPSEN Act, 2004, future educational provision for children with complex special educational needs that cannot be met within mainstream classes, should be available locally in so far as is possible, either as an integral part of a mainstream school (special classes) or situated on the same campus as mainstream schools (special schools or units) so that the opportunity for inclusion can be maximised. (NCSE, 2011.p.84-85)

The policy recommendations arising from the NCSE include the following;

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"In the future, educational provision for children with special educational needs should generally be provided on the same site as mainstream schools, where this is seen to be consistent with their best interests and the effective provision of education to the children with whom they are to be educated. This facilitates flexibility and interaction in terms of the continuum of provision, opportunities for inclusion and enables pupils' movement and progression between the different types of provision."(p.106)

"Planning of new mainstream schools should take into account the needs of pupils with special educational needs in the community, including demographics and distances from other services. This could possibly mean planning for a special unit/school on site but could also mean well planned, time-bound special classes/transition arrangements or resourced mainstream classes to provide for optimal inclusion of pupils."
(p.106 /107)

"Major building programmes for new schools should consider locating special schools onsite" (p.107)

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The NCSE acknowledges the requirement for special schools but argues for the inclusion of these schools alongside mainstream schools, not only to break down barriers, but also to maximise efficiency by optimising the special needs services between both schools.

Lifelong learning

Depending on the range of educational facilities contained on an SEC, there is the opportunity to bring together on one campus a wide range of age groups. The 'Monaghan Educational Campus' as discussed in Section 1.2 is an example of this and brings together primary, post-primary and further education, and community facilities all on the one site. This multi-generational approach has the opportunity to make lifelong learning visible and provides a tangible environment for people of all ages to interact, learn from each other and witness firsthand the continuum of learning that is possible throughout one's life.

The concept of lifelong learning has become central not just to pedagogical theory but also to many international educational strategies. The current 'Programme for Government' (Irish Government, 2011) refers to the concept of 'lifelong learning', pointing to community

education and vocational educational for jobseekers as a priority. In 2000 the 'Learning for Life: White paper on adult education' (Dept. of Education and Science Ireland, 2000) which followed the 'Ready to learn: white paper on early childhood education' (Dept. of Education and Science Ireland, 1999) stated that "a lifelong learning policy requires learning opportunities to be provided over a lifespan rather than only in the early years…" and in this way, speaks to the need to develop a continuum of lifelong learning. The adult education white paper provides a useful description of lifelong learning as a process which incorporates the following: lifelong (within a continuum of education from the cradle to the grave); lifewide (multiplicity of sites in which learning now occurs); and, voluntary and self-motivated.

> "The meaning of lifelong learning includes a process from 'cradle to grave' without constraining it to specific time periods, years, certain organizations or institutions. Lifelong learning is a continuous process in which individuals retain and develop their life based conduct, knowledge and skills." (Demirel, 2009)

The current 'Programme for Government' states that the "ambition is to build a knowledge society. Education is at the heart of a more cohesive, more equal and more successful society, and it will be the engine of sustainable economic growth. Ireland has experienced a decline in educational outcomes in recent years. We will draw from top performing education models like Finland to reverse this trend" (Irish Government, 2011). The Programme for Government refers to the concept of 'lifelong learning' pointing to community education and vocational educational for jobseekers as a priority.

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In more recent times the 'National Positive Ageing Strategy' (Department of Health (IRL), 2013) identifies lifelong education and learning as a key policy area.

> "Remove barriers to participation and provide more opportunities for the continued involvement of people as they age in all aspects of cultural, economic and social life in their communities according to their needs, preferences and capacities" (p.50)

The strategy advocates the use of UD to support the design and development of age friendly facilities while setting out objectives to promote access to a wide range of lifelong learning and education opportunities. The strategy calls for action around removing barriers to lifelong

learning such as the lack of public transport and the existence of inaccessible educational facilities.

2.3.2.Integration of services

This integration of community services has been targeted by a number of countries that are part of the Organization for Economic Cooperation and Development (henceforth referred to as OECD) to facilitate the provision of a range of community services on school sites, including adult education and other social and welfare services. An OCED report titled 'Under One Roof – The integration of Schools and Community Services in OECD Countries' describes the development of integrated service provision as "providing integrated services is understood here as the practice of integrating on one site services which are usually provided separately" (OECD, 1998). The report states that the "provision of integrated services could play a significant role in helping achieve "lifelong learning", an objective which was identified by the 1996 OECD conference at Ministerial level as a nodal point of the OECD's work on education." (Townshend and Programme on Educational)

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The SEC approach may align with this OECD initiative and could benefit from the efficiencies outlined by the OECD in terms of greater integration and optimisation of faculties for both educational and community users. The higher density of facilities on one site offers a critical mass in terms of greater service provision that might not be possible for single facilities in single sites.

In support of this approach, a report by the Economic and Social Research Institute (henceforth ESRI) looking at the design of primary schools for the future in Ireland (Darmody et al., 2010) argues that;

> "Schools should be an important part of the local community. In particular, parental involvement in school life should be facilitated by providing space for parents to meet within the school during and after the school day. The potential to move towards an 'extended school' model with local social and community services provided within, or close to, the school should be explored."

As mentioned earlier in Section 1.2, the 'Fingal Schools Model' (Department of Education and Science (IRL), 2006) already adopts this integrated approach to the delivery of enhanced education and community facilities. The aim of this model in maximizing investment by combining educational and community facilities is similar to the OECD's integrated service provision.

The integration of services on one site and greater school-community integration has implications for on-site management. For example, longer opening hours will require different cleaning and maintenance regimes (DfES 2002), while the role of caretakers or grounds staff will need to evolve in order to deal with greater public access (DfES 2006).

2.3.3. Population growth, site constraints and limited budgets

The growth of the Irish population is putting huge pressure on the existing educational infrastructure and as outlined earlier in Section 1.2, the current school building programme being undertaken in Ireland will result in the construction of 275 major school building projects, composed of both new schools and extensions to existing schools (Department of Education and Skills (IRL), 2012a). In statement in 2013, the Minister for Education and Skills, Ruairí Quinn, T.D., stressed the need to meet Ireland's growing educational needs and to replace existing temporary or unsatisfactory accommodation:

> "We are facing massive increases in the number of school going children in the coming years. Total enrolment in both primary and post-primary schools is expected to grow by over 70,000 between now and 2017 – over 45,000 at primary level and 25,000 at post primary - and will continue to grow up to at least 2024 at second level"
> (Department of Education and Science (IRL), 2013)

The school building programme aims to provide over 100,000 permanent school places, of which over 80,000 will be new school places, comprising;106 new schools at primary level, 65 large-scale extensions at primary level, 43 new schools at post primary level, 49 large-scale extensions at post primary level, 8 new special schools, and 4 extensions to special schools (ibid).

It is also the case that many existing schools are outgrowing their existing facilities for reasons others than additional school places. A government report in 2006 highlights that modern school life and the current curriculum is subjecting existing schools to a lot of pressure:

> "Building projects are undertaken at existing schools because many schools have outgrown their original school buildings. Many school buildings were built decades ago and are unable to cope with the demands of modern school life. In addition, the school curriculum has changed and schools may need more space to teach the curriculum in full" (Department of Education and skills (IRL), 2005).

In many cases the accommodation required for additional school places or new school facilities such as language labs or PE halls, can be achieved on an existing site. While schools in Ireland are typically low rise, often no more than two stories, it may be worth looking at some urban schools in Ireland which may consist of four stories or more (i.e. Belvedere College in Dublin - www.belvederecollege.ie or St Brigid's Primary School, The Coombe in Dublin - www.stbrigidsthecoombe.com). There are also international examples such as 'Schulanlage Leutschenbach' (OECD, 2011a), or the plan to convert an existing six storey office block in downtown Perth, Australia into a school for seven to twelve year students (Hiatt, 2014).

However on more restricted sites, the construction of a large extension, not to mention the co-location of a new school with an existing school, may not be possible due to site constraints. Any large scale redevelopment or construction of a new school must not only provide adequate space for current needs, but also for future needs. In terms of site suitability assessment and selecting a new school site, the Department of Education and Skills (henceforth DES) dictates that any site must be capable of expanding in line with future school needs (Department of Education and Skills (IRL), 2012b). While the 'General Design Guidelines for Schools (Primary and Post-primary) 2011' recommends that the design of the school and the site layout allows future building and the provision of onsite space for additional onsite facilities:

> "Allowance for future building and external expansion must be at least 33%. Capacity for expansion of external facilities must include for future external circulation requirements, additional car-parking and extra ball-courts"(p.15).

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Such spatial demands, not only to meet the needs of current student, staff and curriculum, but also expansion space to future-proof the school, make it very difficult for many schools to continue on their existing sites, and often force the relocation of schools to new larger sites. When the possibility of this happens with two or more schools within a catchment area, the obvious choice is the co-location of the new schools on one larger site, typically a green field site on the outskirts of an urban area.

Some stakeholders have pointed out that such green field sites are far more attractive for Public Private Partnerships as the sites are less expensive; furthermore, there may be fewer unknowns in terms of site or building conditions. Site access for construction and working hour conditions are also less restrictive than urban sites. In terms of construction costs, new build is often cheaper than retrofitting and in many cases it is more economical to achieve higher standards in terms of space provision energy efficiency, accessibility and the provision of Information and Computer Technology (henceforth referred to as ICT).

2.3.4. Sustainable planning and design

The location of an SEC and the masterplanning of the site including the use and generation of energy have a major impact in terms of sustainability. According to the United Nations (henceforth UN), sustainability requires an integrated approach involving "the integration of the three components of sustainable development - economic development, social development and environmental protection – as interdependent and mutually reinforcing pillars." (United Nations, 2005.p12). In terms of the social sustainability component, UD has a key role as it "helps the full inclusion and participation in family and community life" (Duncan, 2007.p27).

At the urban design level UD and sustainability are also interconnected. This is recognised in the Irish 'Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas' which states that:

> "sustainable design and Universal Design are inextricably linked and universal
> design when incorporated from the early stage of planning integrated

neighbourhoods, will reduce the need for costly and wasteful retrofits over the medium to long term"(DEHLG, 2009a.p5).

Sustainable design in the educational context presents a number of challenges and opportunities. The challenges lie in the sustainable location, design, construction and management of school facilities in them, while the opportunities lie in using the school to educate students and staff about sustainability, including demonstrating key sustainability principles through certain activities such as recycling programmes or walk-to-school days, or through building features such as solar panels. In terms of the opportunities, the Irish Green-Schools Programme (An Taisce, 2014) or the draft 'National Strategy on Education for Sustainable Development in Ireland' (Department of Education and Skills (IRL), 2013) are aimed at embedding education and awareness about environmental and sustainability issues in the Irish education system.

In the context of the SEC and the scope of this project which is largely focused on masterplanning issues, some of the main sustainability challenges involve location and on-site operation energy. These are discussed in the following sections below.

Sustainable location – Facilitating sustainable travel patterns

The location of an SEC in relation to the community it serves has already been discussed briefly in Section 2.3.2. above, but it is important to look at this in a little more detail. The report 'Towards and Urban Renaissance' (Urban Task Force and Rogers, 1999) declares that if "the urban framework fails we lose much more than our physical structures…the cohesion of our community depends upon an urban form which supports core institutions" (p29).

Figure 1 on the next page shows the urban framework at the following scales: Local scale, Neighbourhood scale, District scale, Town scale, and City scale. It also shows indicative distances from the home (as the starting point of a person's journey) to the boundaries of each scale. In the context of educational facilities it illustrates that a primary school belongs somewhere between the local scale (200m from home) and the neighbourhood scale (600m from home). A secondary school should be located between the neighbourhood scale and the district scale (2,000m from home) and that higher education can be located between the district scale and the town scale (5,000 from home).
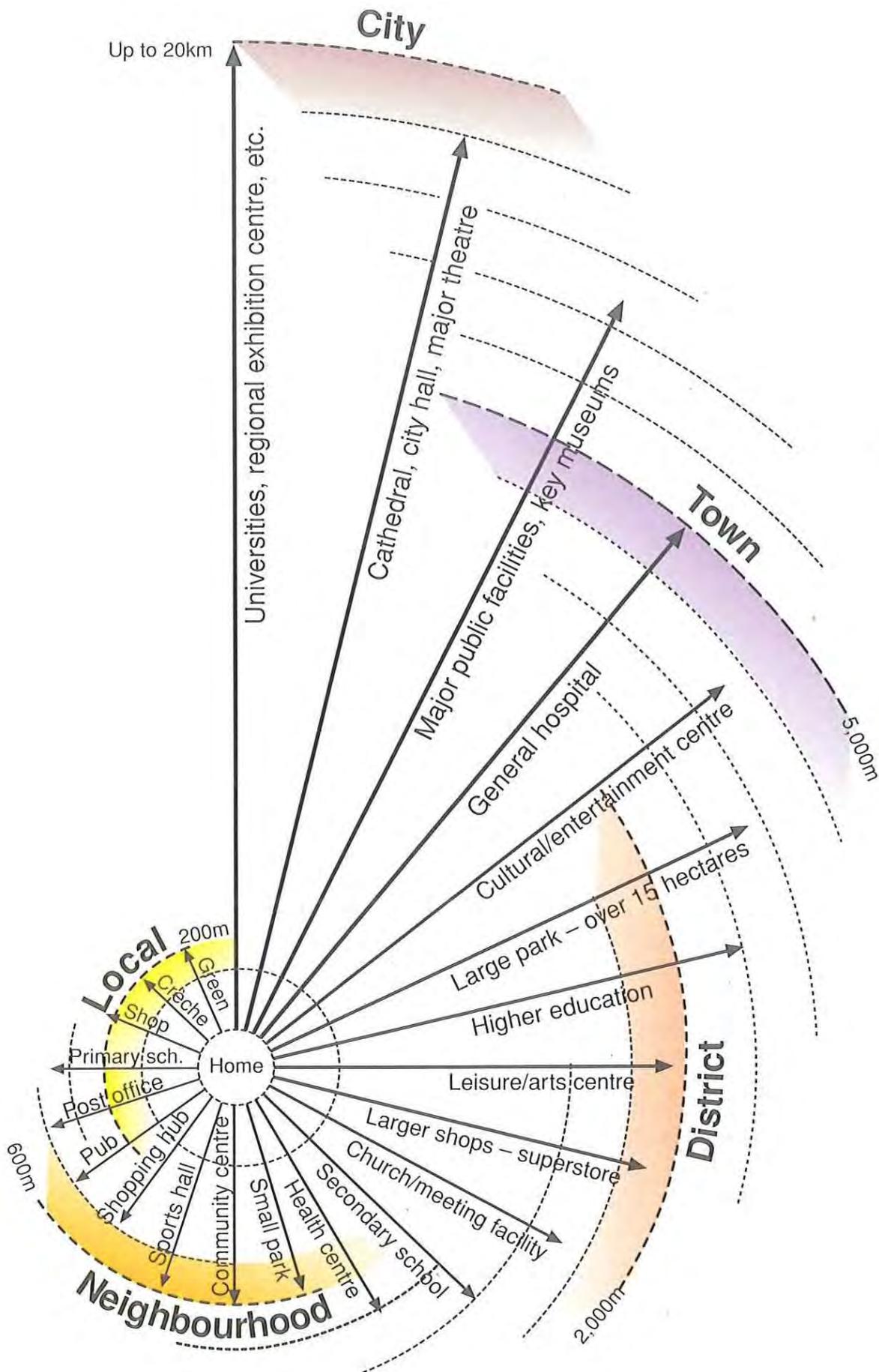
City

Up to 20km

Universities, regional exhibition centre, etc.

Cathedral, city hall, major theatre

Major public facilities, key museums

Town

General hospital

Cultural/entertainment centre

Large park – over 15 hectares

Higher education

5,000m

Leisure/arts centre

District

Larger shops – superstore

Church/meeting facility

Secondary school

Health centre

Small park

Community centre

Sports hall

Shopping hub

Pub

Post office

Primary sch.

Shop

Crèche

Green

Local

200m

Home

600m

Neighbourhood

2,000m

Figure 1- The City and frameworks for core institutions

The policy states that such neighbourhoods should be "compact, energy efficient and high quality urban development; accessibility via public transport networks and also meeting the needs of the pedestrian and cyclist; and provision of a good range of amenities and services within easy and safe walking distance of homes" (p26). This approach towards compact urban form is picked up in other government policy and guidelines (DEHLG, 2007, DEHLG, 2009a, DEHLG, 2009b), and most recently in 'Local Area Plans - Guidelines for Planning Authorities' (DEHLG, 2013) outlines the role that local authorities play in the provision of schools stating the following:

> "Planning authorities are encouraged to promote the delivery of schools as part of well-structured, focal places / centres for the community or neighbourhood. Other community buildings such as community halls, health centres, crèches, and youth cafés could be provided adjoining or nearby school buildings. Alternatively, other community uses could be incorporated into a larger grouping of community buildings or co-located within a larger multi-purpose building" (p.36).

These guidelines also refer to the government's 'Smarter Travel' policy (Department of Transport, 2009, Department of Transport, 2014) and argue that the

> "location of sites for new schools should be centred on the existing/proposed population catchments and encourage sustainable mobility (i.e., walking/ cycling/ public transport)……" (p.36).

The local area plan guidelines direct the local authorizes to the 2008 planning guidelines titled "The Provision of Schools and the Planning System: A Code of Practice for Planning Authorities"(DES and DEHLG, 2008.p10), prepared by the Department of the Environment, Heritage and Local Government (henceforth DEHLG) in conjunction with the DES that states "[s]chools provision should be an integral part of the evolution of compact sustainable urban development and the development of sustainable communities". The document outlines the following considerations regarding school location:

- "Ensure that school sites are fit for purpose in terms of their location, access to services and the provision of space for recreational and sports activities which can help to support

an effective learning and development environment for children, in line with the Department of Education and Science requirements.

- Seek to situate new schools within the existing/proposed catchment in a manner that aids ease of access from surrounding areas and encourages sustainable mobility by walking, cycling and public transport.

- Insofar as possible, reserve lands for educational purposes in locations close to the areas of greatest residential expansion and adjacent to community developments such as community centres, playing fields, libraries etc. so that the possibility of sharing facilities can be maximised." (DES and DEHLG, 2008.p10).

In addition to the guidance outlined above, the DES is currently also working with the National Transport Authority and the DECLG to produce guidance on integrated planning and transport for schools. The intention is to supplement the technical guidance on the location and development of schools. It is envisaged that the guidance will refer to the fact that school site location should be considered with a view to promoting the use of a greater variety of modes of transport such as walking or cycling, as well as public transport and car-sharing for trips to and from school.

Having regard to the various documents outlined above, it is apparent that the centralised location of a school within a compact and diverse community has advantages in terms of efficient transport provision, and sustainable and healthy travel options such as walking or cycling (Jackson and Sinclair, 2012) (Urban Land Institute, 2013).

While this compact city approach is well supported, the diversity of household types and mixed-use-development is another key component of urban sustainability. Housing diversity has an influence on residential lifecycles, which in turn have a direct bearing on the long term success of schools, In this regard NESC(2004) emphasise the need for a diverse housing supply, warning that:

> "the post-war approach to suburban development is now recognised to have a number of negative social consequences. One is a stronger segregation of society by income than is typical in the alternative sustainable neighbourhood approach. A second is a strong segregation by age. This reflects the single housing type that is normal in suburban estates. Indeed, the high level of car dependence can give rise to isolation, and

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ultimately the need for institutional care, once older people are unable to drive. Initial low densities fall even further as young people leave the family home. The reduced density makes it even less likely that a wide range of services will be available." (p.125)

The impact of this limited housing diversity and low density has an adverse impact on the sustainability of schools and this is raised by the 'Commission on School Accommodation'(2002) when discussing the "life cycle of schools" when "Planning school provision in an urban area with an ageing population":

"Schools typically proceed through a cycle of upsurge and growth, stability and, in some instances, decline. When the population of school-going age of an area is in decline, it is logical to expect the overall school enrolment in the area to decline. Consequently, particular schools can experience significant decline in enrolment despite excellent school performance and the provision of excellent school facilities and resources." (p.53)

Advocating "Centred, Diverse, Walkable' neighbourhoods, NESC(2004) contend that "Diversity prevents the demise of services, as density does not fall due to population ageing to the same extent as in homogeneous estates." (p.126). This position is supported in the 'Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas' (DEHLG, 2009a) which looks to "Promote social integration and provide accommodation for a diverse range of household types and age groups" (p.5).

The various Irish policies and guidelines referred to above support the international consensus around designing compact mixed-use urban forms with greater household diversity to help create more sustainable neighbourhoods. These policies present school provision as an intrinsic part of a strategic and integrated approach to sustainable development. In this context schools are not only an essential to high quality compact communities, but will also benefit from compact communities, where greater household diversity will help mitigate the typical adverse effects of the life cycle of schools.

Beyond the issue of geographic location, it could also be argued that combining a number of schools in one location would provide a critical mass of students to warrant proper cycling infrastructure or the provision of public transport to the site. The single site approach may

also facilitate older siblings accompanying younger children to school, where otherwise a parent may end up driving the younger child while the older child journeys to school independently.

Energy efficiency

Sustainable design comprises a wide range of issues such as efficient water use, low carbon or low-embodied-energy materials, or the use of healthy materials. While these criteria are vital to sustainable school design, they are applicable to all educational building projects, not just the SEC model and therefore will not be covered in this research. Energy efficiency is one area that will influence, and be influenced by the design of an SEC. Of course, the location of the SEC in terms of energy consumption associated with travel is one crucial part of this equation and this has been discussed above. The other issue that warrants attention in the context of an SEC is the provision of integrated onsite energy facilities such as large scale biomass boilers, combined heat and power plants and district or campus wide energy distribution. Many of these approaches and technologies are only economically feasible or efficient at a certain scale and density of use and therefore may be applicable for an SEC. According to the current Irish national energy efficiency plan (Department of Communications Energy and Natural Resources (IRL), 2013) the public sector, which includes schools, will needs to improve its energy efficiency by 33%. While this presents a major challenge, energy performance of schools has been increasing steadily over the years. Figure 2 below which shows the reduction of energy consumed in primary schools since the 1980's.

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Energy used in Primary Schools kWhr/m2/year
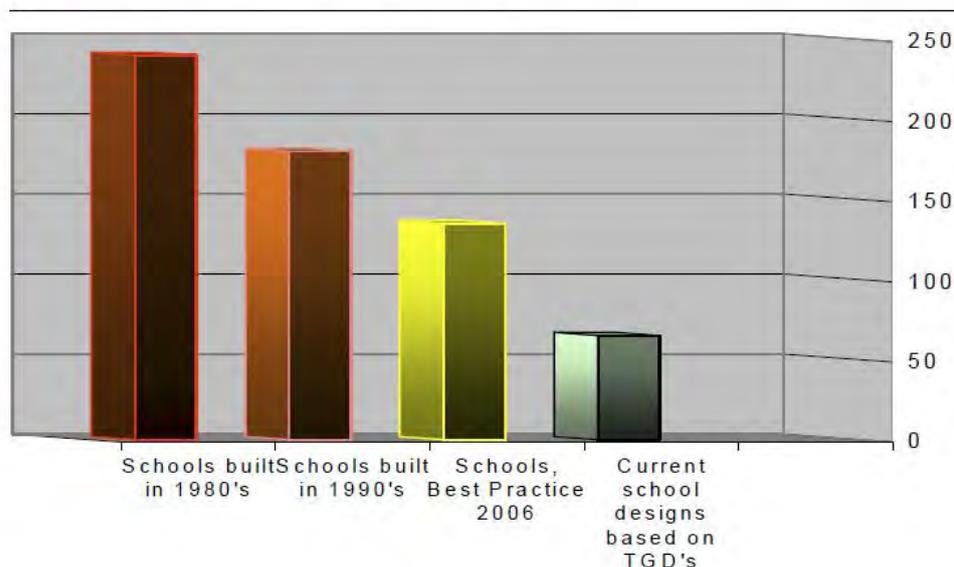
Figure 2 - Energy use in primary schools (Department of Education and Skills and SEAI, 2014b)

Figure 2 also illustrates how Irish primary schools built in accordance with DES technical guidance documents are capable of being 2.3 times more energy efficient than schools built to international best practice (Dolan).

Figure 3 - Coláiste Choilm in Tullamore which won the SEAI Energy Sustainability in the Built Environment Award for 2012 **(**Photo by Donal Murphy www.donalmurphyphoto.com)

In a typical primary school, space heating and the provision of hot water together account for over 80% of the total energy use as illustrated below in Figure 3. The fact that such a high percentage of energy is consumed in this way has focused attention on design approaches and technologies that will help reduce energy consumption related to these building functions.
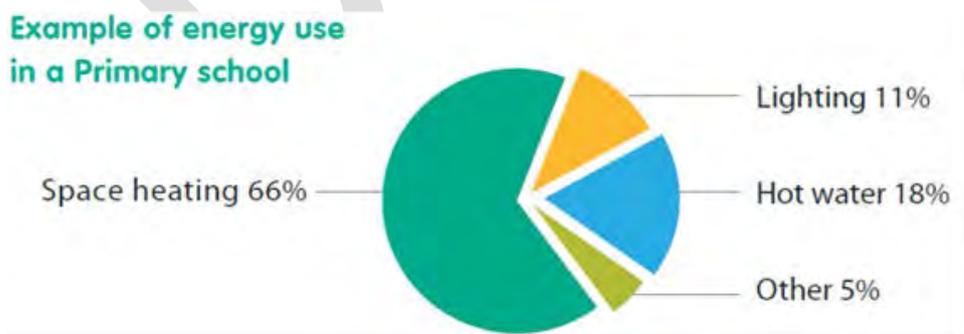
Figure 4 – Energy use breakdown in primary schools (Department of Education and Skills and SEAI, 2014e)

Optimum orientation for passive solar, highly insulated structures, and air-tightness all provide passive approaches which will contribute to increased energy performance. However, other

than issues of adequate space onsite, or overshadowing from other structures, these passive features are not dependent on whether a school is part of a campus or not. From the point of view of this research it is the active technologies which will be influenced by the SEC context. The DES and the Sustainable Energy Authority of Ireland (henceforth referred to as SEAI) have been active evaluating various energy efficiency building technologies and for various reasons specific to the school context, have found that geothermal heat pumps[1] and under floor heating (Department of Education and Skills and SEAI, 2014f), photovoltaic panels[2], and onsite wind turbines (Department of Education and Skills and SEAI, 2014c) are not ideal technologies to serve space heating or hot water needs.

Solar thermal panels for generating domestic hot water, while not suitable in all cases, may be appropriate for shower use in post primary schools or in special schools which may have therapeutic baths for Special Educational Needs (henceforth SEN) students(Department of Education and Skills and SEAI, 2014c).

Other technologies have been examined in the same way by the DES and SEAI, such as combined heat and power (henceforth referred to as CHP)[3] systems and district heating systems[4]. They found that for CHP systems to be most effective the base heating and electrical demand needs to be quite high and continuous and this is not the case for a typical primary or post primary school as currently used (Department of Education and Skills and SEAI, 2014a). However in the context of the SEC, where community use will extend the daily and annual occupancy, this may need to be re-examined. In addition to this, if the SEC is located adjacent to a sufficiently high density of other uses such as residential, commercial, and medical or hospitality services, then it may be feasible to export heat or power to a district heating system and supply hot water or electricity to these buildings, or indeed vice-versa.

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[1] A geothermal heat pump system is a heating and/or cooling system that uses the earth's ability tostore heat in the ground and water thermal masses. These systems operate based on the stability of underground temperatures; the ground a few feet below surface has normally a very stable temperature throughout the year, depending upon location's annual climate

[2] Photovoltaics (PV) convert the sun's energy to electricity using semiconductor technology

[3] (CHP), also known as cogeneration is the use of a heat engine or power station to simultaneously generate both electricity and useful heat.

[4] District heating systems or community heating is where hot water is generated in a centralised boiler and distributed via a highly insulated pipework system (district heating pipes) to various buildings throughout a district, neighbourhood, or campus.

As mentioned above, district heating systems have also been considered by the DES and SEAI and they suggest that if a school is being built in an area with a district system then the option for becoming part of this should be examined (Department of Education and Skills and SEAI, 2014d). In terms of energy balancing, schools can provide a useful heating load for a district heating system when residential demand is low (.i.e. when children are at school and adults are at work).

The above analysis is based on typical school building scenarios or single building situations. The viability of such technologies as CHP and district heating systems may change given the economy of scale presented by an SEC. This has happened already in the Monaghan Educational Campus where the large scale campus and high occupancy levels made it possible to provide a centralised heating centre which supplies hot water produced by two wood chip boilers to the campus via a district heating system. The private company who supplied the equipment also has the contract to maintain the energy centre and supply the woodchip fuel. It is estimated by the Monaghan Education & Training Board (formerly Monaghan VEC) that the centralised biomass heating system will result in energy cost savings of 40% (Monaghan VEC, 2012).

While an energy efficient educational building design must consider a wide range of issues ranging from site planning to optimise building orientation, shade and shelter, through to the thermal performance of the building fabric or building airtightness, it can be argued that these are equally applicable to individual schools or educational campuses with multiple schools. It is in relation to location and sustainable travel patterns, and the use of campus wide integrated energy systems, that the SEC concept has its largest bearing on energy efficiency. These issues have been described above to highlight how the SEC approach in Ireland may have either a positive or a negative impact on energy consumption or energy efficiency. If the SEC was established in a centralised location, with the sustainability benefits that accrue from this, and at the same time, leveraged energy efficiencies from the economy of scale offered by the campus environment, and coupled with greater community integration through CHP or district heating, then the SEC model has the potential to provide an environmentally sustainable solution.

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2.4. Conclusion

This chapter set about identifying some of the main issues influencing the SEC approach in Ireland. There are many more influences of course, and each individual school project has its own set of unique conditions and demands (i.e. depending on the location within the country, whether it is an urban, suburban, or rural school, whether it is primary, post primary, or further education, and the ethos of the school). However the issues highlighted in this chapter exert a significant influence on the location or relocation of a school and provide some context for the decisions made regarding SECs in Ireland.

2.4.1. Key issues arising from chapter 2
International application of the SEC concept
▪ The SEC concept is gaining international popularity and as well as 'Shared Educational Campuses' is appearing as 'Extended Schools'; 'Full Service Community Schools'; 'Multiplex Schools'; or 'Multiple Level' schools.
International and national Issues influencing the SEC
▪ In Ireland and internationally, the SEC is being influenced by a range of issues such as: the desire for integrated learning environments; integration of mainstream and SEN; lifelong learning; the integration of educational and community services; population growth and site and economic constraints; and sustainable planning and design, including energy efficiency.
Strategic spatial planning and the SEC
▪ An SEC will play an important role in the sustainable planning of any community if it is located and designed in line with various strategic spatial planning policies at national, regional, city/county, or community level. Particular attention must be given to location and community integration to ensure maximum community accessibility and transport options such as walking, cycling, or public transport.
▪ National and local government strategic spatial planning policy advocates compact, walkable, mixed-use urban form with greater household diversity. A beneficial relationship may develop between an SEC and the locality if the SEC is located in a compact, diverse urban area – the mix of age groups, including parents and staff, using SEC adds to the social and economic vibrancy of an area. While a mix of ages and diversity of households will provide a more even and continuous pupil attendance from the locality mitigating the negative impact that residential life cycles have on the life cycle of schools.

3. The Universal Design Approach
Informing and supporting educational design

"Space, light, materials, and even colour affect the way we experience education. Schools can make excellent use of these elements in creating buildings and grounds which reflect the needs and desires of their students and staff, but unfortunately, schools are often designed and built without fully considering the needs of the community who uses them." (Kaplan, 2007)

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3.0. UD Introduction

The term Universal Design (henceforth referred to as UD) was first coined by Mace (1998) to refer to "the design of products and environments to be usable by all people, to the greatest extent possible, within the need for adaptation or specialist design". In Ireland, the Centre for Excellence in Universal Design at the National Disability Authority refers to UD as "the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of age, size, ability or disability".[5] In a similar vein, the definition of UD adopted by the United Nations in the Convention on the Rights of Persons with Disabilities (UNCRPD, 2006) refers to 'environments … to be usable

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[5] The definition adopted by the CEUD draws on the Disability Act 2005, which defines Universal Design as meaning: "the design and composition of an environment so that it may be accessed, understood and used to the greatest extent possible, in the most independent and natural manner possible, in the widest possible range of situations, and without the need for adaptation, modification, assistive devices or specialised solutions, by persons of any age or size or having any particular physical, sensory, mental health or intellectual ability or disability."

by people, to the greatest extent possible, without the need for adaptation or specialized design".

UD is not only about removing barriers but also about creating the right environmental conditions for social inclusion across all human abilities. Human abilities, as defined by CEN – CENELEC (2002) include; Physical abilities, Sensory abilities, and Mental abilities, and these vary from person to person and change as a person gets older. Sanford (2012) also discusses human abilities, breaking these down in a similar manner except describing abilities as: Motor abilities (similar to physical abilities), Sensation and Perception abilities (in part similar to sensory abilities), Mental abilities (as above), and Communication abilities. The inclusion of perception above takes account of how sensory information is perceived or processed, not just received. The addition of communication abilities is particularly relevant in the educational context and here Sanford includes speaking, writing, reading, listening, conversing, using social cues and regulating emotions, along with other similar communication abilities.

> "Universal design is intended to engender both positive activity and participation outcomes by focusing on all abilities of all individuals rather than on people with disabilities alone. As a result, universal design is not just about access for some, but it is about usability and inclusion for all."(Sanford, 2012.p.xiii)

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In this regard UD moves beyond the issue of physical accessibility and promotes an integrated approach which is reflected in the design goals and design principles outlined later in this chapter and captured above in CEUD's definition of UD which focuses on environments that can "…be accessed, understood and used to the greatest extent possible." These domains of accessibility, understanding, and usability are now discussed below.

Accessibility is largely associated with physical (or motor abilities), sensory (sensation abilities), or age and size, and must not only address access into the campus and ease of mobility, but must also look at the accessibility of the location. Can users easily get from their home to the campus; as pedestrians, cyclists, via public transport, or by private vehicle?

Understanding is principally concerned with mental abilities, sensory abilities, perception abilities (as outlined by Sanford) and communication abilities. UD in this context must cater to a variety of users in terms of intellect, cognition, learning, and memory. Among other things,

aural and visual messages must be easily understood, signage must be intuitive, and way finding around any environment must be simple and easy to follow.

> "People of diverse abilities should be able to use buildings and places comfortably and safely, as far as possible without special assistance. People should be able to find their way easily, understand how to use building facilities such as intercoms or lifts, and know what is a pedestrian facility and where they may encounter traffic."
> (CEUD, 2012b)

Usability must look at how design increases the 'usability range' (Balaram, 2011) to foster inclusion and equality. Balaram argues that the "usability range of any product or service will increase once we view universal design as more than mere access" (p.3.5). In discussing usability, Sanford (2012) looks at human function and functionality. Function refers to human abilities (as outlined above), while functionality includes usability and is the interaction of human function and physical forms.

> "Functionality is usability and inclusivity of physical form that enable engagement in activities/tasks and participation in society and societal roles. Functionality is a product of the interaction between demands exerted by physical form and human function."
> (p. 6)

Usability, and the resulting functionality of products or services, is therefore determined by how well a design caters for the full range of human abilities: motor, sensation and perception, and Communication abilities. As the interaction of human function and physical form, usability is in many ways the combination of accessibility and understanding.

Iwarsson and Stahl (2003) also discuss usability in terms of functional requirements and suggest that usability is most relevant in explaining the person-environment interaction and is a subjective concept based upon user evaluations.

> "The concept of usability implies that a person should be able to use, i.e. to move around, be in and use, the environment on equal terms with other citizens. Accessibility is a necessary precondition for usability, implying that information on the person-environment encounter is imperative. However, usability is not only

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based on compliance with social norms and standards; it is mainly subjective in nature, taking into account user evaluations and subjective expressions of the degree of usability. Usability is a measure of effectiveness, efficiency, and satisfaction. Most important, there is a third component distinguishing usability from accessibility, viz. the activity component" (p.62)

The UD approach advanced by CEUD offers an integrated understanding of UD which includes a UD philosophy, the UD principles, a UD process, and the concept of Personalisation. The UD philosophy proposes that people should be enabled to participate in a society that takes account of human difference and should be able interact with their environment to the best of their ability. This philosophy has been discussed above in terms of accessibility, usability and understanding. The UD principles comprise of seven key design principles and 28 detailed guidelines, which were originally developed in 1997 in North Carolina University. As outlined on page 64, the UD process involves the four stages of Discover, Define, Develop, Deliver, and is meant as an iterative user centered, participatory design process (see Section 3.5 for more detail). Finally Personalisation allows enough flexibility and adaptability in a design to facilitate a level of specialization, should it be required, to suit individual needs. Personalisation also refers to a participatory process as it is about citizens shaping public services, including education.

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> "Personalisation is …about putting citizens at the heart of public services and enabling them to have a say in the design and improvement of the organisations that serve them. In education this can be understood as personalised learning - the drive to tailor education to individual need, interest and aptitude so as to fulfill every young person's potential." (DfES (UK), 2004.p.4)

This UD approach creates a more inclusive and participatory design process which promotes user centered solutions based on a detailed knowledge of the context, user needs and user preferences. This approach is highly relevant in the context of SECs and this chapter seeks to explore some of the key aspects of this UD approach which are most relevant to the design of SECs in Ireland. Section 3.2 below looks at the need to design for both the whole person, and the wide diversity of school users. Section 3.3 looks at the goals and principles of UD and how they apply to the educational environment, and finally Section 3.4 looks at the UD process and its applicability to educational design.

# 3.1. Understanding the whole person and the needs of diverse users

"Inclusion is…being in the ordinary school with other students, following the same curriculum at the same time, in the same classrooms, with the full acceptance of all and in a way which makes the student feel no different from other students". (Bailey 1998, p. 173)

Inclusive education takes a holistic view of the learner and embraces human diversity and consequently the UD approach supports inclusive education on many fronts. UD employs a user centred process with design solutions emerging from the specific needs and preferences of the users, while at the same time providing a higher baseline of design which caters to a wide spectrum of people regardless of sizes, age, ability and disability.

Increasingly, both UD and inclusive education consider the user or learner in biological, psychological and a social terms - or as a 'bio-psycho-social' entity, (Engel, 1981, Smith, 2002) this helps ensure a holistic understanding and treatment of the person. This 'bio-psycho-social' approach is supported by the 'International Classification of Functioning, Disability and Health' (ICF) which has developed by the World Health Organisation (WHO) (2001) as a "standard language and framework for the description of health and health related states" (WHO, 2002). This framework shifts the emphasis from a person's disability to their level of health and functioning in society. The ICF places activity at the centre of its model by emphasising that a poor interaction between a person and his/her environment can limit activity, which in turn restricts the individual's participation in society. This activity limitation is a large part of the disability, and not the individual's health condition. The ICF stresses the importance of social participation and acknowledges the role of the environment in creating disability, thus defining disability as:

"an umbrella term for impairments, activity limitations and participation restrictions. It denotes the negative aspects of the interaction between an individual (with a health condition) and that individual's contextual factors (environmental and personal factors)" (WHO, 2002 p.3).

This emphasis on activity and participation can be expressed further through the Person-Activity-Environment Fit which refers to the congruence of individual skills and abilities of a person, the demands of the activity and the nature of the physical, social and cultural environment (Neistadt, 2000). In the context of applying the ICF to Universal Design, CEUD (2012a) emphasise this Person-Activity-Environment (PAE) interaction, stating that this PAE model should inform any design approach relating to the built environment, products, or services. Through a flow chart based on the ICF, CEUD illustrate the impact of environmental barriers and facilitators (or UD environments), to outline how human activities, participation and performance are either restricted or enhanced by the environment.
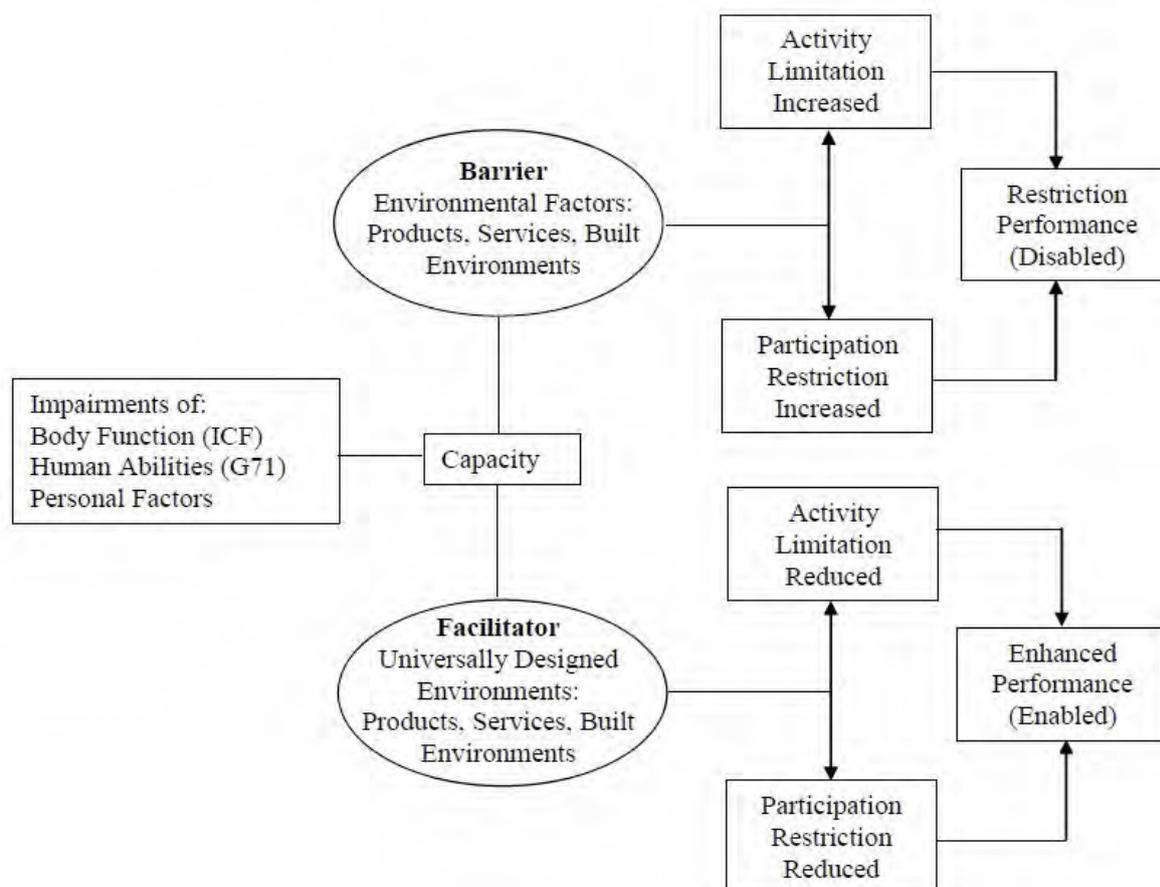
Figure 5 - The Dynamics of UD in enhancing the execution of tasks or actions (CEUD, 2012a)

In the educational domain this holistic approach was underpinned by Bloom's Taxonomy (Bloom et al., 1956) which proposed a more integrated educational model. Bloom encouraged the educator to pursue objectives in three key domains including: 'cognitive' (often referred to as 'knowing' or 'the head'); 'affective' (referred to as 'feeling' or 'the heart'); and 'psychomotor' ('doing' or using 'the hands'), thus promoting a more rounded approach to education.

Adopting a similarly integrated approach, Gardner (1983) put forward the theory of multiple intelligences arguing that humans, as a result of brain system functioning, possess a number of different capacities which he called intelligences. For Gardner there were at least seven, and possibly nine different types of intelligence: Linguistic; Logical-Mathematical; Interpersonal; Intrapersonal; Musical; Bodily-Kinaesthetic; and, Artistic Intelligence. According to Gardner, "our inability and difficulty in recognising these intelligences is a result of the way we educate people, relying mostly on words and numbers" (ibid).

Figure 6–Gardner's multiple intelligences http://questgarden.com)

The recognition of the person as a 'bio-psycho-social' entity; the integrated approach offered by the ICF; Bloom's cognitive / affective / psychomotor educational objectives; or Gardner's multiple intelligences, all help to direct educational practice away from traditional, one-dimensional education, towards more holistic student-centered teaching and learning. With an emphasis on providing more accessible, usable and easily understood environments, products or services, Universal Design (henceforth referred to as UD) supports this educational agenda.

Furthermore, recent developments focusing on the direct use of UD in teaching methods and curriculum development, demonstrates how UD can be used more specifically in education. The US organization CAST (CAST, 2014) has developed a 'Universal Design for Learning' (henceforth referred to as UDL) framework which seeks greater equality and a move way from a one-size-fits all curricula. Specifically, the UDL framework highlights the following:

"In learning environments, such as schools and universities, individual variability is the norm, not the exception. When curricula are designed to meet the needs of an imaginary "average", they do not address the reality learner variability. They fail to provide all individuals with fair and equal opportunities to learn by excluding learners with different abilities, backgrounds, and motivations who do not meet the illusive criteria for "average". (CAST, 2011.p.4).

This UDL framework is supported by three principles proposing that learners should be provided with: multiple means of representation (i.e. visual, auditory, etc); multiple means of action and expression (i.e. writing, drawing, speaking etc.); and multiple means of engagement (i.e. working alone or in groups, using spontaneity or routine etc.) (Ibid)

Further developments of UDL such as Katz's 'Three-Block Model of UDL' (Katz and Brownlie, 2012) provide an education method to create inclusive learning environments and improve student engagement. This method contains three parts which include: 'Social and Emotional Learning' (respecting and valuing diversity, democratic classroom management etc); 'Inclusive Educational Practice' (integrated curriculum, student choice, higher order learning etc); and finally 'Systems and Structures' (reforms around professional development, distributed leadership, staffing for collaborative practices etc) (Katz et al., 2013). To date there has been limited research carried out into the effectiveness of this approach but early results show positive outcomes from the 'Three-Block Model of UDL' including "increased students' engaged behaviour, particularly active engagement, and promoted social engagement through increased peer interactions, student autonomy, and inclusivity." (Katz, 2013).

In the Irish context, the National Council for Special Education (henceforth to be referred to as NCSE) examined the literature around Higher, Further and Continuing Education, including training and rehabilitation for adults with disabilities (NCSE, 2013b). Looking at the entire student journey form access, to participation and progress, they discuss the positive role of UD, not just in terms of the physical environment and products, but also with regards to UDL and 'universal design in instruction and universal design for instruction' (p.85). [6]

[6] For a review of various UD Educational Models see RAO, K., OK, M. W. & BRYANT, B. R. 2014. A Review of Research on Universal Design Educational Models. *Remedial and Special Education,* 35**,** 153-166.

In the same year the NCSE produced a policy advice paper (2013a.p.159) recommending that programmes "should be developed around principles of universal design and inclusive pedagogy" to ensure that teachers understand the needs of all students across the full spectrum of abilities and can plan at both the class and the individual levels.

UD for Education, and the UD approach in general, emphasises inclusive education approach that must consider the variety of users in a typical educational environment. Petronis and Robie (2011) discuss the need to integrate everyone into all aspects of the built environment and outline the challenges facing public educational institutions around making learning environments supportive of all regardless of their learning or physical abilities. They argue that all users must be considered – students, staff and visitors – and contend that UD seeks to provide an optimal environment for all users. In the Irish context the Department of Education and Skills (henceforth referred to as DES) guidelines for 'Primary & Post Primary School Specialist Accommodation for Pupils with Special Educational Needs' (Department of Education and Skills (IRL), 2012e) provides direction for the design of permanent accommodation for pupils with special educational needs (henceforth referred to as SEN) as part of a mainstream school. These guidelines recognise the diverse needs of students with special educational needs including "pupils with autistic spectrum disorders, emotional disturbance and / or behaviour problems, speech and language difficulties, hearing impairment, visual impairment, multi-sensory impairment and other needs"(Greville, 2009.p.1)

In a similar manner, the Department for Children, Schools and Families (DfCSF) in the UK has prepared design guidance (DfCSF (UK), 2008) for mainstream and special schools and this outlines four main areas SEN and disabilities which include the following;

- Cognition and learning: Specific learning difficulty (SpLD); Moderate learning difficulty; (MLD); Severe learning difficulty (SLD); Profound and multiple learning difficulty PMLD

- Behaviour, emotional and social development (BESD)

- Communication and interaction: Speech, language and communication needs (SLCN); Autistic-spectrum disorder (ASD)

- Sensory and/or physical: Hearing impairment (HI); Visual impairment (VI); Multi-sensory impairment (MSI); Physical disability (PD)

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The above guidelines refer specifically to SEN students in the both mainstream and special schools. However it can be argued that mainstream students, not to mention the staff, visitors or users from the local community, will also represent a wide variety of needs which need to be carefully considered in the context of school design. In discussing the range of users that are typically found on a university campus, Salmen (2007) argues that UD has the potential to transform universities into truly egalitarian institutions and also contends that they are ideal for the application of UD due to the transient nature of many of the occupants. Of course the same argument can be made for school environments, particularly given that young children grow at a rapid pace with changing needs year-on-year:

> "Universities are especially good facilities for the application of UD because they accommodate a wide range of transient users. Since one size does not necessarily fit all, the application of UD needs to be appropriate to the institution's scale, facility type, and program for it to be completely effective. Universal design accommodates not only people who use wheelchairs or are blind, but also older learners, parents with children, and non-traditional learners of all sorts." (p.13)

This range of users is almost infinite, especially if the school is integrated into the community and provides onsite local services open to the general public. The following sections identify a small range of specific users who may have particular needs in relation to the built environment and the UD shared education campus (henceforth referred to as SEC).

Figure 7 –various campus users

3.1.1.All children and younger people
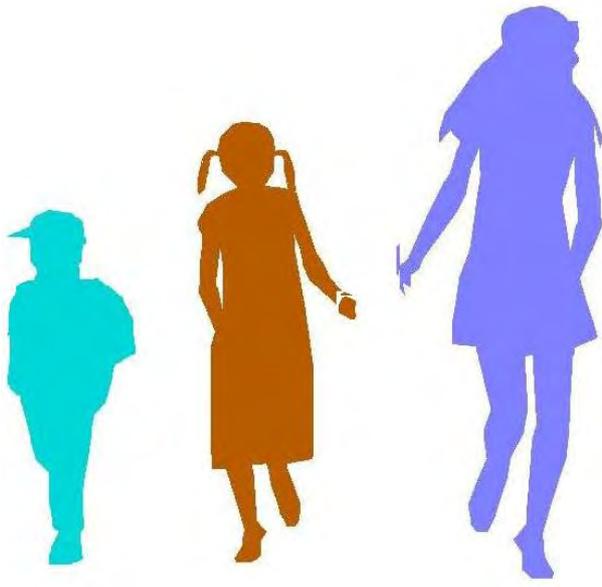
Personas - Sean, Ellen and Patricia all walk to school every morning and the short journey there is always full of adventure. The minute they sit down they can't wait to get out for a run around at break-time. On wet days when they can't venture out there is nobody more disappointed than their teacher who has to contend with 25 cooped up energetic children!

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Any educational environment for children should obviously aim to create a child friendly setting (child friendly design will be discussed in Section 4.6). The United Nations Children's Fund (henceforth referred to as UNICEF) describes their child-friendly schools (henceforth referred to as CFS) framework as promoting "child-seeking, child-centred, gender-sensitive, inclusive, community-involved, environmentally friendly, protective and healthy approaches to schooling and out-of-school education worldwide" (UNICEF, 2014).

A UD SEC that supports children must firstly consider the overall spatial and physical nature of the community in which it is located. The Irish 'National Children's Strategy' (Irish Government, 2000) states that children should benefit from a built environment that supports their physical and emotional well-being. In terms of children's use of public space in general, research carried out into Irish Government policy on the built environment for children, shows that the streets and road close to a child's homes are the most important locations for play (Kerrins, 2011) yet children's mobility range is decreasing due to parental fear and perception of risk. Burton (Burton, 2011) supports this view and argues that while access to outdoor space and the community in general is a vital part of their growth and development,

the space available to them is shrinking due to a risk adverse society and the increasing availability of home entertainment.

Wendel et al (2008) define the key ingredients required for a health promoting built environment for children as one that:

> "provides children with protection from injury risk and protection from exposure to pollutants and disease. It gives children opportunities for physical activity, play and contact with nature. It also incorporates sustainable practices, helping to prevent catastrophic environmental changes."

In relation to "opportunities for physical activity, play and experiences in nature" Wendell at al address these issues at the community scale and argue that the 'Transportation' sector must provide bicycle and pedestrian infrastructure, improved connectivity and travel distance reduction. The 'Land use' sector must look to increased density and mixed use neighbourhoods, while the 'School design' sector should locate schools within communities in order to promote opportunities for walking and cycling to school.

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van Loon and Frank (2011) acknowledge the complex range of issues that influence children in the built environment and use an 'ecological model' to outline the various correlates of child physical activity and the built environment. They categorise the key urban forms that influence youth physical activity in terms of 'access' and 'design' (See in Figure 8 below).
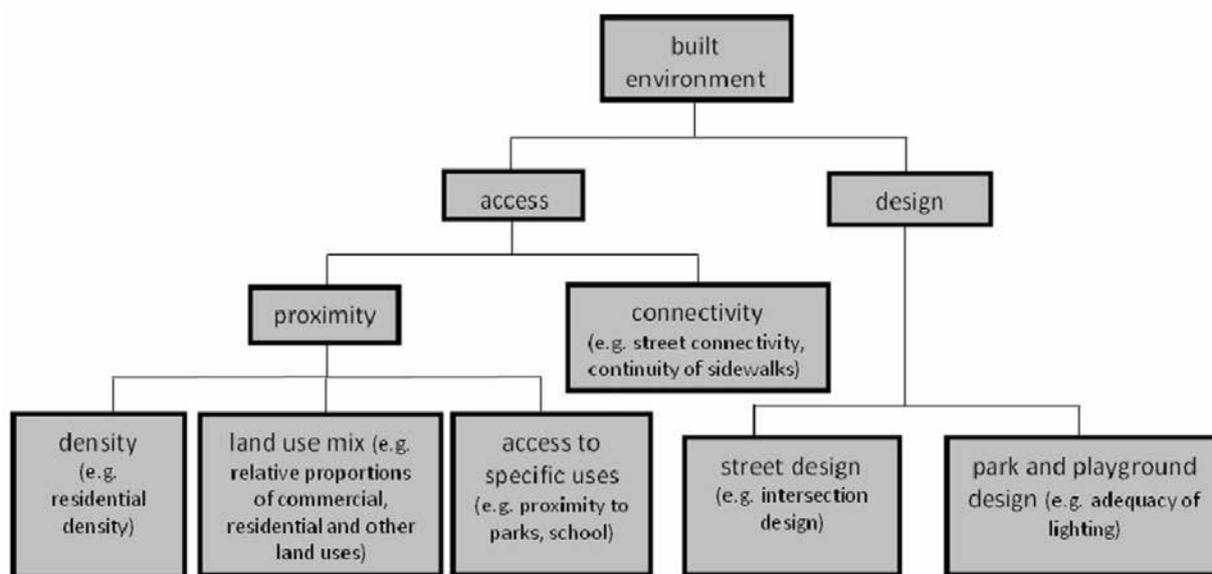

Figure 8 – Key urban forms that influence youth physical activity

In terms of street design, van Loon and Frank refer to various pieces of research that point to higher levels of moderate to vigorous child and youth activity in areas with less neighbourhood traffic, improvements in sidewalk, crossing, and traffic controls, and a greater frequency of parallel parking (possibly due to its traffic calming effect). While speed bumps were found to contribute to greater activity among adolescent boys in the evenings, it was the presence of two or three traffic or pedestrian lights that contributed to more bike or pedestrian trips by adolescent girls. Overall traffic calming measures correlate to higher pedestrian numbers, including children.

In relation to parks and playgrounds, van Loon and Frank refer to research which finds that spaces are more conducive to play where there are features that can be easily used or manipulated by children, and that contain diverse play opportunities for all children and for children of different age groups. The authors also refer to the need to take into account the needs of parents who will often accompany younger children and issues such as toilets, drinking water, water attractions, lighting and shade need to be considered.

Child-friendly environments must afford children space and time to play as this is an essential part of their physical, social and cognitive development (Gleeson and Creamer, 2012, Committee on Environmental Health, 2009). Malone et al (2003), in examining the role of the school grounds as sites for learning, identify the various categories of play and the associated activities associated with these types of play (see Table 1below). This analysis demonstrates the complex role of play in any child's development. To understand that play promotes; physical and motor skill development; social development; and cognitive development, is to acknowledge the importance of providing appropriate space for both structured and free play. This space must be provided for all children in all locations; in, or directly adjacent to the home; in the parks and squares of villages, towns and cities; and in all school grounds.

Table 1 - **Play in relation to the development of the children (Malone and Tranter, 2003)**

Play in relation to the development of children	
Categories of play in relation to child development	**Types of play behaviours / activities characteristic of each of these developmental**
Play & physical / motor skill development For children, the desire to run, jump, crawl, climb and swing is the natural way through which children's bodies develop. Improvement in coordination, bone and muscle growth, strength, agility and endurance and essential ingredients to a healthy child now and in later life.	Playing on fixed structures, participating in structured games, using free equipment (i.e. bats/balls)
Play and social development Play enables social and emotional development through activities where the child must play with others, share and cooperate, respect other views, express their ideas feelings and needs without the constant mediation of an adult. It is the time when a child constructs identity and 'tries on' to see which identity fits. The children learn to negotiate their own self in relation to others, and interact with their peers. It allows the child to acquire social skills and emotional well-being—essential to normal development	Talking with others, watching others, reading, daydreaming—this could include onlooker activities where the child watches the activities of others but does not attempt to engage in the activity. There is also unoccupied behaviour when a child demonstrates a marked absence of focus or intent. This could include: (a) the child staring blankly into space, (b) s/he wanders aimlessly.
Play and cognitive development Through play children discover, explore and develop understanding of the environment around them. Through their exploration and experience of the social, physical and natural environment they become familiarised with the patterns and systems of life and the interconnectedness of these with themselves. Cognitive play will include creative, construction and imaginative play activities.	Includes imaginative and creative play — building or making things with loose materials, observing and interacting with nature, exploring environment, engaging in imaginative activities (role plays, drama, fantasy).

In the context of an SEC that accommodates a wide range of age groups it is important to provide age appropriate social and recreation space within the school grounds. The

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Department for Education and Skills (DfES) in the UK has published guidelines around the design of school grounds and advises that provision must be made for differing children's needs, whether this is age or ability related (Department for Education and Skills (UK), 2006).The adoption of certain spaces by year groups is inevitable and it is suggested that sufficient, well designed space must be provided for different age groups to reduce conflicts and to create conditions for greater positive social interaction. They suggest the following approach for the design of external space for various age groups within the school grounds;

Children in their early years benefit from spaces with a balance of hard and soft landscape (including grass, trees etc), and spaces that balance risk and challenge to allow children safely challenge themselves. Shelter and shade should be provided through planting, playhouses or through more flexible covers such as canopies or sails. Transitional areas between internal and external space are also beneficial, particularly if they are covered and extend the indoor space. Changes in topography and a variety of textures, colours and shapes is important but it is important to some space remains free for to allow children invent their own activities. Adaptability will help in this regard, and will also allow staff to successfully use the space. While safety and appropriate access need to considered, young children require supervision and therefore easy visual and physical access for adults is important

Primary school children need space that appeals to their intellect, sense of fun and need for physical and mental exploration. It is helpful to provide a number of seating options to facilitate various social and teaching arrangements and this should be reinforced through a management approach which allows children and staff to adapt the space. Provide 'Open ended' playground markings allow a diversity of uses and make sure there are opportunities for both formal (i.e. PE) and informal physical activities. Finally, Walsh (2006) points out that older children get hot and tired during play and recommends that water fountains and rest areas should be provided.

Secondary (Post Primary) school children need 'play' as much as younger children and the school grounds should consider this while also providing practical learning opportunities. School grounds should provide well-designed, comfortable social and eating spaces. Ideally some of these spaces should be covered and furnished with seating so to provide high quality spaces that can also be used for teach purposes. While it is important to provide larger spaces for traditional activities such as football, it is also worth considering other approaches

such as activity trails which are large enough and provide sufficient challenge. The design of space on school grounds must reflect the age of students, younger post primary students may need the 'safety' of some level of containment, while older students may prefer a campus environment which is more adult-like. Finally, for this age group, the size of the social group associated with young females or males may differ and thus influence the design of certain social spaces.

In the context of a UD SEC, the design of space for the age groups identified above must include provision for children with SEN or disabilities. However, given the complexity of these needs they are examined separately in a number of sections that follow.

An SEC should also provide shared spaces that tie these individual spaces together and provide common space for the entire campus and local community. The DfES guidance referred to earlier points out that the relationship between various age appropriate spaces is important in terms of integration and transition, and that a balance must be stuck between the safety of all children and the avoidance of duplication of resources (Department for Education and Skills (UK), 2006). The issues around shared campus space will be discussed later in Section 4.5 of Chapter 9.

The Creation of a child-friendly educational environment is not only about creating a safe and secure setting but also about providing them with the space and time to develop physically, socially and intellectually. In this context the following key issues must be considered:

Key considerations for the design of a UD SEC

- Consider UNICEF's child-friendly schools framework which promotes "child-seeking, child-centred, gender-sensitive, inclusive, community-involved, environmentally friendly, protective and healthy approaches to schooling and out-of-school education…"

- Consider how the spatial and physical nature of the surrounding community supports the SEC, provides access, and creates safe opportunities for physical activity (including walking or cycling to school), play and contact with nature.

- Use the UD SEC to create child-friendly environments to afford children space and time to play as an essential part of their physical, social and cognitive development

- Provide age appropriate spaces that respond to the needs of various age groups ensuring that these spaces are safe while affording appropriate levels of challenge to support development.

- In addition to the above, ensure that there is shared spaces to provide appropriate integration and transition between all age groups.

3.1.2. People with cognitive, learning, behavioural, communication and interaction difficulties

Persona - Sean is 5 years old and is on the autistic spectrum and has been placed in the Autistic/Autism Spectrum Disorder (henceforth referred to as ASD) class because of his specific learning needs. He has only started in school this year and is finding the new environment very challenging. He walks to school with his mother most mornings which takes them about 20 minutes. The journey makes Sean quite anxious due to the heavy traffic. Once Sean gets onto the school grounds he relaxes a little and his mother allows for a few minutes so that Sean can run five times around the large sycamore tree which they pass as they walk up through the school grounds.

Referring back to the DfCSF design guidance (2008) mentioned in Section 3.1, three of the four categories relate to non-physical disabilities and as outlined earlier include: Cognition and learning; Behaviour, emotional and social development; Communication and interaction. The guidance details a number of design issues associated with each of the specific needs and these are outlined in the following sections.

According to this design guidance **children with cognitive and learning difficulties** may need practical sensory and physical experiences to support learning in relation to abstract ideas and concepts. These needs must be considered as part of school design and attention must be paid to good acoustics for speech and language support and storage for learning aids and other SEN resources. Good visibility to help with supervision and well designed wayfinding to aid independence are also important issues.

In relation to **children with behaviour, emotional and social development difficulties**, disruptive, disturbing or hyperactive behaviour, or a tendency to be withdrawn or isolated will influence school design in many ways. In this case the design issues relate to good sightlines which create a balance between privacy and supervision, secure storage and tamper proof services, low health and safety risks, and large spaces for social and outdoor activities.

For **children with communication and interaction difficulties** the design of a school should provide a legible school layout with clear signage that is easily comprehended while providing good lighting and acoustics. ICT may be required to provide additional sound or speech supports. Children with Autistic Spectrum Disorder (ASD) are often considered in this category and will benefit from the measures described above, however they may also require additional measures to ensure an inclusive education approach. The DfCSF design guidance recommends a simple school layout containing: "calm, ordered, low stimulus spaces, no confusing large spaces; indirect lighting, no glare, subdued colours; good acoustics, avoiding sudden/background noise" (p.199). Safe indoor and outdoor spaces for withdrawing and calming down are also recommended along with precautions around health and safety and tamper proof services.

These **ASD** specific design issues align with those highlighted elsewhere in literature which discuss an ASD friendly design approach (McAllister and Maguire, 2012, Mostafa, 2008, Notbohm, 2005, Scott, 2009). In a recent publication which examines the experience of

primary school from the perspective of a young boy with ASD, McNally et al (2013) illustrate the challenges faced by a person with ASD when attending school. The authors describe how people with autism may have difficulty comprehending verbal and non-verbal communication. They may also be hypersensitive or hyposensitive (under-sensitive) to sensory information such as: sight, sound, touch, taste, smell, balance, or proprioception - relating to stimuli that are produced and perceived within an organism, especially those connected with the position and movement of the body (Oxford Dictionaries, 2014).

In terms of the spatial and physical design of the school environment McNally et al argue that the following key issues are critical to providing an appropriate environment for children with ASD:

- Arrival: the noise and activity of a school in the morning can be problematic so the transition from home to school should be as straightforward and stress free as possible. Ensuring that parents can accompany a child as far as possible or providing a secondary entrance with less activity may help this transition.

- Wayfinding: circulation to and around the school must be clear and comprehensible.

- Legibility: visual cues to help with orientation and identify the purpose of individual spaces coupled with personalised spaces using colours or recognisable objects, and dedicated spaces for particular activities will help with overall legibility.

- Scale and organisation: smaller schools or those that broken down into smaller 'neighbourhoods' will provide a more navigable and legible environment that allows easier orientation and is less daunting or disorientating.

- Threshold: any transition or change in environmental conditions can be problematic therefore any space that allows a child to prepare and reorient themselves will be helpful.

- Classroom: a well ordered and structured space which has identifiable areas for specific tasks or activities will help provide a secure and familiar space for a child with ASD.

- Sensory Issues: certain environmental triggers can often upset or distract a child with ASD Avoid bright shiny surfaces, bold geometric patterns or strong textures as these can cause visual distraction. Reduce excessive sunlight and glare, and be careful with fluorescent lighting as the flicker form this lighting may perceived by those who are hypersensitive. Use good acoustic design to mitigate excessive noise and avoid strong smells which can be problematic for people with ASD.

- Engaging with others: provide respite spaces in circulation areas, playgrounds or other social spaces from which the child can retreat but still maintain a view to activities to avoid being totally removed or isolated. The provision of secure dedicated play space for a particular class or age group may also help in this regard.

- Quiet Space: greater retreat than that outlined above may also be beneficial and the provision of a quiet space which is acoustically separated from the activity area will help a person with ASD to calm down and rest.

- Safety and Security: children with ASD will often attempt to 'escape' so security and supervision is important especially when outside. They may often have a diminished sense of fear which can lead them to venture beyond safe boundaries and thus increase risk , particularly when sensory or co-ordination difficulties are also a factor.

The above issues are also a major challenge in terms of a school location, approach and adjacent spaces in the community. Hypersensitivity can cause many obvious problems for people in public spaces or streets where noise, crowds and bright lights are part of everyday life. Traffic lights, pedestrian stop lights, the sound of oncoming traffic, emergency sirens or public announcements may be stressful and disorientating, On the other hand, people who are hyposensitive or for instance those who experience hypotactility may fail to notice or understand tactile paving.

As discussed previously the open and publically accessible nature of an SEC will result in a wide spectrum of users including many older people who may be availing of further education or using the campus as part of the community. In this regard issues around dementia may become a design factor to insure that all people can use the SEC equally.

Dementia friendly environments seek to support people with cognitive decline and Fortunately many of the ASD friendly design issues explored above align with dementia friendly requirements and this should used to a designer's advantage when creating educational settings. Dementia friendly environments have been described by Marshall (1998) who recommends that a dementia friendly approach should include: distinct spaces for different functions; safe outdoor space; the use of personalisation; good signage with multiple cues such as sight, smell and sound; Objects used for orientation; enhanced visual access; and control of stimuli especially noise.

Similarly, Burton and Mitchell (2006), echo many of the ASD friendly design issues highlighted earlier when they propose a dementia friendly approach to the design of public space. The authors propose six key design principles to support dementia friendly streets which include: familiarity; legibility; distinctiveness; accessibility; comfort; and safety.

People with cognitive, learning, behavioural, communication and interaction, or other related difficulties, present a huge variety of needs that vary greatly from person to person. However, heightened sensitivity to sensory information often plays a significant role in how they perceive and operate in an environment, which in turn greatly influences their comfort, wellbeing and ability to undertake tasks and participate in everyday activities.

Taking into account the heterogeneous nature of people with cognitive, learning, behavioural, or communication and interaction difficulties, and acknowledging the diversity of their needs, the following key design issues should be considered in any UD educational environment:

> Key considerations for the design of a UD SEC
>
> - Create more human scale environments by avoiding very large schools small or by breaking down larger schools into smaller 'neighbourhoods' that provide a more manageable, navigable and legible environment.
>
> - Ensure that the school layout is clear and comprehensible and that the environment provides multiple sensory cues and good signage to help with legibility and wayfinding.
>
> - Provide good sightlines to support this legibility and also to allow student supervision
>
> - Consider alternative arrival routes for people who may be hypersensitive and have trouble dealing with typical activity associated with the start of the school day.
>
> - Carefully consider threshold spaces which introduce environmental change. Consider transition spaces that allow a person to prepare and reorient themselves.
>
> - Provide respite spaces in circulation areas, playgrounds or other social spaces from which the child can retreat but still maintain a view to activities to avoid being totally removed or isolated.
>
> - For a greater level of retreat provide quiet space withdrawal spaces which are acoustically separated from the main activity.

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- Provide calm, well ordered and structured external and internal spaces with identifiable areas for specific tasks or activities to help provide a secure and familiar space.

- Provide extra space for practical sensory and physical experiences to support learning in relation to abstract ideas and concepts. Provide space for additional learning aids.

- Pay attention to all sensory stimuli avoiding excessive noise, very strong odours, or visual stimuli such as glare, bright shiny surfaces, bold geometric patterns or strong textures.

- Carefully consider safety and security and provide tamper proof services, secure storage, and minimum health and safety risks.

3.1.3. People with visual difficulties
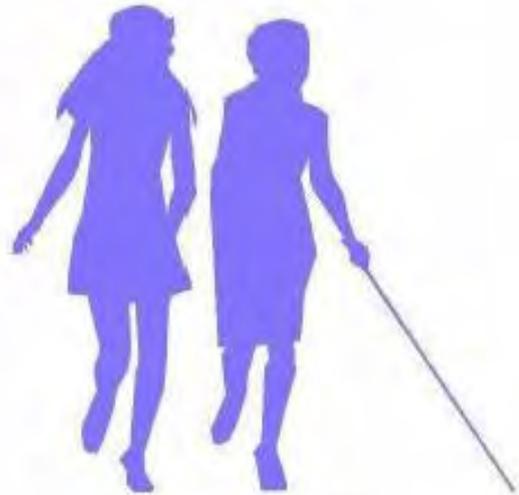
Persona - Jean is a 16 years old and has very limited vision and uses a long cane. She is in 5th year of a mainstream school. She walks to school nearly every day with her older sister and they both really enjoy chatting along the way. They live about 2kms from the school and must pass a few busy roundabouts and crossroads on the way to school. Only for Jean's sister this wouldn't be possible and her dad would have to drive her.

People with visual difficulties have a variety of different wayfinding techniques depending on the navigational aids they use and these are outlined by Atkin (2010). People with residual sight tend to rely on what sight they have, as well as sound and memory of the space they are

using. For these users tonal contrast between the pavement and carriageway is important; meaningless colour changes can be confusing, and sudden level changes without indication via colour changes can cause trip hazards.

Long cane users rely heavily on tactile walking surface indicators, audible information from directional traffic movement, and audio pedestrian lights. They tend to use the building line as an orientational cue but will avoid the kerb line as they feel unsafe walking so close to traffic; wide open spaces without good navigational cues can cause disorientation. Level surfaces with no height differences between the path and carriage way can pose difficulties for long cane users as there is no way to detect movement from the path onto the road (Atkin, 2010).

In relation to navigational methods used by guide dog users Atkin (2010) found that they rely on a combination of on tactile paving, signals received from the dog and audible information such as traffic noises. Guide dogs are trained to orientate themselves using the kerb line and the building line. Guide dog users can use tactile paving to differentiate between the path and carriageway; however, if the tactile paving is missed for whatever reason, and the surfaces are level, a person with visual difficulties has no way of correcting the dog's mistake, and may be placed in a dangerous situation.

The DfCSF design guidance (2008) outlines a range of school design issues in relation to students with visual difficulties. These include: "Good quality ambient & task lighting & controls; visual contrast, cues, symbols, tactile trails & maps; good acoustics, low background noise, speech & audio aids; sounder alarms, H&S (health and safety) warnings; VI (visual impairment) resource room; storage and maintenance of technical aids" (p.199). This document also refers to the need for mobility training which typically requires a dedicated mobility training room. It is also noted however that mobility training can take place around the school and in external spaces that contain obstacles or different surfaces to negotiate.

 While the design requirements in relation to people with visual difficulties will depend on the location and context of the school or campus, and the specific needs of the students, staff or members of the community, at a minimum the following key issues should be considered:

Key considerations for the design of a UD SEC

- Provide convenient, clearly defined and legible travel routes supplied with carefully located and well designed signage for enhanced wayfinding.

- Provide circulation routes that support navigation through multiple sensory cues including visual (e.g. colour and tonal contrast or landmarks), smells (e.g. fragrant planting), or distinct sounds (e.g. chimes or moving water).

- Provide conveniently located private vehicle or public transport drop-off points

- Ensure good levels of natural and artificial lighting with even illumination especially along circulation routes.

- Use tactile paving surfaces to indicate hazards, level changes or steps and generally aid navigation.

- Ensure circulation routes are sufficiently wide to cater for a person using a long cane, somebody with a guide dog, or a teacher or parent walking beside a child with visual difficulties.

- Consider how the school and campus can be used for mobility training using various kinds of mobility aids or a guide dog.

- Consider what ICT solutions may be beneficial to people with visual difficulties in terms of wayfinding and how these might be included or influence the design of the campus.

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3.1.4. People with mobility difficulties including wheelchair users

Persona - Mark is a 17 years old 6th year student and has been using a wheelchair now for 4 years since his accident. He is driven by his father to school every day. There has been an ongoing battle about Mark having his own car but his parents can't afford it. Mark is very sporty and plays basketball with a local team and loves to do as much sport as possible with his friends during physical education class and after school.

Research shows how people with mobility difficulties are supported by environments that are free of clutter, contain even surfaces and have limited crossfall (Department for Transport UK, 2011b). Those with limited mobility, arthritis suffers, and cane or rollator users, need plenty of well placed seating to afford resting points. The United Kingdom based Manual for Streets (Department for Transport UK, 2007) suggests that seating should be provided at 100 metre intervals along key pedestrian routes and should be located where there is good natural surveillance. The UK Inclusive Mobility (Department for Transport UK, 2005) guidance refers to recommended walking distances for people with various mobility difficulties and points out that while a typical wheelchair user my need to rest approximately every 150m, a person with mobility difficulties and who uses a stick would need to rest every 50m.

Regarding mobility issues specific to the educational setting the DfCSF design guidance (2008) recommends the following: higher accessibility standards; greater space for carers and bulky

mobility equipment and greater storage area; shallow pitch stairs; rest places; greater H&S awareness along with provisions for assisted emergency escape.

In terms of the overall campus circulation it is important to provide short, conveniently located, level, clutter free circulation routes that are accessible and usable by those with mobility difficulties. Vehicle access, circulation, parking or set-down and drop-off areas need to be carefully considered to cater for people with a limited travel range. Sufficient circulation and gathering or waiting spaces must be provided in key locations (DfCSF (UK), 2008).

People with mobility difficulties will have specific requirements for outdoor space including: play areas with sufficient space for specialised play equipment; outdoor PE facilities such as all-weather pitches for ease of movement; covered outdoor space providing a transition between indoor and out spaces; garden areas with raised beds for wheelchair users or those with restricted mobility. While the integration of children with mobility difficulties with mainstream is essential, it may be beneficial to provide some dedicated spaces to protect vulnerable students from the boisterous play that is natural in schools. Dedicated trails or routes can provide this protection while also supporting mobility training where safe simulations of everyday hazards can be introduced as part of the learning process.

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Key considerations for the design of a UD SEC

- Provide vehicle access, circulation, parking or set-down and drop-off areas to suit people with a limited travel range

- Provide short, level, slip resistant, and clutter free circulation routes in convenient locations

- Ensure circulation routes are sufficiently wide to cater for a person using mobility equipment or being assisted by another individual.

- Provide seating, respite areas, and sheltered seating or social areas in key external spaces and along circulation routes.

- Provide adequate external space and storage for bulky mobility equipment.

- Consider how the school and campus can be used for mobility training where everyday hazards can be introduced in a safe environment.

- Provide protected play or circulation areas for more vulnerable children while also considering integration and transition from protected spaces to shared spaces.

3.1.5.People with hearing difficulties

Persona - Brian is 15 years old and has Down Syndrome and a hearing impairment. He is in 2nd year in a special education needs school and goes to school on the regular school bus most mornings. The other option is a dedicated bus service for the special school but Brian prefers to go on the regular bus as there are a few lads from his estate that also take this bus.

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People with hearing difficulties also have associated balance issues and therefore surfaces with appropriate crossfall will provide greater ease and comfort when walking (Department for Transport UK, 2011a). During field studies for research undertaken by Grey et al. (Grey et al., 2012) participants with hearing difficulties, who also represented the Irish Deaf Society, spoke about the need for wider footpaths to allow two people walk comfortably side by side to facilitate lip reading or communication through sign language. The issue regarding the inability to hear oncoming traffic or emergency vehicles which were out of direct view or approaching from behind also arose. This was highlighted as an issue vis-à-vis the individual needing to cross a street in moving traffic or navigate through a space where there is a certain mix of motorists and pedestrians. These issues need to be carefully considered with regard to approaching, entering and circulating within educational campuses.

Referring to educational design issues specific to those with hearing difficulties, the DfCSF design guidance (2008) focuses on how to minimise distraction and support diminished hearing by providing high quality acoustics and reducing background noise. To support text or lip-reading they recommend the use of subdued colours, high quality and low glare lighting, and the avoidance of shadows silhouetting. In terms of technology the guidance proposes

"visual alarms, sound-field systems, hearing loops; storage & maintenance of technical aids" (p.199).

While the design of the internal environment is critical in supporting the needs of people with hearing difficulties, the design of external space and the layout of the campus should also play a part by considering the following;

Key considerations for the design of a UD SEC

- Ensure that circulation routes are wide enough to allow at least two people to walk comfortably side by side to facilitate lip reading or communication through sign language.

- Ensure that acoustic conditions are optimised for people with hearing difficulties especially in noisy environments such as playgrounds or in areas with potential traffic hazards.

- Consider what ICT solutions may be beneficial for people with hearing difficulties and how these might be included or influence the design of the campus.

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3.1.6. Older people

Persona - Patricia is 72 years old and often walks her granddaughter to school. This 1.5 km walk usually takes them around 15mins. She enjoys the exercise and opportunity to chat with her granddaughter. She finds the footpaths quite uneven though, and is always a bit nervous crossing the road amidst heavy volume of morning traffic

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In general, the quality of the built environment has been shown to contribute to older people's health through opportunities to be active and through the provision of spaces where people can socialise (Sugiyama and Ward Thompson, 2007). However many of these activities require a certain level of physical strength and fitness and often times the built environment presents barriers that older people find difficult to negotiate (Sugiyama and Ward Thompson, 2005) due to age related biological changes such as mobility, visual or hearing difficulties.

Research carried out by the Inclusive Design for Getting Outdoors (henceforth referred to as I'DGO) research consortium has examined the many issues that affect older people in the built environment and they have published a set of findings and guidelines (I'DGO, 2010). This research involved focus groups, interviews and onsite audits and found a number of common preferences and concerns for older people. Most of respondents preferred wide, uncluttered footpaths with minimum temporary obstacles and for the parking of cars on footpaths to be discouraged. The research also found that the respondents favoured traditional kerbs, and where required, dropped kerbs to clearly differentiate the carriageway from the footpath. However, many found the presence of tactile paving at the dropped kerb uncomfortable and

some reported that they felt like they could twist their ankle. In relation to pedestrian crossings, most felt that a signal-controlled crossing suited them best while the least favourite was informal or uncontrolled crossings. Most of the older people interviewed also welcomed the presence of seating as rest points at appropriate distances but would also use informal objects such as low walls or seating in bus shelters to rest.

As dementia is more prevalent among older people the design of a dementia friendly environment will obviously be beneficial for many older people. A range of dementia friendly design issues have been discussed earlier and it was pointed out how these measures are in many ways closely aligned with an autism friendly approach. In fact many of these measures, such as enhanced legibility, or the use of multiple sensory cues for orientation and wayfinding, are also beneficial for other users such as those with visual or hearing difficulties.

A key aspect of any shared educational campus will be the level of intergenerational interaction facilitated on the campus. While some school based intergeneration approaches prove beneficial to the health and well-being of older people, this is often associated with programmes where an older adult mentors or teaches the school children (Kaplan, 2001). While this may be the case in a UD SEC, there will also be situations where children and older adults need to share the campus, facilities and resources, and in these scenarios there may be challenges. Research into intergenerational shared sites (IGSS) in the US by Ruggiano (2012) finds that many of the older people who participated in the study displayed certain negative behaviours and attitudes to the children on the IGSS. Many older people believed that the children were prioritised, they were seen as invading older people's territory, and were considered as the cause of overcrowding and noise. In fact "sound as an environmental stressor" was deemed a major factor in this research as follows:

> "Findings from this research also have implications for the physical environments within IGSS. Similar to Jarrott and Bruno's (2007) findings, this study suggests that older adults may become uncomfortable when sharing environments with children where the level of sound generated from children's activities is high, particularly in environments with poor acoustics, such as indoor swimming pools and gymnasiums. While elevated sound levels created through the children's programs may increase the amount of press in older adults' environment (Lawton and Nahemow, 1973) naturally occurring hearing loss (Wingfield et al., 2006) and decreased ability to inhibit competing noise (Gordon-

Salant and Fitzgibbons, 2004) negatively affect cognitive processes as adults age, therefore reducing older adults' capacity to maintain an "adaptation level." (p.49)

An SEC will need to provide a supportive environment for older people in terms of age related mobility, visual and hearing difficulties, or cognitive difficulties caused by dementia. However, it is equally important to provide a campus environment that supports positive intergenerational interaction that does not compromise or prioritise one group over another. At a minimum the design of a UD SEC that successful caters to older people in an intergenerational context should consider the following ;

Key considerations for the design of a UD SEC

- Provide vehicle access, circulation, parking or set-down and drop-off areas to suit older people with a limited travel range

- Provide short, level, slip resistant, and clutter free circulation routes in convenient locations

- Provide convenient, clearly defined and legible travel routes supplied with carefully located and well designed signage for enhanced wayfinding.

- Provide circulation routes that support navigation through multiple sensory cues including visual (e.g. colour and tonal contrast or landmarks), smells (e.g. fragrant planting), or distinct sounds (e.g. chimes or moving water).

- Provide seating or sheltered areas in key external spaces and along circulation routes.

- Ensure good acoustic conditions particularly in areas adjacent to noisy activities such as playgrounds or main circulation routes.

- Consider what ICT solutions may be beneficial for older people with visual or hearing difficulties and how these might be included or influence the design of the campus.

3.1.7. Cyclists

Persona - Margaret is a 55 year old junior school teacher and cycles most days a distance of 5 kms but doesn't really enjoy the stretch of road leading up to the school. While there is a cycle path the road is very exposed and not that pleasant a cycle. She also laments the lack of covered bicycle storage and hates dealing with a wet saddle!

Cyclists are considered to be vulnerable road users who tend to try to avoid heavy traffic flows. This is particularly true in the school setting where younger children may be cycling to school accompanied by an adult or older sibling, or independently.

Cyclists need smooth surfaces over which to ride, and sufficient bike locking facilities at convenient locations. According to the UK Manual for streets, cyclists prefer direct, barrier free routes which allow them to keep moving without having to stop. (Department for Transport UK, 2007). This document also states that in areas of low traffic volume and slower speeds, cyclists should be accommodated on the carriageway, without the need for additional cycle lanes.

The 'Irish National Cycle Manual' was published in 2011 (National Transport Authority, 2011) and, along with a wide range of guidelines for the planning and design of cycling facilities, it also sets out five key requirements for cyclists, including: road safety; coherence; directness; attractiveness; and comfort. The guidance states that conflict arises where different modes of

transport share the same space and goes on to provide detailed guidance to reduce this risk, especially at junctions.

Cycling to school, or cycling to community facilities within an SEC, is a sustainable form of transport with many health and social benefits. Cyclists should therefore be supported by considering the following;

Key considerations for the design of a UD SEC

- Provide direct, barrier free cycling routes with smooth surfaces.

- Provide sufficient, secure bike locking facilities at convenient locations for those remaining on campus and for those dropping off or picking up. Provide covered bicycle storage where possible.

- Provide dedicated cycle routes to and throughout the campus. Where traffic volume and vehicle speeds are low cyclists can safely share the carriage way with vehicles, or with pedestrians where appropriate shared space design is implemented.

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3.1.8.Motorists

Persona - Peter is 39 and works as a caretaker in a school. He has re-occurring work-related back problems which have developed over the last 2 years. If he is careful he can manage this but it does affect his work and this frustrates him. Peter drives to work every day and parks either in the service yard or one of the parking spaces to the front of the school.

Motorists approaching, entering and circulating around educational campuses will interact with pedestrians in a very different manner than on a typical road. These interactions inevitably result in much reduced speed; Hamilton-Ballie argues that in today's cities, traffic journey times improve at lower steady speeds (Hamilton-Baillie and Jones, 2005) and that achieving lower speeds is not necessarily a traffic engineering issue, but more an exercise in making drivers appreciate risk and interact more fully with other road users, such as pedestrians (Hamilton-Baillie, 2008). Engwicht (1993, Engwicht, 1999) discusses the "psychological retreat" from the street and how street design needs to reverse this phenomenon in order to populate the street with people and activity. Research conducted by MVA research (MVA & Department for Transport UK, 2009) looks at driver - pedestrian interaction and points to studies carried out in the UK and Sweden which show that motorists give way to pedestrians at both courtesy crossings and in Shared Spaces (See (Grey et al., 2012) and Section 4.5.5 in this report for further information on Shared Space Design).

While the above refers to safety issues arising from the interaction of vehicles with pedestrians or cyclists, it must also be remembered that vehicles, whether private or public transport, provide mobility for many people with physical disabilities. The UD SEC must therefore ensure that these users can access and circulate to key points within the campus

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such as building entrances. Conveniently located parking spaces, set down areas or dropping-off space must be provided for those with a restricted travel range such as people with mobility or sensory difficulties.

Finally, service, maintenance and delivery vehicles must also be catered for and should be provided with access points and circulation routes that are removed from key teaching and social areas. Particular attention must be given to the acoustic environment to ensure that vehicles do not create excessive noise adjacent to sensitive campus users such as those with ASD or dementia.

Consider the following when designing for motorists;

> **Key considerations for the design of a UD SEC**
>
> - Provide vehicle access, circulation, parking or set-down and drop-off areas for people with a limited travel range such as those with mobility or sensory difficulties.
> - Consider traffic calming measures to reduce vehicle speeds with the campus and adjacent spaces.
> - Provide service vehicle access points and circulation routes that are removed from key teaching and social areas.
> - Ensure a good acoustic environment by ensuring that vehicles do not create excessive noise adjacent to sensitive campus users such as those with ASD or dementia.

3.1.9. Convergence and possible conflicts between various user needs

The previous sections looked at a variety of users to ascertain their specific needs. However, in the context of a UD SEC, which must be used equally by people of all ages, sizes, abilities and disabilities; and a desire for greater integration as part of an inclusive education approach, it is important to understand the convergence and possible conflicts that may exist between the needs of the various users. Table 2 below examines these needs based on a framework which includes; Overall considerations; Campus approach and entry; campus layout and key

external spaces; Circulation; Information and Communication Technology (ICT); and Other, which includes cross-cutting issues such as storage.

Table 2 – Key considerations for all users on the UD SEC

Key Considerations for all users	High Priority for user							
	Beneficial for user							
	Potential concern for user							
Overall Considerations	1	2	3	4	5	6	7	8
Consider UNICEF's child-friendly schools framework which promotes child-seeking, child-centred, gender-sensitive, inclusive, community-involved, environmentally friendly, protective and healthy approaches to schooling and out-of-school education.	green	yellow	yellow	yellow	yellow			
Create child-friendly environments to afford children space and time for active play as an essential part of their physical, social and cognitive development.	green	yellow	yellow	yellow	yellow	orange		
Campus approach and entry	1	2	3	4	5	6	7	8
Ensure that the spatial and physical nature of the surrounding community supports the SEC, provides access, and creates safe opportunities for physical activity (including walking or cycling to school), play and contact with nature.	green	green	green	green	green	green		
Consider alternative arrival routes for people who may be hypersensitive and have trouble dealing with the typical activity associated with the start of the school day.		green			green			
Campus layout and key external spaces	1	2	3	4	5	6	7	8
Create more human scale environments by avoiding very large schools, or by breaking down larger schools into smaller 'neighbourhoods' that provide a more manageable, navigable and legible environment.	green	green	green	green	green	green		
Ensure that the school layout is clear and comprehensible and that the environment provides multiple sensory cues and good signage to help with legibility and wayfinding.	green	green	green	yellow	green	yellow	yellow	
Provide good sightlines to support this legibility and also to allow student supervision.	green	green	yellow	yellow	yellow	green		
Provide age appropriate spaces for children that respond to the needs of various age groups ensuring that these spaces are safe while affording appropriate levels of challenge to support development. In addition to the above, ensure that there are shared spaces to provide appropriate integration and	green	green	yellow	yellow	yellow	yellow		

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	1	2	3	4	5	6	7	8
transition between all age groups.								
Provide protected play or circulation areas for more vulnerable children while also considering integration and transition from protected spaces to shared spaces.								
Provide calm, well ordered and structured external and internal spaces with identifiable areas for specific tasks or activities to help provide a secure and familiar space.								
Provide respite spaces through seating or covered areas in playgrounds, social spaces, or circulation areas, to which a person can retreat but still maintain a view to activities to avoid being totally removed or isolated.								
For a greater level of retreat provide quiet withdrawal spaces which are acoustically separated from the main activity.								
Pay attention to all sensory stimuli avoiding excessive noise, very strong odours, or visual stimuli such as glare, bright shiny surfaces, bold geometric patterns or strong textures.								
In line with the above, ensure good acoustic conditions particularly in areas adjacent to noisy activities such as playground, main circulation areas, or vehicle access routes.								
Ensure good levels of natural and artificial lighting with even illumination especially along circulation routes.								

Circulation	1	2	3	4	5	6	7	8
Provide convenient, level, slip resistant, clutter free, clearly defined and legible travel routes supplied with carefully located and well designed signage for enhanced wayfinding.								
Provide circulation routes that support navigation through multiple sensory cues including visual (e.g. colour and tonal contrast or landmarks), smells (e.g. fragrant planting), or distinct sounds (e.g. chimes or moving water								
Carefully consider threshold as part of circulation spaces that introduce environmental change. Consider transition spaces that allow a person to prepare and reorient themselves.								
Use tactile paving surfaces to indicate hazards, level changes or steps and generally aid navigation.								
Ensure circulation routes are sufficiently wide to cater for a person using a long or a guide dog; two people walking side-by-side who may be communicating using sign language; a person walking beside another person to assist them; or people using larger mobility equipment								

	1	2	3	4	5	6	7	8
Provide dedicated smooth, barrier free cycle routes to, and throughout the campus. Where traffic volume and vehicle speeds are low cyclists can safely share the carriage way with vehicles, or with pedestrians where appropriate shared space design is implemented							■	
Provide vehicle access, circulation, parking or set-down and drop-off areas for people with a limited travel range such as those with mobility or sensory difficulties								■
Consider traffic calming measures to reduce vehicle speeds within the campus and adjacent spaces.	■	■	■	■	■	■	■	
Ensure vehicle circulation routes, particularly service vehicle access points, are removed from key teaching and social areas. Pay particular attention to sensitive campus users such as those with ASD or dementia.	■	■	■	■	■	■	■	
ICT	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Consider the use of ICT solutions for all campus users, in terms of wayfinding especially for people with various mobility, sensory, or cognitive difficulties.	■	■	■	■	■	■		
Other	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Carefully consider safety and security and provide tamper proof services, secure storage, and minimum health and safety risks. (Potential concern – While certain people with special educational needs or older campus users with dementia will require careful risk management, it is also important to ensure that children are presented with appropriate risk as in the school setting as part of their natural development)	▣	■				■		
Provide adequate external space and storage for bulky mobility equipment.				■				
Provide sufficient, secure bike locking facilities at convenient locations for those remaining on campus and for those dropping off or picking up. Provide covered bicycle storage where possible.							■	

1)All children and younger people; 2) People with cognitive, learning, behavioural, communication and interaction difficulties; 3) People with visual difficulties; 4) People with mobility difficulties including wheelchair users; 5) People with hearing difficulties; 6) Older people; 7) Cyclists; 8) Motorists

The above table demonstrates that careful design can ameliorate any conflicts between the various users on a SEC. Referring back to Section 3.1.6 it is acknowledged that in certain

cases some older people may find the noise created by children difficult due to age related hearing loss and a decreased ability to inhibit competing noise which results in a negative impact on cognitive processes. The management of risk for specific users, and the introduction of appropriate risk and challenges for all children must also be carefully handled as part of a balanced design. Otherwise it is apparent that many design features are beneficial to all users, or at minimum have a neutral effect and do not have an impact one way or another.

In the context of inclusive education and community involvement, the built educational environment has a significant influence on the various users as outlined above in the previous sections. Dewey (1933.p.4) argued:

 "We never educate directly, but indirectly by means of the environment. Whether we permit chance environments to do the work, or whether we design environments for the purpose makes a great difference".

In support of this, Strange et al (2001) propose that educational environments greatly influence educational outcomes and argue "that educational settings designed with an understanding of the dynamics and impact of human environments in mind will go further in achieving these ends." (.p.2).

UD engages with these dynamics and impacts and has the potential to create the supportive educational environments as discussed by Dewey and Strange. To understand the role of UD in creating inclusive educational settings, it is important to examine the various design goals, principles, guidelines and processes which are encompassed by UD. The following sections examine these and this chapter then concludes with a brief discussion about the role UD has supporting inclusive education and UD SECs.

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3.2. Universal Design Goals and Principles

Steinfeld and Maisel (2012) argue that it is important to keep the design goals in sight when to developing a good framework for Universal Design (henceforth referred to as UD). They suggest that design professionals need four types of information, namely: goals; guidelines; strategies; and, best practice. To address part of this problem, they outline a number of UD goals which they believe should provide a basis of the UD principles. These UD goals relate to human performance, health / wellness and social participation and are composed of the following:

1. Body fit - accommodating a wide a range of body sizes and abilities.
2. Comfort - keeping demands within desirable limits of strength and stamina.
3. Awareness – insuring that critical information for use is easily perceived.
4. Understanding – making methods of operation and use intuitive, clear and unambiguous.
5. Wellness – contributing to health promotion, avoidance of disease. and prevention of injury.
6. Social integration – treating all groups with dignity and respect.
7. Personalization – incorporating opportunities for choice and the expression of individual preferences.
8. Cultural appropriateness – respecting and reinforcing positive cultural values and local context.

Steinfeld and Maisel developed the above goals to add clarity of purpose to the internationally established UD principles (Kose et al., 2001, Preiser and Smith, 2011) which are as follows:

1. Equitable Use – the design is useful and marketable to people with diverse abilities.
2. Flexibility in Use – the design accommodates a wide range of individual preferences and abilities.
3. Simple and intuitive – the design is easy to understand regardless of the user's knowledge, language skills or current concentration levels.
4. Perceptible Information – the design communicates necessary information effectively to the user, regardless of ambient conditions of the user's sensory abilities.
5. Tolerance for Error- the design minimizes hazards and the adverse consequences of accidental or unintended actions.

6. Low Physical Effort – the design can be used efficiently and comfortably with minimum fatigue.

7. Size and Space for Approach and Use- design provides appropriate size and space for reach and manipulation, regardless of user's body size posture or mobility.

Figure 9 below illustrates the links that Steinfeld and Maisel (2012) make between the seven UD principles and the eight UD goals.
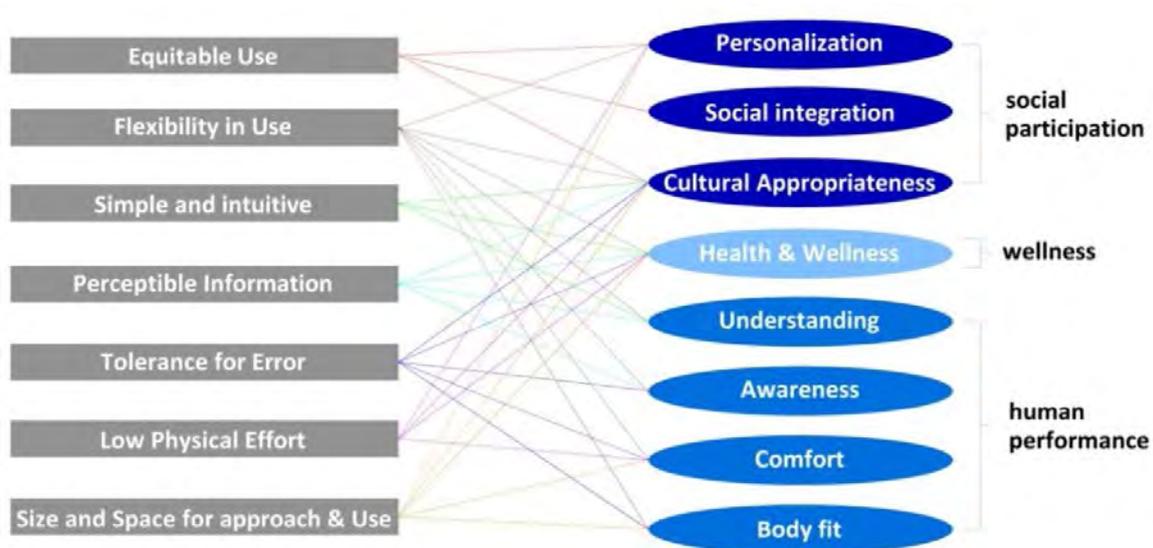
Figure 9 - Relationship between Universal Design Principles and Universal Design Guidelines (adapted from Steinfeld and Maisel, 2012)

Lissner looks at the seven UD principles in relation to educational campuses and for each principle he offers a description and an exemplar. The intention is an outline of how typical design issues experienced on an educational campus could be resolved within the framework of the seven UD principles (Lissner, 2007).

Table 3 - The Seven Principles of Universal Design for the Built and Learning Environments (Lissner 2007)

Equitable Use: Welcoming to diverse groups; provides for equivalent if not identical participation and effort. Consider characteristics such as height, weight, strength, vision, hearing, gender and cultural/background, experiences of all potential users.

Exemplars: entrances at grade, captioned media, accessible web design for voice output.

Flexibility in Use: Adaptability of the overall spaces over time (sustainability) as well as flexibility and control by the users in interacting with specific elements and functions.

Exemplars: typical gendered group restrooms vs. individual/family restrooms, alternative

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methods of demonstrating learning, cascading style sheets in web design.

Simple and Intuitive Use: Welcoming to non-native English speakers and individuals from diverse backgrounds; provides consistent forms, locations, and cues for way finding, operation, or interaction.

Exemplars: building or directional signage that includes local area maps or floor plans, course management system instructions that consider the range of experience with the technology by participating students and faculty.

Perceptible Information: Communicate information effectively across the spectrum of ambient conditions (light, sound, activity) using a variety of modalities (tactile, visual, auditory, linguistic).

Exemplars: light strobe and auditory output on alarms, pictograms on signage, volume, spacing, and size of text on PowerPoint slides.

Tolerance for Error: Minimize hazards and the adverse consequences of unintended actions, variations in pace, or vigilance; provide warnings or fail safe features.

Exemplars: changes in texture and color at elevation changes, the "undo" option in computer software, opportunities for feedback prior to grading.

Low Physical Effort: Efficient building systems; minimize user fatigue by reducing the need for sustained physical effort, allowing for neutral or ergonomic body positioning and reasonable operating forces.

Exemplars: Sustainable and Green building technologies, walking distances from transportation points, maintaining low slopes on ramps and paths of travel, articulating keyboard trays in computer labs, seating options in classrooms.

Size and Space for Approach and Use: Appropriate space for approach and reach across user heights, sizes, and relative position; appropriately sized elements to allow manipulation across a range of hand sizes and reach ranges. *Exemplars*: mounting heights that are comfortable for children, adults, or wheelchair riders, adequate space at computer workstations (aisles, table surface, knee clearance), adequate space to respond to test questions.

3.3. The Universal Design Process

Steinfeld and Maisel (2012) discuss the term 'Universal Designing' (Steinfeld and Tauke, 2003), reflecting that UD is a "constant evolutionary process leading to more and more inclusion over time" (p.29). They contend that design participation needs to be a critical part of UD and suggest efforts should be made in every design project to include representatives of end users. This view of UD as a participatory design process is promoted by the Centre for Excellence in Universal Design (henceforth referred to as CEUD) at the National Disability Authority.
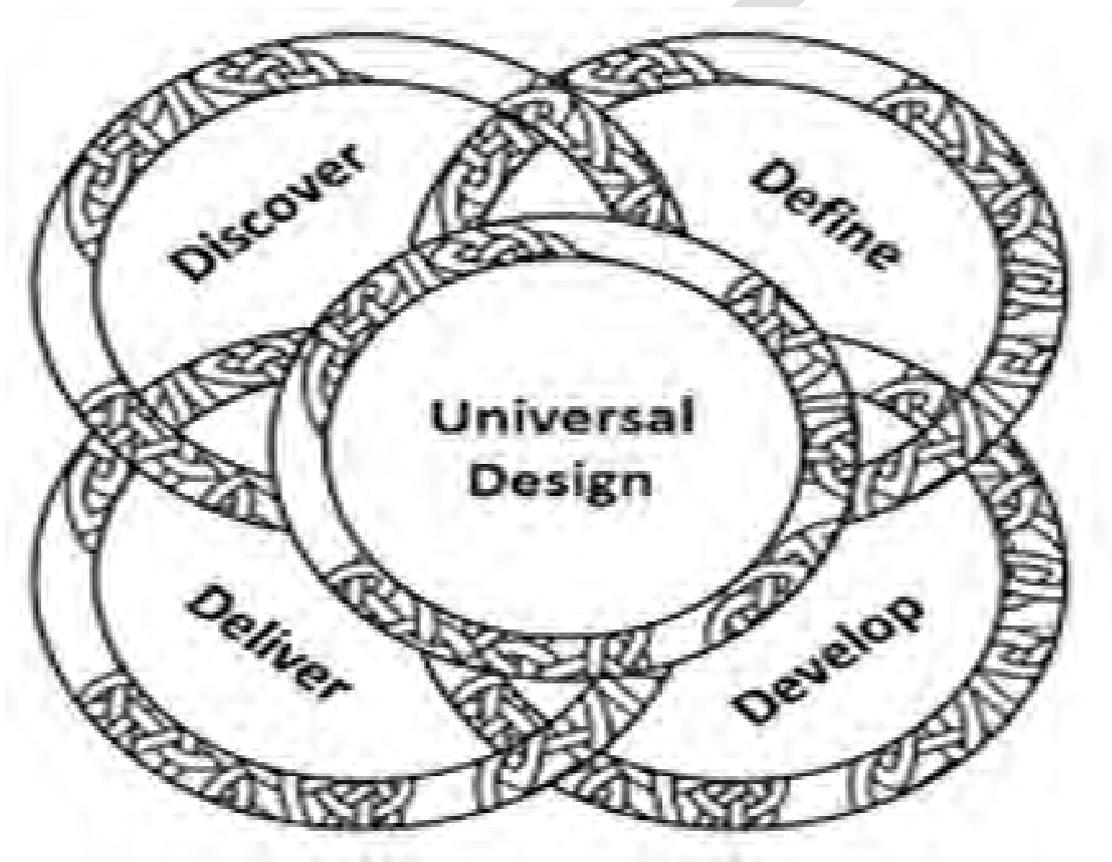
Figure 10 - The Universal Design Process (CEUD 2013)

Figure 9 above illustrates the UD process as envisaged by CEUD. It outlines a number of stages including 'Discover' 'Define' 'Develop' and 'Deliver. (Insert CEUD ref xx) ' This process is crucial in the context of using the UD approach for the planning, design and management of shared educational campuses (henceforth referred to as SEC). If an SEC is to become a learner- and community-centred environment then the design process must be inclusive and invite user participation in all stages of the design. The discovery phase must highlight the key user needs in conjunction with the users, while the definition phase must

include users in creating a brief. The development phase must be a participative co-design process to empower users and engender ownership. Finally, the delivery phase, which may involve pilot testing and feedback, will also rely on user involvement to evaluate the design and provide feedback to the design team so that the environment, product, or service can be improved in the next iteration.

In the US this participatory approach is advocated in the '33 Educational Design Principles for Schools and Community Learning Centres' where the first principle is 'Maximise Collaboration in School Planning and Design' (Lackney, 2003.p.1).Arguing that one of the main objectives "should be to obtain multiple perspectives while exploring all potential problems and opportunities" (p.1.) Lackney advises the following approach

> "Involve a wide spectrum of representatives from the community during the planning and design of a school or community center. In addition to school administrative decision-makers, encourage the active participation of parents, business and community leaders, teachers and even students when possible. Recommendations from the student group in particular should be taken seriously for; this group represents the broader community interest" (p.2-3).

In a similar manner Fielding (2006) advocates for an "inclusive, outcome-based process" (p6) to facilitate community involvement. This process includes the development of a vision, design workshops, stakeholder site walks, reading and discussion groups, community resource surveys, continual design evaluation, and finally commissioning workshops and post-occupancy evaluation once the facility has been constructed.

In the UK this school design process is supported by the Department for Education and Skills (DfES) through the building bulletin 'Schools for the Future - Designs for Learning Communities' (Department for Education and Skills (UK), 2002). They argue for consultation at a number levels including: school consultation involving staff and students; community consultation; and consultation with other schools in the locality who may be affected. The DfES claims that "This approach will help to encourage greater use of the building, develop trust between all parties and add to the feeling of community and ownership" (p.63).

The DfES claim that this process is essential to the development of a good brief and they argue that the design team should be involved at the briefing stage to ensure that requirements are communicated properly. Design exemplars, such as existing high quality schools, will help communicate ideas, preferences and dislikes; while the use of an 'activities based brief" may allow freedom for innovative solutions to emerge.

It has been suggested that the development of a brief should be conceived as a more dynamic 'Briefing process' (Blyth and Worthington, 2010, MacPherson, 1992). This is not merely about preparing a brief to instruct the design team, but rather a deeper process involving the development of detailed knowledge about the client needs. In the past the former UK based Commission for Architecture and the Built Environment (henceforth to be referred to as CABE) produced a number of documents offering advice and support to local communities, schools and clients (which may include local authorities or Boards of Education) in relation to the design and procurement of new schools (CABE, 2004a, CABE, 2007b, CABE, 2010). CABE also produced guidance advocating the role of a 'design champion' within a school design project as follows:

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> "A design champion is a senior person within the client organisation, advocating
> and monitoring good design with decision makers and the project team
> throughout the project. They could be an elected member of the local council,
> a member of the […] project board or a head teacher who is going to have an
> ongoing role beyond their own school" (CABE, 2007a.p.2).

The consultation and participatory design approaches outlined above are also in agreement that the consultation process should continue throughout the design and construction process with newsletters, websites and displays used to keep all stakeholders informed. Where works are being carried out to an existing school it is suggested that linking the project to the curriculum may benefit the students and engender a more positive attitude to the works (Department for Education and Skills (UK), 2002)

Edwards (2006) discusses the benefits of participatory design in the 'Sharing Spaces Project' which was carried out in three schools in North Staffordshire, in the UK. This research demonstrated the link between improved school grounds and improved student welfare. A critical component of this project was the pupil-centred consultation process which resulted

in the formation of a pupil committee, and a design process where all students assessed the existing site and addressed key concerns by designing out issues such as bullying 'hot spots'. The students then developed their ideal playground design and this was taken on and developed by a landscape architect. Upon evaluation of the completed projects the researchers found that there was a reduction in negative playground incidences; that children had more pride in their schools and felt happier at break time; and there was increased use of the school grounds as a learning resource. One school reported that the higher quality external spaces improved co-operation between children in the school grounds.

In terms of campus management the DfES suggest that caretakers and grounds workers, as the "gatekeepers of the schools facilities" must be consulted in terms of the creation and implementation of access agreements or codes of conduct for the campus(2006 pg.79). They also propose that "Ongoing management policies should encourage and allow pupils and staff to adapt the space and its uses to suit current and future priorities", (2006 pg.93).

3.4. Conclusion

This chapter sought to outline the key components of UD approach and how this relates to the design of the educational environment. As stated previously, UD is not only about removing barriers, but also about creating positive environments to maximise inclusion and the empowerment of all people. If an SEC is to be a 'shared' environment , in a meaningful sense of the word, then it must be accessible, easily understood, and usable to the greatest extent by all users regardless of age, size, ability and disability.

3.4.1. Key issues arising from chapter 3
UD supporting inclusive education
▪ Through its holistic and integrated human-centred design approach for all people regardless of age, size, ability or disability, UD supports the goals of inclusive education, which take a holistic view of the learner, promotes participation and embraces diversity.
▪ The emphasis on activity and participation in UD, expressed through the 'Person-Activity-Environment ' (PAE) interaction, helps to highlight how human activities, participation and performance are either restricted or enhanced by the environment. This PAE interaction is therefore crucial in an inclusive education setting.

Supporting multiple users with various needs and preferences

- The UD SEC must cater to a diverse range of student, staff and community needs and preferences. Students across primary, post primary and further education will present a wide variety of age and ability related needs. While older people, who may be students, or members of the local community, will also have specific needs based age related biological changes such as mobility difficulties, visual or hearing difficulties, or cognitive difficulties such as dementia

- As part of the above, the varying and specific design requirements associated with special educational needs must include: students with cognitive and learning difficulties; students with behaviour, emotional and social development difficulties; students with behaviour, emotional and social development difficulties; students with communication and interaction difficulties (including those on the Autistic Spectrum); and people with visual, mobility, or hearing difficulties

- In this context a well designed SEC will support cycling and balance the needs of cyclists and those referred to above, with private vehicle, public transport and service vehicle access.

- This chapter has examined a range of design approaches and features that cater to the multiple needs outlined above. It has been shown that many of these features are beneficial to all users, or at a minimum are neutral in terms of their impact. The UD approach must be used to balance the design response in order facilitate all users equally and create an inclusive campus environment for all.

UD supporting a inclusive, user-centred design process to facilitate design flexibility and adaptability

- The UD approach advocates an inclusive, user-centred design process and promotes design flexibility and adaptability to facilitate the personalisation of environments, products and services to suit specific needs.

- This supports the consultation and participatory design approaches proposed by various international educational design experts and government bodies which seek enhanced student, staff and community participation in school design to develop greater levels of trust, and engender better feelings of community ownership and stewardship. The design process must include all stakeholders, refer to exemplars, make use of 'design champions', and incorporate a dynamic 'briefing process' which may result in a more innovative 'activities based brief'.

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4. Educational Campuses
A review of Universal Design in educational settings

"Universal design is therefore not "just" about access, but also about creating a more inclusive and learning-friendly environment in school. Schools that are built based on universal design principles will therefore be more effective because these schools will enable children to learn, develop, and participate, instead of "disable" children by creating barriers to their development and participation." (UNESCO, 2009.p.19).

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4.0. Introduction

This chapter looks at the available literature regarding the design of educational campuses using the Universal Design (henceforth referred to as UD) approach. The aim of this review is to draw out some key design features and practices which can be used to inform the planning and design of shared educational campuses (henceforth referred to as SEC) in Ireland from a UD approach. The analysis of the literature is informed by the three key domains of UD, namely: Accessibility; Understanding; and, Usability and how they are accomplished in the context of educational campuses. The literature review will also look at how the UD process, or design process in general has been used to engender a participatory approach towards planning, design and managing education environments.

With regard to the UD approach and Irish school design, a number of school design guidelines developed by the Department of Education and Skills (henceforth to be referred to as DES) build 'universal access' into the design philosophy and state that all "new schools and

school extensions should be designed to cater for persons with varying ranges of physical ability and they must not be disadvantaged by design limitations" (Department of Education and Skills (IRL), 2011p.17).

4.1. Universal Design and Spatial Scales

Accessibility in the context of UD must be considered at a number of spatial scales, not just address access into the campus and ease of mobility around the campus. Accessibility must also consider access to the campus location from other geographic areas, whether this is the adjacent community, somewhere within the region, or further afield.

Iwarsson and Stahl (2003) examine the dimensions of accessibility using the spatial levels of the home, neighbourhood, and community. Using the sociological terms micro, meso, and macro levels of accessibility, they contend the following: (1) the micro level could refer to the immediate physical environment and include housing, and the immediate physical surroundings; (2) the meso level of accessibility operates at the neighbourhood level and includes public space and other public facilities, such as public transport; and (3), the macro level describes society as a whole, at either a national level or an international level. Audirac (Audirac, 2008) continues this spatial analysis of UD and uses the same micro-meso-macro framework, except that in this version the macro level remains as a specifically spatial quality.

Mobility and Types of Social Exclusion

Dimensions of Social Exclusion and Mobility	Description	Accessibility[a]		
		Micro	Meso	Macro
Physical exclusion	Physical barriers of the built environment (streets, sidewalks, crossings) impede access to transportation; physical barriers in the transportation system itself (e.g., vehicles, bus stops and stations) exclude people with physical or psychological difficulties; individuals with impaired mobility, hearing, or vision; people with children or baggage; frail elderly people, and non-English speakers	X	X	
Geographical exclusion	Lack of automobility and lack of transit; transit service's poor metropolitan reach limits accessibility beyond the neighborhood to economic opportunity, shopping, recreation, and social life. Increasingly found at the edge of expanding metropolitan areas.			X
Exclusion from facilities	Related to the above; exurbanization of retail and other facilities and relocation or reorganization of private and public services require more travel, more travel time, and/or more costly travel.			X
Economic exclusion	Low income, no automobile, and no transit service or poor transit service exclude mobility-disadvantaged populations from economic opportunity.		X	X
Time-based exclusion	Related to poor transit service (infrequent during the day and week, unreliable, unpunctual), affects all transit-dependent people but more so, caregivers, particularly single mothers.		X	X
Fear-based exclusion	Fear for personal safety in public spaces, which varies by time of day and gender and influences the use of public transportation.	X	X	
Operator-based exclusion	Lack of information and assistance about transit service, staff attitudes, and drivers' behavior toward impaired people contribute to suppressed journeys and social exclusion.	X	X	X

Table 4 - Mobility and Social Exclusion, Accessibility, and UD Applied to Transit (Audirac, 2008)

In Table 5 above, Audirac investigates the dimensions of social exclusion and mobility. These dimensions range from physical exclusion, with issues at the micro and meso scales, through to geographical exclusion, where the problems are experienced at a macro level, all the way to operator exclusion, where difficulties arise with respect to all three spatial scales. For each dimension of exclusion Audirac propose UD solutions to address problems experienced at each spatial scale. For example, solutions to challenges experienced in the dimension of physical exclusion, at both the micro and the meso level, include UD low-floor buses, UD bus stops and shelters, UD signage and way finding, or appropriately located bus stops to minimise walking. The UD approach proposed for the geographical exclusion includes proper route planning and "Mobility Management or Complete Transport Chain models" (Table 3 p.11). Overall, it is argued that UD must encompass geographical accessibility in addition to physical accessibility at the micro level. Specifically:

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"UD applied to transit has focused primarily on planning and design guidance of the physical side at the micro-accessibility level. However, extending UD considerations to geographical accessibility, as intended in "complete chain" and "mobility management" models, has recently drawn attention to the fact that "accessible transit for all" implies that the physical chain of accessible transit must be seamlessly integrated with a regional administrative chain" (p.11).

4.2. Universal Design and Planning Policy

Moving UD beyond individual products, buildings, or even streets is the approach being adopted in Norway where UD is currently being integrated into national planning policy (Bringa, 2007). In Ireland, Booklet 9 'Planning and Policy', of the 'Building for Everyone' (henceforth to be referred to as BfE) series, produced by CUED at the National Disability Authority, argues for the inclusion of UD at every level of planning in Ireland (CEUD, 2012c). This document contends that UD contributes to planning in the following ways:

- "It helps us avoid bad development and help us to deliver genuinely sustainable solutions for communities

- It helps us to create better places - for all abilities and all age groups - equitable, inclusive, participative and accessible

- It avoids the need for wasteful and inefficient retro-fitting of solutions, as a these matters should be considered at the outset of the design process

- It informs genuinely integrated strategies for land-use, transportation and urban design

- It creates greater efficiencies for public infrastructure investment and produces better economic development models

- It widens the audience and market for well considered development projects enhancing commercial viability It helps provide an environment in which people can age and retain their independence" (p.12).

The BfE booklet 9 'Planning and policy', as referred to earlier, promotes UD for planning at the meso and macro scale to assess distances from "neighbourhoods to places of work, healthcare facilities, education, convenience retailing and social facilities" (p27). In terms of the

urban framework and planning policy for housing it is recommended that planning should provide "safe and direct links to nearby schools and neighbourhood centres" (26).

4.3. Universal Design and Integrating Schools Into The Community

The location and integration of public facilities such as schools within the community, is a key concern in '"Universal Design New York 2" (Levine et al., 2003). This document argues that 'human services facilities' (social, cultural, educational) considered through a UD approach need to be:

- "Located centrally within the community to increase convenience and utilization

- Located near other communities to help forge effective partnerships between community agencies

- Human service buildings clustered on a site to provide a sense of community where generations of neighbours can meet and share their cultures" (194).

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The greater integration of schools into the community has already been mentioned in Section 2.4.1 as a way to foster relationships between child-centred learning and the community, but as outlined by Levine et al., there are also UD implications. One way in which education is evolving towards being more child-centred is through greater interaction with the community and the use of the community as a learning resource (Atkins, 2011).This aligns with the UD approach in terms of greater inclusion and social participation.

Nair (2009) argues that if schools are integrated into the community to the extent proposed by many educators and policy makers, they would actually become 'Community Learning Centres' (henceforth referred to as CLC) which among other things would be: seen as a resource for the whole community; located in a place that is accessible to the surrounding community (pedestrians, cyclists, and cars); provide a curriculum enriched by the available resources in the community; and, provide co-circular and extra-curricular activities for young people and adults. The CLC should be an integral part of the community and secure "itself in ways that are as far removed as possible from the prisons that so many of our schools have

become." (p 200) Nair also proposed that the CLC should be created by way of an inclusive and collaborative process.

While the CLC outlined by Nair above provides a far more integrated model than many traditional schools, there are other educational innovations that are taking this integration even further. The 'Dumfries Learning Town' initiative is an ongoing project looking to provide an integrated and community-based education platform for this Scottish town. Having rejected the idea of building fewer but larger new schools in 2008, the council and the community started to look at ways of maintaining the existing schools while providing greater integration between these schools and the local primary schools and local services.

> "Dumfries Learning Town is about planning and delivering education on a whole town basis and not looking at schools individually. We want to make sure that all of our young people benefit equally. We want to make sure that our schools, college, Universities and local business work together for the best. Most importantly, we want to make sure that your child's school experience is the best that it can be and leads on to further study or a job" (Dumfries and Galloway Council, 2014 #1612).

One of the options being explored, referred to as the 'emerging option' involves the retention of all existing secondary and primary schools but with greater collaboration and shared management among schools, the community and local services. These schools would then be supplemented with a centralised 'Learning Hub' which would mostly serve older secondary school children, adults returning to education, and the community in general. One of the aims of this facility is to provide a transition from the shelter of school to adult life, involving work or third level education. The facility would also serve younger students and the wider community through the provision of theatre, enterprise or sporting opportunities (Dumfries and Galloway Council, 2013).

The 'Hume Global Learning Village' (Hume City Council, 2014) is already achieving some of the aspirations set out in the Dumfries Learning Town. Located 15 kilometre to the north of Melbourne in Australia, the city's "vision for Hume is that of a learning community; a city of lifelong learners who are active and empowered participants in community life, education and employment". To attain this the council has created a local learning network of partners drawn from the Council, schools, universities, 'neighbourhood houses', libraries, job service

agencies, businesses, community groups, government departments and community members. The 'Learning Village' is supported by two 'Learning Centres', which provide a central hub for community and business organisations and 11 'Neighbourhood Houses' which are smaller facilities with a local community focus offering courses and support in an informal manner.

The above examples illustrate the integrated approach to learning that is advocated by Harrison and Hutton (2014) who, as illustrated in Figure 10, believe that learning should not be fragmented into self contained sectors of society, but should become the hub of any community .
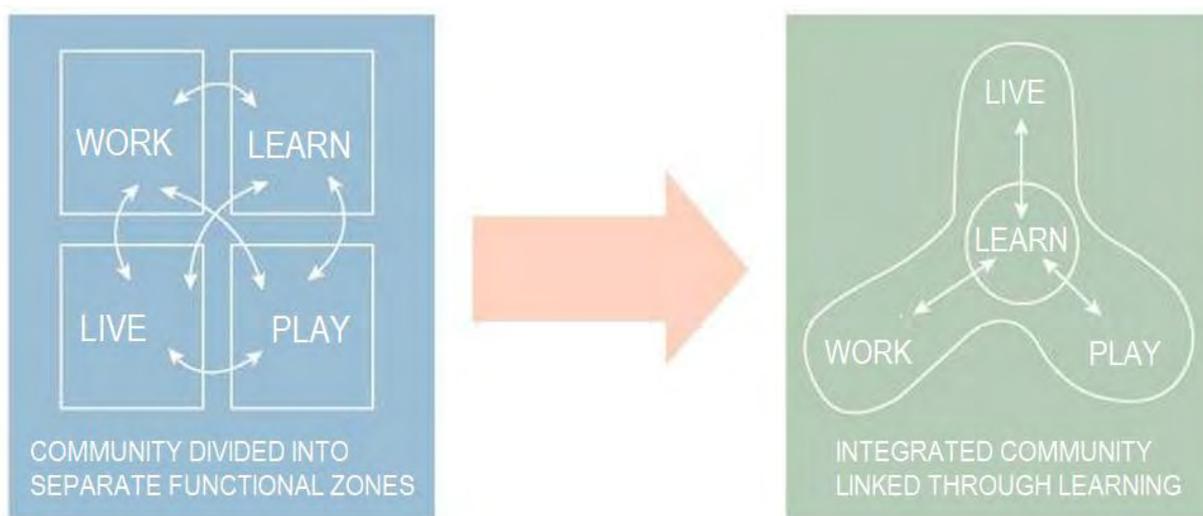
Figure 11 - Learning as the hub of the community

They argue that while this approach is widely discussed, there is still a distinct lack of the kind of spatial integration among community, educational and business partners required for holistic and integrated learning. Specifically:

> "It is notable that while there has been a great deal of innovation within building types – and a lot of talk about shared community resources and partnerships – there is little concerted effort to take an overview about holistic learning and remarkably little concentration on the spatial implications of any cross-cultural partnering that does exist – in short, an absence of integration" (p.viii).

The integration of schools into the community in a meaningful manner requires a collaborative process which is critical to the UD approach. The UD process has already been

described in Section 3.5 but it is worth reiterating that the integration of schools and the UD process are interconnected and mutually supportive.

4.4. Creating a Child and Community-Friendly Educational Environment

The creation of community-friendly educational environments that are integrated into and with the locality has been discussed above in terms of location and accessibility in macro terms. However the balancing of a child friendly and a community friendly educational environment presents some challenges in terms of age appropriate design, designing for special needs students and a balancing of the overall needs of various users. It has already been discussed in Section 2.3.1 that the Education For Persons with Special Educational Needs (henceforth referred to as EPSEN) Act promotes the education of children with special educational needs in an inclusive environment with mainstream. This helps schools become more child-friendly as it advocates for an environment that meets the needs of a wide diversity of students. However, the question arises as to whether a child-friendly environment needs to be child-specific, or age appropriate. In this context, it would be important to consider or take stock of the extent to which the school would, among other things, prioritise the needs of the children it serves, over those of other groups, or whether the school would be structured and organized in such a way that it simply presents no barriers to children, and supports their general needs.

Section 3.1 has already considered a range of users, both school-based and users from the community, that might frequent an SEC, and the key design issues around their needs has been set out. These key design issues help to highlight some of the main requirements for a UD SEC and points to the main convergences and possible conflicts between their needs

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Figure 12 - Child-friendly or child-specific? **Aadharshila Vatika: Kindergarten in New Delhi, India** (OECD, 2011b)

The level of inclusivity described previously forms one of the central tenets of the UD approach but it is worth examining the balance that must be struck between UD and the creation of a child-friendly or a child- specific environment.

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In Section 3.2.1 The United Nations Children's Fund (henceforth referred to as UNICEF) child-friendly schools framework was described as one which "promotes child-seeking, child-centred, gender-sensitive, inclusive, community-involved, environmentally friendly, protective and healthy approaches to schooling and out-of-school education worldwide" (UNICEF, 2014). In describing the ideal conditions for innovative learning environments, Atkins suggests that they must be age appropriate (Atkins, 2011). To some extent age appropriate design requires specialised design to facilitate the specific needs of children at certain ages (at a basic level this includes age appropriate tables, chairs, toilets etc). Looking back at the seven UD principles as detailed in Section 3.4, it could be argued that these are mostly consistent with child-friendly environments. On the other hand, and with respect to 'equitable use,' where it is specified that the design is useful and marketable to people with diverse abilities, this may not be entirely applicable in a child specific-setting such as the school illustrated in Figure 11 above. As such, and In order to ensure equitable use, any school, while striving to be child-friendly, will also need to consider how it will cater for adult teaching and maintenance staff as well as visiting parents. In addition, in terms of communal spaces where children of different

age groups mix, any child-friendly features will need to take account of and be aware of the various age groups using the space in terms of user size, cognitive abilities, and maturity. On this point it is worth pointing out that UD does not claim to be a 'one-size-fits all' solution. Jon Sanford, one of the authors of the original UD principles (2012) believes that one of the real advantages of UD is that, while it cannot meet the needs of every individual user with specific needs, it creates a high supportive baseline which can be then be adapted for specialized needs. This brings us back to the UD approach as promoted by the Centre for Excellence in Universal Design at the National Disability Authority (henceforth referred to as CEUD), which builds on the principle of personalization, or the ability to adapt a design to specific needs.

The child-friendly environment as outlined by UNICEF above also includes the need for protection. The issue of security is always high on the agenda in school design as children are vulnerable and school authorities have a significant duty of care. Blyth (2011b) discusses the implications for security when integrating schools into the community, stating:

> "Integration with the community raises the question of security. If children and teachers do not feel safe, learning will suffer, and making education facilities safe remains an integral part of the design of the buildings." (p.15)

With respect to security, and in instances where feelings of 'being unsafe' prevail, leading to fear-based exclusion, the needs of children, and other vulnerable groups must be addressed and carefully considered in order to make schools more inclusive and accessible to the community. The UD analysis of transit as carried out by Audirac (2008), and as described in Section 4.3, looks at the consequences of 'fear based exclusion', which is defined as "[f]ear for personal safety in public spaces, which varies by time of day and gender…"(p.9). She contends that this is predominantly a micro and meso level issue and that women, older people, and people with disabilities are particularly affected. The UD solution proposed for tackling fear-based exclusion involves the 'Crime Prevention Through Environmental Design' or the CPTED approach.

CPTED[7] is a planning, urban design and architectural design approach. Beginning with Jacobs (1961) and later being further defined by Newman (1972), CPTED promotes environmental design and management practices that create safer places for inhabitants and discourage criminal activity by increasing passive security and making targets more unattractive for criminals. CPTED is also concerned with reducing fear of crime by designing out spaces that make people feel insecure or vulnerable. Various guidelines have been developed for CPTED at the urban level (Balducci et al., 2007, CEN, 2007).

4.5. Spatial and physical attributes of UD educational environments

The previous sections examined some of the broader issues around UD educational settings to determine the context of the more specific spatial, and physical attributes of a UD campus. This section now looks at the issues around the following six elements: (1) Location and access from the community; (2) Approach and entering or exiting the campus; (3) Campus size; (4) Campus layout, key external spaces and architectural design; (5) moving around the campus; and, (6) Technology on the Campus the campus.

Using a similar approach, the Commission for Architects and the Built Environment (henceforth referred to as CABE) sets out its '10 criteria for successful school design (CABE, 2011) which starts at the broader community level and then zones in gradually to interior design and the use of sustainable design strategies. CABE outline the following set of criteria that contribute to good school design:

1. Identity and context: making a school the students and community can be proud of.

2. Site plan: making the best use of the site.

3. School grounds: making assets of the outdoor spaces.

4. Organisation: creating a clear diagram for the buildings.

5. Buildings: making form, massing and appearance work together.

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6. Interiors: creating excellent spaces for learning and teaching.

7. Resources: deploying convincing environmental strategies

8. Feeling safe: creating a secure and welcoming place

9. Long life, loose fit: creating a school that can adapt and evolve in the future.

10. Successful whole: making a design that works in the round.

For each criterion there are a range of questions organised into themes to provide a framework for reviewing school design proposals. These ten criteria will be examined in further detail as appropriate in the following sections.

(See Appendix H for details about all 10 criteria for successful school design)

4.5.1.Location and access from community
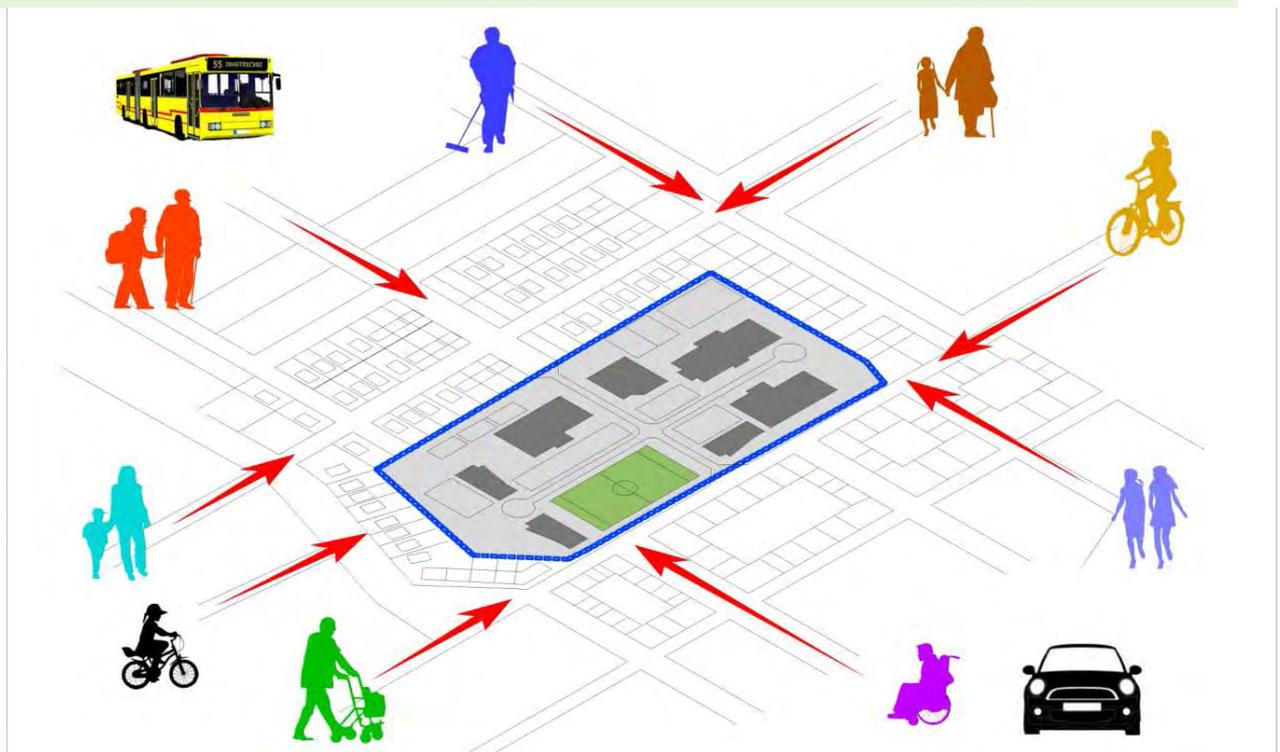
Section 2.3.4 has already discussed the location of an SEC in terms of proximity to the local community and sustainable travel patterns. In addition, Section 4.2 and 4.3 of this chapter also touched on the issue of location, but it is important to consider some of the specific locational requirements for educational facilities in terms of UD.

Strange and Banning (2001) contend that educational campus design that encourages student participation and involvement is critical to successful education. The first physical dimension they consider is that of campus location. In terms of an urban campus they observe that if located within an area that is deteriorating or has social issues, this may hamper onsite activities and access to certain resources or locations. Furthermore, particular vulnerabilities in such areas could be heightened, depending on time of access to the location (e.g. females may be at an increased risk at night in an area that is unsafe). Environmental noise from traffic, rail or other infrastructure or activities also has a negative impact on student and staff welfare. Darmody et al (2010) identify situations where the school community was negatively impacted by traffic or other urban noise and where teachers were unable to open windows because of external disturbances.

On the other hand, if the school is in a less noisy, more attractive urban area this might provide a more positive environment and offer the students a good opportunity to become involved with the community. On this point Darmody et al state:

> " In fact an understanding of involvement of such settings may need to be expanded to include those activities and roles students bring with them to campus, particularly non-traditional age students (Schuh, 1991). Whether internal to the institution or a combination of campus-based and community-centered programs and leadership opportunities, the key is to identify those initiatives with the potential for drawing students into them both as means of complimenting classroom learning as well as contributing to the quality of life in the institution and its environs" (p.137).

The first CABE criterion for successful school design (CABE, 2008)– i.e., 'Identity and context: making a school the students and community can be proud of' – includes questions about the school ethos and identity, and asks whether the school is inviting to the community and whether it responds positively to the locality. This places much responsibility on the school design, ensuring that the school respects local views and the urban grain, while also asking questions such as how "the design relate to a holistic vision for the area in relation to the school enhancing the local character?" (CABE, 2008).

Following this, CABE outline a range of issues around the 'civic character' of the school, asking whether the school design will "strengthen the image of education locally" or whether the school will "improve social cohesion in the community?" (CABE, 2008).

These CABE criteria around identity and context, and civic character, demonstrate a concern for the school-community relationship and the level of interaction that should exists between the two entities. According to CABE the school is a central component of the community, and as such must strive towards becoming an important piece of social infrastructure. In the Irish context, Darmody et al (2010) recommend that primary schools should be located in a central location with the capacity for pupils to walk to school or use public transport, but they argue that sites must be large enough to facilitate sporting and play facilities, specifically:

> "In choosing the location of a school, building in the centre of the community rather than on the periphery would enhance school community links and parental involvement" (p. 106).

In terms of the macro and meso dimensions proposed by Audirac (2008), and bearing in mind the urban framework sketched out by the Urban Task Force and Rogers (1999) two main issues influence how easily a user can get to and from the SEC. These are: (1) the physical distance from home to school; and, (2) the condition of the route in terms of accessibility and usability. In developing an accessibility design guide to accompany Australia's aid program, the Australian Agency for International Development (henceforth to be referred to as AusAID) (AusAID, 2013)uses the UD principles as a guiding framework. While these are principally aimed at developing countries, many of the planning and design issues around educational facility design are relevant in most circumstances. These guidelines identify selecting an accessible school site and getting to school and as the first two priorities.

In terms of selecting an accessible site the UD approach would:

- "involve the community, including local stakeholders, Disabled People's Organisations and villagers, in site selection, especially for primary schools;

- select a site as close as possible to the centre of the village where it is likely many children live; and,

- develop a site that can accommodate present and future enrolments" (p.79).

These selection of criteria clearly prioritise strong community involvement and an emphasis placing the school at the heart of the community. This proximity to the community also enables greater accessibility and in this regard AusAID recommend that a UD approach would:

- "provide accessible and safe paths for all children to travel to school;

- provide alternative transport if no public transport is available;

- provide affordable transport options where walking and cycling are not options (for example, unassisted children in wheelchairs or students using crutches may have difficulty in accessing a school that is 500 m or more from their home);

- reduce road safety hazards and potential for abuse by encouraging adult supervision of children and safe pathways to get to school; and,

- organise community participation to support improving and maintaining local roads for easier access to schools" (p.79).

The AusAID guidelines reinforce the urban structure advocated by the Urban Task Force and in many ways align with the criteria outline by CABE above which promote the school as an important piece of social infrastructure. By specifically adopting a UD approach AusAID not only consider location and access in spatial or geographic terms, but also have regard to community participation, accommodating the needs of all users, and the issue of affordability. The AusAID guidelines, while aimed primarily at developing countries, demonstrate the kind of integrated thinking that is sometimes missing from school delivery in so-called first world countries, and could used to inform an approach to the SEC concept in Ireland.

4.5.2. Approach, boundary and entering or exiting the campus
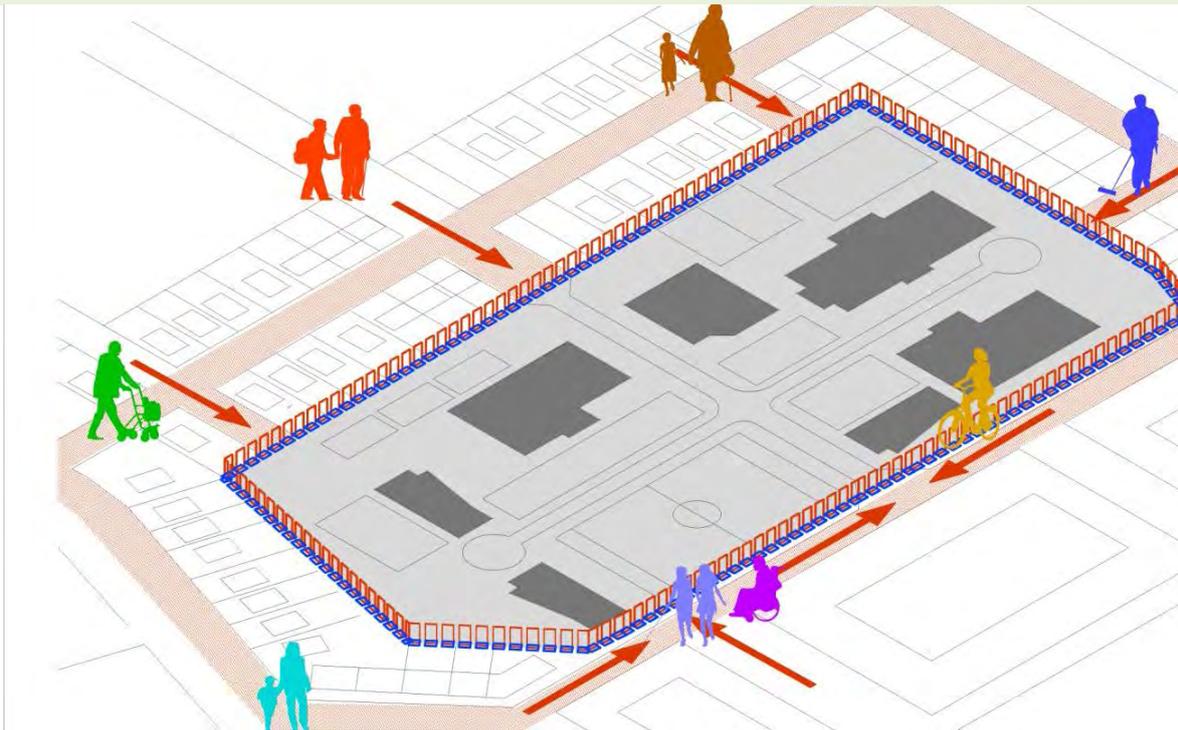
The environment that surrounds the school or educational campus is critical to the UD approach. The CEUD at the National Disability Authority have developed a series of booklets under the heading 'Building for Everyone – A Universal Design Approach' (BfE); booklets 1 and 9 in the series provide guidance regarding environments vis-à-vis schools/educational campuses, in the context of UD (CEUD, 2012b, CEUD, 2012c).

Booklet 1of the series is entitled 'External Environment and Approach' and it deals with major design issues around topographical constraints, safety and convenience, and the balancing of various user needs in the external environment. Detailed guidance on both the pedestrian and vehicular environment is also provided, and it should be noted that this is all highly applicable in the context of an SEC. Providing accessible, easily understood and usable approach routes and entry points is critical to a UD SEC. In this regard BfE Booklet1'External Environment and Approach' provides detailed guidance on pedestrian access routes, changes in level (i.e. ramps, steps etc), surface materials, street furniture, pedestrian crossing points, and tactile paving surfaces. While good levels of artificial lighting are important on the approach and entry to any school, an SEC may be open at night for community activities and as such would require lighting levels above those typically needed. Improved lighting, wayfinding, and signage will be a factor in the immediate SEC environs as users arriving from the local area will comprise of a range of people, of various ages, and of diverse physical, sensory and cognitive abilities or size.

The 'Building for Everyone – A Universal Design Approach' Booklet 9 is entitled 'Planning and Policy' (CEUD, 2014b) and it discusses wayfinding and signage in the context of 'legibility', where legibility is described as "a design concept which makes it easier for people to work out where they are and where they are going" (p.41). Physical characteristics of the landscape such as landmarks, distinctive natural features, and clear sightlines to destinations or wayfinding landmarks all serve to increase legibility. This can be supported by signage which is defined as "easily identifiable, clearly legible, distinguishable from its background and consistent in their design" (p.42).

Vehicle traffic, public transport or cyclists in the immediate vicinity of an SEC may be entering or exiting or just passing by. This mix of pedestrians (many quite young and thus more vulnerable), cyclists and motorised traffic creates a challenging environment, especially at times when students are going to and coming home from school. In such a context urban design and traffic engineering approaches such as shared space design (to be discussed in detail in Section 4.5.5) have been used to engender a more pedestrian friendly environment in urban settings. Shared space design is an engineering and street or road design concepts aimed at creating safer urban spaces and residential environments where emphasis is on place-making and pedestrians, not traffic movement. The concept involves removing traditional separation between motor vehicles, cyclists and pedestrians, and the removal of typical lines, kerbs, signs and signals. The idea is to improve road safety by forcing road users to negotiate their way through shared areas at appropriate speeds (Department for Transport UK, 2011a).

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A 'Home Zone', which is a form of shared space design, is the term for a [residential] street where people and vehicles share the whole of the road space safely, and on equal terms; and where quality of life takes precedence over ease of traffic movement. (Jones and Institute of Highway Incorporated, 2002). The Home Zones approach has been used as part of the mixed residential development in Adamstown, Co Dublin, Ireland, where the school opens out onto a Home Zone which is flanked on the opposite side by three storey town houses (See Figure 13 below).

Figure 13 - Home Zone with adjacent housing and school in Adamstown, Co. Dublin

That said, whether shared space design is employed or not, there will be a variety of vehicle movement and parking approaches adopted to suite the specific context. This may require dropping-off or setting-down points for private vehicles, taxis, or public transport. Setting-down points should be located as close to the main campus buildings as possible to allow a person with physical, sensory or cognitive disabilities to alight directly adjacent to their destination (CEUD, 2012b.p.34-36, CEUD, 2012c).

The boundary conditions of the SEC and how one enters or exits the campus is a key component on how it interacts with the local community, and how it provides a safe and secure environment for children. The CABE criterion for 'Site Plan: making the best use of the site' (CABE, 2008) contains a number of themes relevant to this aspect of the SEC. The first theme focuses on 'Enhancing the Character of the Site' and raises questions around whether the scheme makes the most of its position and views, and how well it relates to buildings outside the site. In relation to the theme 'Strategic Site Organisation' the following issues are identified: creating identifiable boundaries and security zones; entrance sequences for different modes of transportation; and linking school entrance routes to local routes.

Fielding (2006) advocates for the integration of learning communities with the local community and calls for these learning communities to have permeable edges which allow greater interaction with the community. Specifically, Fielding states the following:

"Take down fences surrounding our schools. Within small learning communities, the sense of ownership and care of immediate surroundings associated with small learning communities provide greater security than a fence" (p.5).

However, as discussed earlier, safety and security is a major concern for both school management and parents. Darmody et al (2010) address this security issue and point out that while many stakeholders they spoke to as part of their research were supportive of greater school-community interaction, they identified practical security problems around restricting access to certain parts of the school. In the 2004 Organization for Economic Cooperation and Development (henceforth referred to as OECD) document called 'Review of security in school design in Ireland' (Dolan, 2004), security is examined at both the building and site level, focusing on the following;

- Location and surroundings. Theoretically, a school located in a densely populated area that is unoccupied at night, weekends and holiday periods presents a higher risk than a school located in a suburb or rural area. In reality, schools are situated in the community they serve, and the availability of sites is often limited by factors such as poor town planning. Ideally, a school site should not be isolated and should be overseen by the local community.

- Site boundary. An effective site boundary is a critical component of school security and can relieve pressure from other areas. Although it is difficult to construct a perimeter that is physically impenetrable, socially acceptable and affordable, an appropriate site boundary should:

  - Be well-defined, prevent casual intrusion and make deliberate intrusion difficult and conspicuous.

  - Prevent access from inside and outside the site, so that it is as difficult for intruders to break in as to break out. Locks on gates should be located out of sight to deter vandalism.

  - Incorporate a symbolic barrier at road entrances to indicate private school grounds.

  - Not impede visual surveillance of the site, for example by using high walls instead of railing-type fences.

The recommendations outlined above are not exactly consistent with Fielding's small learning communities and it could be argued that they are too security-focussed, but it clearly illustrates the tensions between the open and community integrated SEC and the typical safety and security issues associated with a school.

Perhaps a more balanced approach is presented in CABE's '10 criteria for successful school' design where the design criterion - 'Feeling safe: creating a secure and welcoming place' – seeks to balance security and community integration (CABE, 2008). Rather than suggesting a high security approach through enclosure or protected boundaries, CABE asks whether there is a balance between the security strategy and openness; whether all users can access the site safely; and whether pedestrian routes are overlooked and safe at all times of the day. They highlight the importance of territoriality by asking if external routes and boundaries are clear and well defined and whether it is obvious which areas are open to the community and which are more private It is suggested that the boundary treatment should facilitate the school's approach to security while entrances should be "welcoming for all users of the building, well located and capable of passive surveillance".

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4.5.3. Campus size
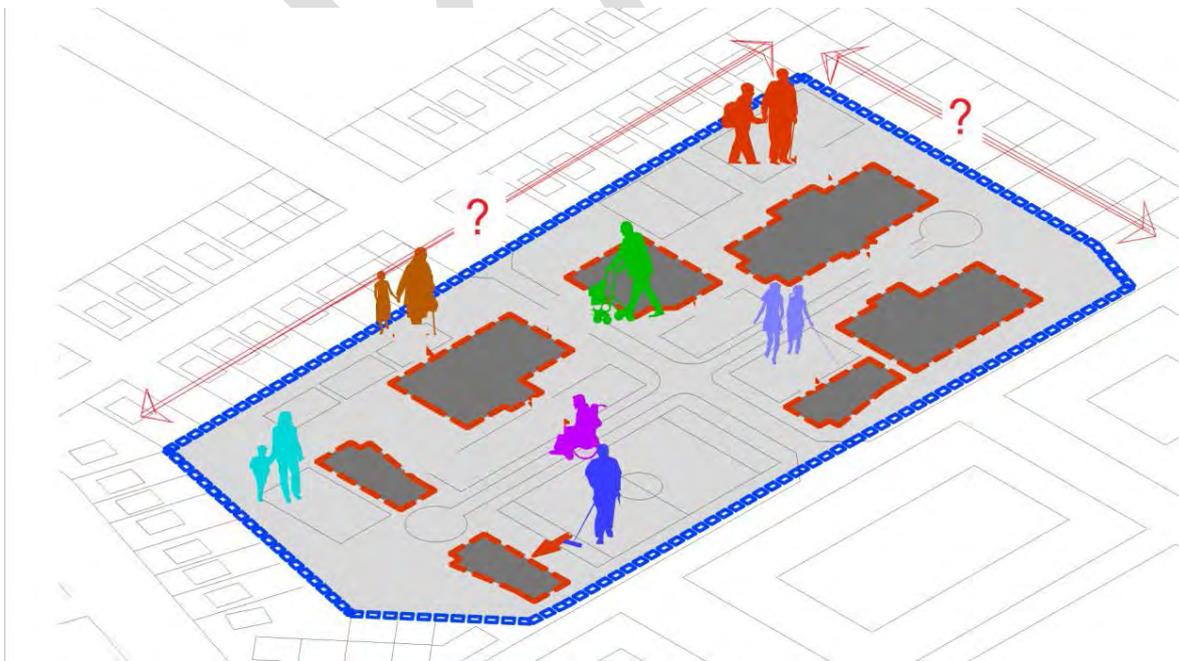
School size and scale has emerged in the literature as an important aspect of child-friendly environments. An OECD design series called 'Building for School and Community' (OECD, 1978) looked at the integration of schools within the community and reported that while

large scale problems could be problematic, smaller scale, neighbourhood based projects were more successful.

Many authors advocate for smaller schools and argue that where a larger student number exists, that this should be broken down into smaller school units to create a campus of individual buildings, each at more intimate scale (Lackney, 2003). Lackney refers to a small school as one with 100 to 150 students, while a large school is over 2,000 students. Atkins, in presenting case studies to demonstrate criteria for 21st century schools points to Dandenong High School in Victoria, Australia where, in order to deal with a large school population of 2100 students, the design broke down the school into a number of 'houses, with each house acting as a school within a school to establish smaller learning communities. The design goal centred on creating a sense of belonging and community, with each of the 'houses' catering to 300 students. Many other authors argue for the benefits of smaller schools and where a larger student number exists, it is recommended that the student population is broken down into smaller school units to create a campus of individual buildings each at more intimate scale.

Campus size also affects travel distances between individual buildings on the site and in this regard AusAID (2013) argues that school design using a UD approach should "minimise the distance between administration areas, essential facilities, teaching rooms and toilets when site planning to facilitate safe access and movement" (p.80). Tepfer also discusses this in the context of UD in educational environments (Tepfer, 2014) arguing that travel distances within buildings and between buildings should be evaluated during the design process using the hourly and daily routine schedules of the pupils and staff who will be served by the design. On this point, Tepfer states:

> "Many people with disabilities travel more slowly than average people and therefore need more time to get from place to place. Their routes should be shorter than inaccessible alternatives, or slightly longer if necessary, and in total should provide an entire educational environment that works well for them." (Tepfer, 2014).

It should be pointed out that the same applies to young children, older people, and those with temporary injuries.

Figure 14 - Dandenong High School, Victory Australia (Designing Australian Schools, 2014)

Darmody et al (2010) have examined the literature around school size and its impact on learning outcomes. Drawing from the available research (.i.e. Cotton, 1996, Cotton, 2001, Lindsay, 1982, Newman et al., 2006) they conclude that while high quality empirical studies are sparse, much of the research that does exist shows that smaller schools are safer, more personalised, and more equitable than larger schools. The research also points to students in smaller schools performing better academically and participating in more activities in which to further themselves. While the benefits of a smaller school is questioned by Newman et al (Newman et al., 2006) other research shows higher levels of violence (Leung and Ferris, 2008) , and absenteeism (Foreman-Peck and Foreman-Peck, 2006) and lower levels of academic attainment in larger schools (ibid). Larger schools are often considered as being more economical to run. On this point, some studies have shown that small schools can often be more cost effective through a reduced drop-out rates (Howley, 1997) while small to medium schools may be in a better position than larger schools to balance costs and benefits (Andrews et al., 2002).

In outlining the optimum conditions for the primary school of the future Darmody et al (2010) contend the following:

> "There are obvious economies of scale attached to larger school size. However, international research and stakeholder perspectives generally favour small to medium-sized schools for educational and social reasons. Primary schools in Ireland are small by international standards, with the vast majority having fewer

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than 400 pupils. Stakeholders generally favour having one or two classes per year group, which would translate into an upper limit of sixteen classrooms per school. However, they also point to the challenges associated with the necessity of having multi-grade classrooms in very small schools" (p. 106).

Strange and Banning (2001) discuss the importance of human scale in the design of positive campus environments. Quoting Kuh et al (1991) they argue that greater participation and involvement among students is experienced in human scale settings:

"The concept of human scale is multifaceted. Taken together, human scale properties permit students to become familiar with and feel competent in their environment. In this sense, human scale environments engender a sense of efficacy and confidence….." (p.110).

While the material presented above argues for smaller schools, or at least the breakdown of larger schools into more intimate and personalised units, there is very little said about the minimum size of a school or campus. Darmody et al (2010) speak about the lack of space either within the school, or externally in terms of playgrounds or sports facilities as a major complaint among teaching staff. As discussed earlier (Department of Education and skills (IRL), 2005) many schools have outgrown their buildings and in many cases there is now a need for more space to teach the curriculum.

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The Department of Education and Skills (henceforth referred to as DES) has guidelines around site selection for primary schools and recommends: a site area of 0.71 Hectares for a 4 to 8 classroom two storey school; 1.04 Hectares for an 8 to 16 classrooms; 1.5 Hectares for an 16 to 26 classrooms; and 2.025 Hectares for a 24 to 32 classroom school (Department of Education and Skills (IRL), 2012b). For a post primary school, which is measured in pupil numbers, it is recommended to have a site area of 3.13 Hectares for a 500[8] pupil, two storey school; a site area of 3.82 Hectares for 750 pupils; while a site area of 4.57 Hectares is recommended for a 1000[9] pupil school.

[8] For the purposes of this research anything below 500 pupils will be consider a small school
[9] While anything above 1000 pupils will be considered a large school

The inclusion of SEN students in mainstream classrooms and schools will inevitably increase space requirements. For instance, based on the DES 'Primary and Post Primary Specialist accommodation for pupils with Special Educational Needs' (Department of Education and Skills (IRL), 2012e) the DES recommends a total floor area of 470m2 and 300m2 external area, plus 6 car parking spaces for 16 pupil special needs unit (SNU) in a primary school. A 12 pupil post primary SNU requires 552m2 with 300m2 external area, plus 6 car parking spaces.

While the DES site selection guidance states that school size is driven by local need and projected enrolments, the joint Department of Environment, Heritage and Local Government (henceforth referred to as DEHLG) and DES code of practice for local authorities states that an 8 class primary school is the typically the minimum size for a new school, while rapidly growing urban areas may require a minimum size of 16 classrooms (Department of Education and Skills (IRL) and (IRL). 2008). In terms of maximum school size, the DES does recommend that if a primary school is greater than 24 classrooms, it should be broken into two schools sharing one site. (Department of Education and Skills (IRL), 2012b).

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To refer back to the question raised earlier about a minimum school or campus size, there is little literature or research which recommends a minimum threshold for a school or a campus population, beyond the DEHLG and DES code of practice for local authorities referred to earlier. However, more research is warranted in order to address issues such as; the certain critical mass of students required to create a vibrant, diverse campus; in the instance where the campus is embedded and fully integrated into a dense urban neighbourhood as community facility, the impact of this location to provide the required critical mass regardless of the campus size; and, where the campus is in a low density, suburban or rural site, the need to have a minimum number of students to create the critical mass required for a meaningful campus community. So far this current research has not uncovered enough evidence to suggest a firm answer about whether there is a desirable minimum campus size and as such, it is suggested that further research is required in this area.

4.5.4. Campus Layout, Key External Spaces and Architectural Design
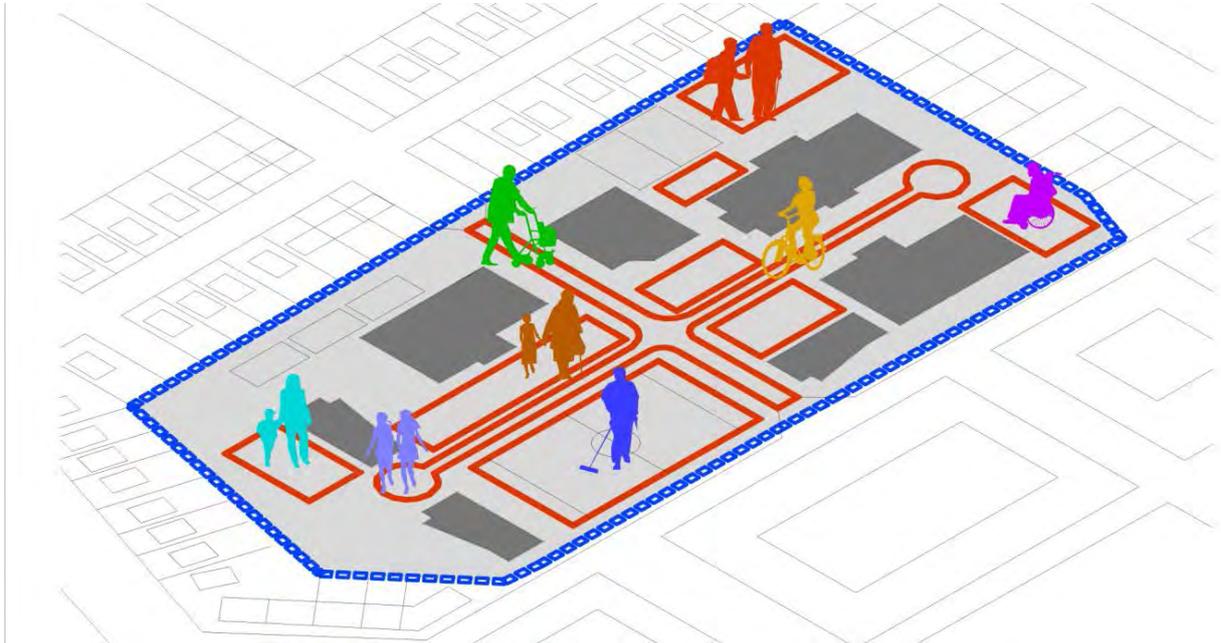
As previously mentioned, Section 3.1 has examined the needs of a range of users, both school-based and users from the community, and has set out the key design issues to considered. These design issues will help to inform the material presented in the following sections relating to campus layout, key external spaces and architectural design.

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Overall Campus Layout

Strange and Banning (2001) refer to Miller and Banning (1992) and highlight four criteria for the design of positive campus environments, namely; the "call for community, the call for territory, the call for landscape, and the call for wayfinding" (p.28). The sense of community is helped by gathering spaces, sitting areas and green spaces. Territory is about calling a place your own and is provided by distinct spaces, while landscape is helped by legibility (safety) and mystery (opportunity). At a more detailed level the presence of water features (Ulrich 1983) is often cited as a positive attribute on a campus setting. In general, views to natural landscapes have shown to be beneficial to human health and well being in various settings including hospitals and schools (CABE 2002, Ulrich 1984, Butterworth 2000). A campus layout which promotes social spaces, personal spaces, and 'third spaces' (i.e. a hangout space) contribute to good campus design.

As discussed earlier, Fielding (2006) promotes the idea of the community-integrated, small learning communities with permeable edges. Commenting on how the shopping centre or mall now functions as a social space, he challenges communities to compete with this to "plan our schools and communities to become part of a learning community that is healthier, more fun, better for our urban and town streetscapes, and accessible to all"(p4). He outlines the following steps to creating positive small learning communities:

- "Upgrade libraries to Global Learning Centers. Provide community access to technology, public cafés, display spaces for student and professional work, and community meeting spaces.
- Provide "incubator" shops/classrooms/studios managed by partnerships with local and national business/organizations.
- Create outdoor amphitheatres serving student and community events.
- Provide colourful landscapes with local trees and planting, flanked by walking, running, and biking trails with stopping places for exercise equipment, water fountains, benches, and outdoor lighting" (p.5).
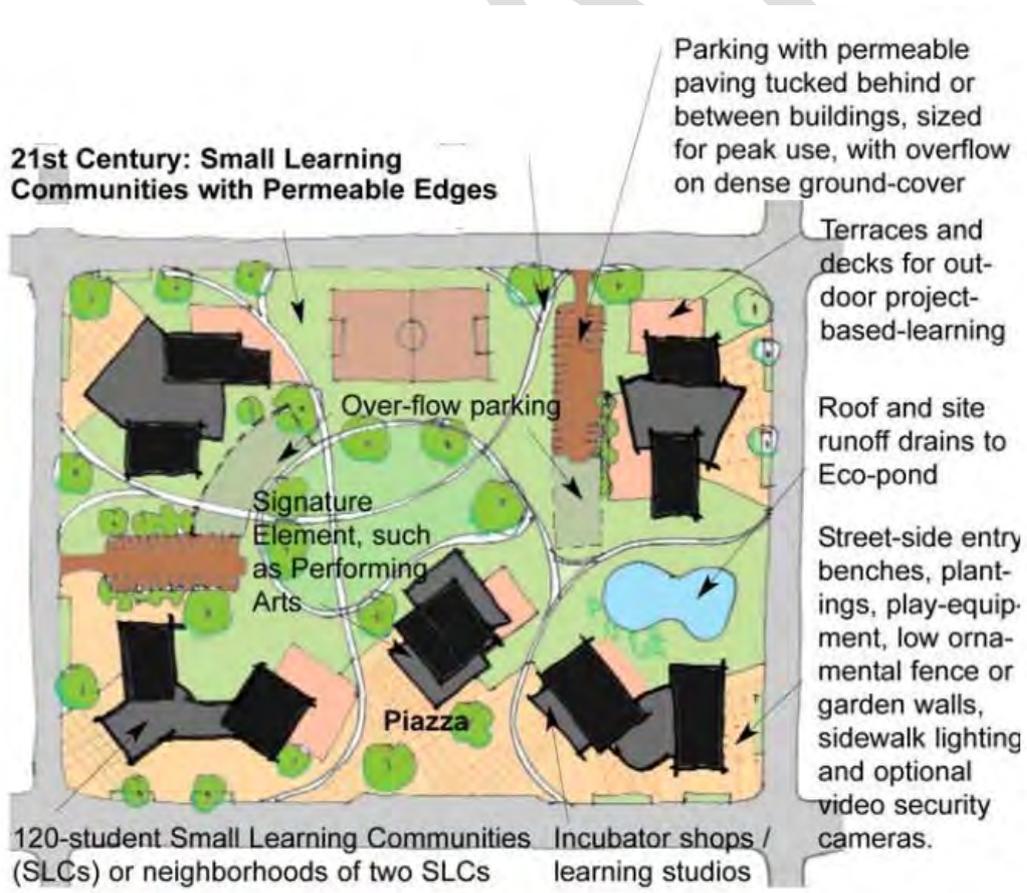
Figure 15 – Fielding's small learning community (Fielding 2006 p.4)

Figure 15 above illustrates Fielding's vision of a small learning community which has an open boundary to the community, distributed car parking, public walking and bike tracks, and a central green area.

In terms of site layout and the quality of external space, Fielding's sketch layout shown in Figure 14, or the Dandenong High school pictured earlier, represents a different approach to that experienced in some Irish schools. In many of these situations the car parking is in a central and dominant position, often taking up prime space on the site while social spaces or playing fields are consigned to the periphery, as illustrated in Figure 15 below.

Figure 16 - School layout showing car parking dominance

The CABE criterion for 'Site Plan: making the best use of the site' (CABE, 2008) also contains issues and questions relevant to the overall layout of the UD SEC. The first theme 'Enhancing the character of the site' poses a number of questions about the scheme such as: the design fostering a sense of place; the enhancement of the local topography, existing landscape features; and the micro-climate and ecology of the site. In this criterion CABE also highlight the importance of the design providing shelter from the prevailing wind, rain and sun while relating well to buildings outside the site.

Key Campus Spaces – Outdoor education, social and play spaces

The third CABE criterion for successful school design 'School grounds: making assets of the outdoor spaces'(CABE, 2008) contains a theme which focuses on the 'Relationship between the grounds and the buildings.' This theme contains issues which focus on: creating a sense of place using the grounds and planting; the relationship between exterior spaces and the building form; the enhancement of micro climate; and the creation of views to the surrounding landscape. CABE recommend a rich sensory environment which creates shelter and contributes to the overall sustainable strategy for the site.

Another theme within the criteria aims to support 'Social spaces and play' and here CABE advocate that safe outdoor space should provide for a variety of 'different student social activities, interest ranges and group sizes; should allow imaginative and creative play; and facilitate both informal and formal outdoor dining.

'Outdoor learning' is included as part of this third criterion – i.e. 'School grounds: making assets of the outdoor spaces' - and in this context CABE challenge the designers to design space that supports the curriculum and the school's pedagogy. Links between the indoor and outdoor learning environments are encouraged while the growing of food on the school grounds is promoted.

In terms of 'Physical activity' CABE pose questions around the provision of appropriate sports pitches, the opportunities for winter activities, and the integration of sports facilities into the landscape strategy. It is also questioned whether these facilities are available to the wider community or whether other local facilities are being considered for use.

CABE also ask an interesting question about whether the school provides for "opportunities for challenge and risk taking in the grounds" This whole area of risk and the design of public places has been examined by CABE in another report (CABE, 2007c) and they have found that often times 'risk aversion' based on fears rather than evidence has a negative impact on the quality of the built environment. This is reinforced by Gleeson and Sipe (2006) who discussing child-friendly cities refer to the 'bubble wrap generation' or the 'pampered prisoners' arguing that many children are being deprived of recreation and self expression due to increased parental anxiety and control (p.1).

In terms of key spaces, The CEUD at the National Disability Authority series of Booklets 'Building for Everyone – A Universal Design Approach' (BfE), Booklet 7 titled 'Building Types' provides guidance for parks, gardens and courtyards. A well designed UD SEC will contain a range of communal, age specific and more intimate spaces. According to BfE Booklet 7: Building Types, 'gardens and courtyards should provide relief from the activities taking place in the adjacent spaces. Changes in light and shade, the sound of water, and landscape features that stimulate the senses should be included, especially in terms of people with various sensory or cognitive impairments'. Trees, shrubs and planting can be used to soften the acoustic environment, which is of particular relevance in schools with young children, as young children naturally create a high level of sounds. This should be carefully considered where classrooms open onto a courtyard, and in an environment where certain people such as those on the autistic spectrum may experience sensory hypersensitivity (see Section 3.2.2). To deal with this the AusAID guidance suggests that designers:

> "locate quiet classrooms and reading rooms away from noisy activities such as music classes, physical education activities, playgrounds and workshops (if unavoidable, install a sound barrier or orient windows and doors so they do not open directly into the noise source)" (p.80).

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These spaces should be designed and maintained to support maximum biodiversity which can be used as learning support spaces for the students. Food growing should also be considered, including means through which it can be incorporated into the curriculum or extra-curriculum activities. As mentioned earlier, direct views to natural features, such as trees, plants, the sky, among others, can have a soothing effect on building occupants and direct views and contact between the interior spaces and the exterior should be accounted for.

Careful consideration must be given to circulation areas and other surfaces to ensure they are accessible and usable by all people, while good wayfinding and signage should be adopted for legibility and orientation. Raised plant beds provide better access to people using wheelchairs, people of small stature, or those with restricted mobility, and can be used not only to allow direct access to planting in order to enhance sensory and tactile experiences, but also to allow people to work on the raised beds, for recreational and/or educational purposes.

Playgrounds, play structures and equipment are also covered in BfE Booklet 7: Building Types, emphasising the important role of play in social, physical and emotional development. These spaces should encourage adventure, curiosity and play; furthermore, the spaces should present a challenge through activities which cater to a range of abilities.

Darmody et al (2010) point out that while little research has been conducted into outdoor spaces in schools there is still research (Hayhow, 1995; Tanner, 2000) that illustrates how external space can contribute to learning and socialisation across diverse ages and abilities. They also refer to Carty (2007) who contends that children perceive spaces as play spaces when they themselves are the main users, while classrooms are seen as work spaces because they are controlled by teachers. Darmody et al (2010) recommend the following:

- "Outdoor spaces with a variety of surfaces (including soft non-grass surfaces, especially for younger children)
- A school garden and other habitats to be included in the landscaping of the site;
- A variety of playground and sports equipment to cater for the needs of different pupil groups;
- In addition, principals and teachers should be encouraged through professional development to use outdoor space as a learning zone." (p.109)

Rudd (2008) argues for a more holistic approach to play spaces where collaboration with the local community creates spaces that are mutually beneficial to both. He points to the UK 'Best Play' guide which was created by Fields in trust along with PLAYLINK and the Children's Play Council which has the following objectives:

- the provision extends the choice and control that children have over their play, the freedom they enjoy and the satisfaction they gain from it

- the provision recognises the child's need to test boundaries and responds positively to that need

- the provision manages the balance between the need to offer risk and the need to keep children safe from harm

- the provision maximises the range of play opportunities

- the provision fosters independence and self-esteem

- the provision fosters children's respect for others and offers opportunities for social interaction

- the provision fosters the child's well-being, healthy growth and development, knowledge and understanding, creativity and capacity to learn" (p.28).

Figure 17 - Play space created by Martha Shwartz Partners (Rudd, 2008)

The advice offered above helps in creating a more child-friendly environment but in the context of the SEC, especially if it contains a special school, these child friendly spaces will also need to take into account the needs of SEN children.

The Department of Education and Skills 'Planning & Design Guidelines Primary & Post Primary School Specialist Accommodation for Pupils with Special Educational Needs' (Department of Education and Skills (IRL), 2012e) provides guidance for the design of SEN facilities as part of a mainstream school. It acknowledges the challenges around designing environments that will suit both mainstream and SEN students. For example:

"the design of learning spaces in educational buildings should stimulate pupils. However consideration needs to be given to pupils with special educational needs who may also have sensory sensitivities. Some pupils with Autistic Spectrum Disorders (ASDs) may display extreme sensitivity to sensory stimulation, for example, sound, light, colour, smell and pattern"(p.10).

This integration demands a thorough consideration of many location, planning and design issues, including but not limited to, for example the avoidance of locations with rivers or ponds that might be particularly dangerous for pupils with special educational needs who may

not be aware of such hazards. External play areas should ideally be close to and directly accessible from the SEN classroom and contain both hard and soft play sections. The needs of students with photophobia should be considered by providing shaded outdoor areas and the avoidance of playground surfaces that contain highly reflective particles. A quiet area may be required for vulnerable students while the yard should provide no hidden areas where SEN students can be out of view. The boundaries of the play area should be secured using 1.8 m high fencing which includes gates with tamperproof latches.

The guidance from DES suggests that water and electrical services should be provided for a water feature while a wheelchair accessible sensory garden should be provided within the secure play area if possible. On the latter point, the DES guidelines state the following:

> "A sensory garden stimulates the senses. Hard and soft landscaping – fountains, raised wheelchair accessible planted beds, pergolas (climb-proof), wind chimes, foot chimes, bird tables, etc., can be used in a variety of ways to provide experiences involving seeing, smelling, hearing, and touching.. Pupils should be encouraged to interact with the plants, touching and smelling them. Space to sit down, picnic, watch wildlife, listen to sounds, etc should be considered within the layout" (p.13).
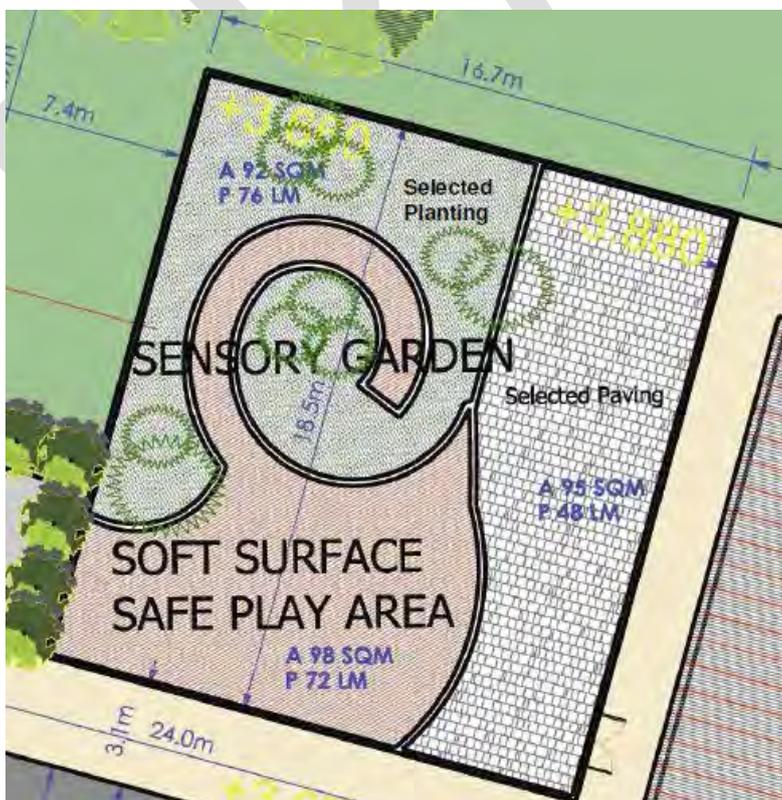
Figure 18 - Sensory garden (Department of Education and Skills (IRL), 2012e)

Notwithstanding the need to protect certain SEN children who may more vulnerable to the 'rough and tumble' of normal child's play, there is still a need to strive towards greater integration of all children on the campus as a way to break down barriers. As discussed in Section 3.3, Edwards (2006) research into the 'Sharing Spaces Project' demonstrated the link between improved school grounds and improved student welfare and co-operation in the school grounds. Improving co-operation between all students regardless of age, size ability or disability, is critical to achieving greater student integration, particularly between SEN and mainstream children. There is some evidence that the pupil-centred design process experienced in the 'Sharing Spaces Project' resulted in improved social and behavioural conditions in the school grounds. It is therefore reasonable to assume that such a process may be helpful for empowering students and designing for greater integration among all students in the SEC context.

Architectural Design – Appearance, scale and materials

So far, this section has largely examined the quality of key open spaces within an SEC, but these spaces are typically framed and contained by campus buildings. The design quality of these buildings including: building mass; height; scale; fenestration; materials; details and finishes; colour and other similar design characteristics, will influence the overall appearance of the campus and must be carefully considered in the context of a UD SEC. Earlier in this chapter, Section 4.4. looked at creating a child and community friendly educational environment. In this context age appropriate design was discussed along with the need to balance this with a community friendly approach that caters to a wide range of ages and abilities throughout the community. While this section acknowledges that age appropriate design will be required, it also suggests that UD can create a high supportive baseline which can be adapted for specialized needs.

In all cases the architectural design of an educational environment should be determined by a range of factors including the brief, site conditions or the local context. However, as outlined in Section 4.5.3 and earlier in this current section, the idea of a human scale environment has been discussed in the literature as an important design consideration. Referring back to Strange and Banning (2001) and Kuh et al (1991),the importance of human scale design is again emphasised :

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"The concept of human scale is multifaceted. Taken together, human scale properties permit students to become familiar with and feel competent in their environment. In this sense, human scale environments engender a sense of efficacy and confidence…..Human scale environments are not over-crowded, blend in with the natural surroundings, and accommodate small numbers of people in structures usually no more than two or three stories above ground… For example, smaller, low rise dormitories seem to be more cheerful, friendly and relaxing, and spacious than larger high-rise dormitories. A greater sense of helping behaviour are exhibited by residents of low-rise units when compared with counterparts in high-rise units. In addition, cohesion and social interaction characteristic of small living units seem to mediate tensions and stress common to academic communities" (p.110).

In terms of overall architectural quality, the fifth CABE criterion for successful school design 'Buildings: making form, massing and appearance work together'(CABE, 2008) suggests that "A successful scheme will be a coherent piece of architecture in its own right. Elevations, spatial organisation, materials and construction methods should work as part of an overall design idea and contribute to the quality of the scheme." In relation to this criterion CABE question whether there is a coherent design concept that ties the design together. In terms of massing and form they question whether form and massing is appropriate to the location, whether it been considered from an educational point of view, and the relationship between buildings on the site. With regard to appearance CABE ask whether the elevations reflect the concept and create an inspiring building; how the entrances have been defined; and how colour, pattern, graphics and texture have been integrated. The final theme in this criterion relates to construction and material. Here CABE refer to how materials should contribute to the quality of the scheme; are durable and easily maintained; and how they contribute to the character of the scheme.

Flexibility and adaptability

The final issues to be considered in this section revolve around adaptability and flexibility of a UD SEC to ensure it can evolve in line with various drivers of change including: demographic change; student, staff and community needs; pedagogical development; and societal and technological change.

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Firstly, in the context of local demographic change, Section 2.3.4 argued that the negative impact on schools arising from the residential life cycle of typical suburban schools could be ameliorated by ensuring that schools are part of compact, mixed-use communities with a diversity of household types. This pattern of urban development, which is frequently experienced in many older European cities, tends towards greater heterogeneity and will often have a higher density and a more diverse mix of family types and age groups. These communities are not prone to the same degree of growth and decline in the school-going population as witnessed in homogenous neighbourhoods, and therefore offer greater stability in terms of maintaining attendance across all age grades in local schools.

Notwithstanding the above, demographics and the other drivers of change listed above will continue to exert pressures on an SEC and must be accommodated through flexible and adaptable internal and external spaces. In general terms the spatial, structural and services design of a school building will determine its flexibility and adaptability, and this has been described by Clynes (1990). In this regard CABE set out its ninth criterion for successful school design - 'Long life, loose fit: creating a school that can adapt and evolve in the future.' (CABE, 2008). This proposes day to day flexibility for various teaching and learning activities, long term adaptability to facilitate organisational and pedagogical changes over time, and the capacity for school expansion.

While this flexible and adaptable approach can cater for future spatial, physical and technological change, this approach is also necessary to accommodate current pedagogical developments, which present a more dynamic, personalised and diverse form of education. To facilitate this educational transformation, Atkins calls for the creation of innovative learning spaces (Atkins, 2011p.26), which among other design criteria include spaces that;

- Promote learning for students, professionals and the wider community through active investigation, social interaction and collaboration.

- Support a full range of learning and teaching strategies from direct explicit instruction to facilitation of inquiry to virtual connection and communication.

- Support disciplinary and interdisciplinary learning.

- Move beyond the simplicity of flexible open spaces to integrate resource rich, special purpose spaces with flexible, adaptable multipurpose spaces to provide a dynamic workshop environment for learning.

- Support individual, 1 to 1, small group and larger group learning.

- Facilitate learning anywhere, anytime, by any means, through seamless access to ICT, distribution of learning resources for ease of access in learning spaces and accessibility beyond the traditionally defined school day.

The above design requirements for contemporary educational spaces not only demand building flexibility and adaptability at many levels, but constitute a pedagogical approach where flexible teaching and learning that can be adapted or personalised for individual need are core principles. This approach is now materialising in a number of ways including: the creation of small learning communities as described earlier by Fielding (2006); the creation of a 'house' or sub-school within schools (Atkins, 2011); the combination of large flexible shared open spaces for team teaching or larger groups and more intimate enclosed spaces for individuals or groups. Nair et al (2009) have developed a series of school "design patterns" with the first pattern as 'Principle Learning Areas - Classrooms, Learning Studios, Advisories and Small Learning Communities'. This pattern describes a flexible spatial approach suitable for a wide range of age groups that can be configured according to need. Nair then reinforces this flexible approach through pattern 14 – 'Flexibility, Adaptability and Variety' which reflects the overall educational and design ethos presented by the authors.
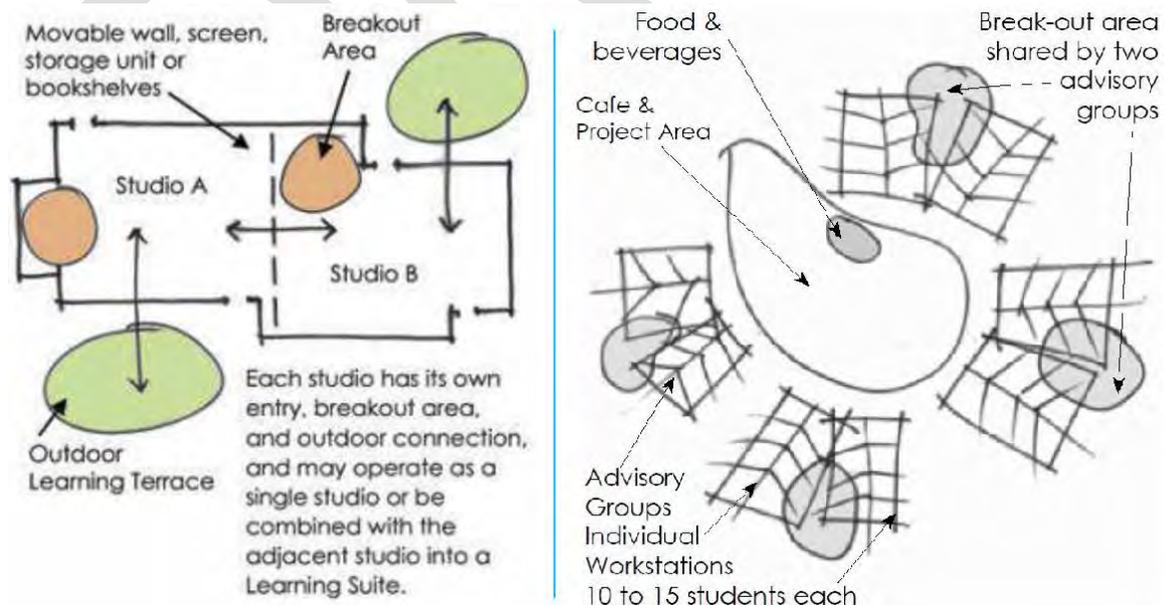
Figure 19 – 'Learning Studios' (left) and 'Advisories' and break-out areas gathered arounf a communal café and project area (Nair et al 2009)

In concluding this section about flexibility and adaptability, there are three key issues relevant to the design or overall layout of a UD SEC. Firstly, a central location within a diverse and compact neighbourhood will ameliorate the negative effects of household life cycle and therefore mitigate obsolesce, school closure, or the need for it to be converted into a radically different use. Notwithstanding this, there will always be some level of change, therefore the second issue regarding a 'long life loose fit' approach will facilitate changes and extensions to schools and campuses. Thirdly, the fact that many contemporary pedagogical practices require a variety of spaces that combine open plan areas with smaller enclosed spaces, all within a flexible framework. It can therefore be argued that if school design is informed by contemporary pedagogical practices that they will act as open systems and will therefore be inherently flexible and adaptable.

"Infrastructures, in this context, should be regarded as open systems, well connected to existing networks of learning, both virtual and physical, memorable spaces in their own right that are not derived from any one model of teaching and learning. They should offer options to create micro-environments which are easily appropriated and controlled by their users, while at the same time give a feeling of connectedness to a greater whole. By leaving as much space as possible open for negotiation between function and form, architecture could once again become a social art." (Kuhn, 2011p.23)

4.5.5. Moving around the campus
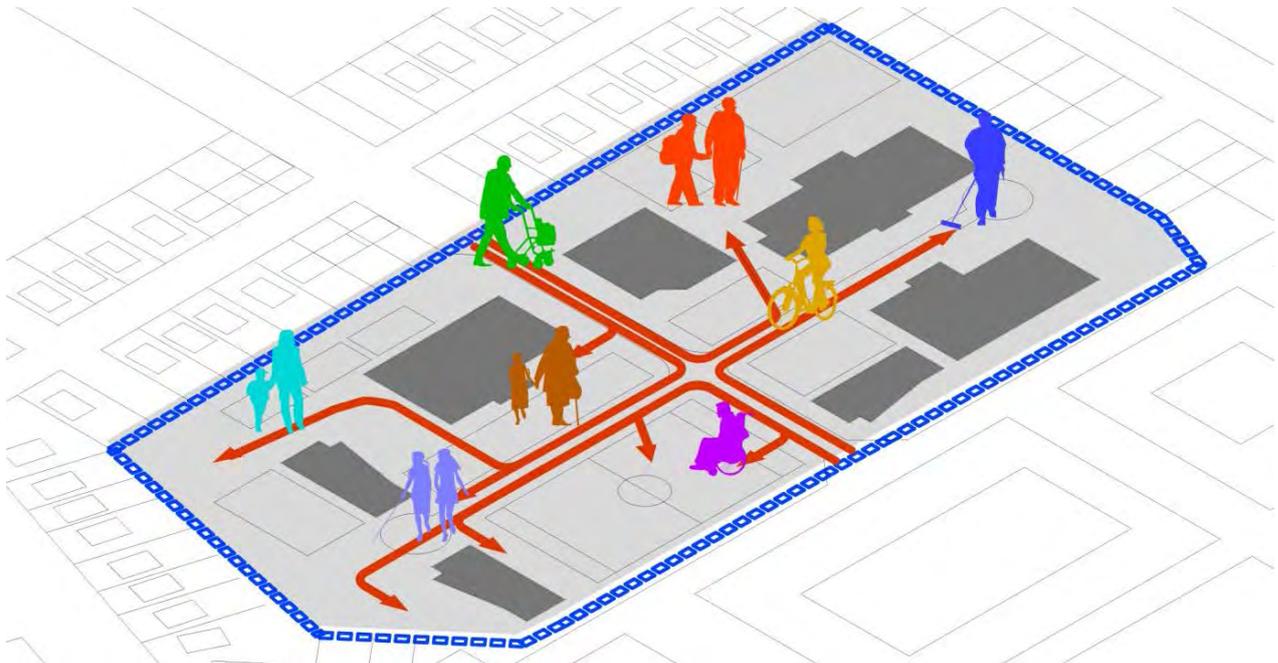
As discussed in the Section 4.6.3. Building for Everyone – A Universal Design Approach'
Booklet 1: 'External environment and approach' and Booklet 9: 'Planning and policy' (CEUD,
2012b, CEUD, 2012c) contain much guidance regarding the UD approach for the external
environment. Booklet 2: 'Entrances and horizontal circulation' also describes the UD
approach to the external entrance of a building this will give some additional guidance to the
external circulation areas directly adjacent to an individual building.

The DES 'General Design Guidelines for Schools (Primary & Post-primary)' TGD -020
(Department of Education and Skills (IRL), 2011) builds in universal access into the design
philosophy and states that "Provision should be made for disabled access from the site
perimeter to the school, with universal access routes to all main building entrances." (p.17)
In providing Universal Design guidance across the full spectrum of the built environment in
New York, Levine (2003) distinguishes between 'accessibility' and 'Universal Design', and
consequently breaks down the guidance between the two. She argues that accessibility
focuses mainly on the removal of barriers and provision of access for people with disabilities,
while UD is about improved usability for all.

In discussing the design of public urban space, Levine(2003) states that the key design goals for
the UD of external spaces should address individual needs and preferences, ensure the

security and safety of all users during all times of normal use, and provide a continuous path with no obstacles from the site access points to all destinations on the site.

In what Levine refers to as 'Universal' she recommends, among other things; direct access from all access points to all facilities and the separation of pedestrian, vehicular and bicycle/skating pathways with clearly marked boundaries. In addition she proposes; seating areas for resting and appropriate lighting along pathways (i.e. does not create hot spots or glare); the use of contrasting colours, textures or materials to alert users to hazards; and the avoidance of highly reflective surfaces. In terms of UD and ICT she refers to the need for emergency communications equipment at strategic locations, and video surveillance as a deterrent in dangerous areas.

While Levine is dealing with public urban space, as opposed to educational environments specifically, the guidance informs the SEC on many levels. It is also interesting that she chooses to deal with accessibility and UD separately in the recognition that UD is a more integrated and holistic approach that caters to all users.

Referring specifically to the design of exterior circulation routes in educational environments AusAID (2013) recommends, among other things, that the design of the school grounds should:

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- "provide external paths with a smooth, hard surface to facilitate safe movement from the school entrance to school buildings, between buildings, to outdoor teaching spaces, to playgrounds and to toilets.

- provide clear signage and visual references so children with low vision and blindness can navigate easily" (p.80).

As an example of how the UD measures advocated by Levine and AusAID can be used effectively in a campus environment, it is worth noting the case of Kutztown University in Pennsylvania, USA. Built on a hilly site, the design team used the UD approach to deal with the difficult terrain and to successfully design the external circulation. According to Salmen (2011) the redesign of the external routes on the campus resulted in the provision of at least one accessible route, and in most cases multiple routes to each destination. This accessibility was then supported by college maps, pamphlets and signage provided onsite and also on the college website, which indicated to all users where to find the accessible routes and accessible entrances to buildings.

As discussed previously, the CABE criteria for successful school design (CABE, 2008) contain many issues relating to external circulation and school grounds. Many of these have been referred to in the earlier sections but some, which relate directly to external circulation areas, are worth highlighting. CABE discuss the need for clear external circulation areas which balance the needs of different users; provide safe on-site pedestrian routes; and present a clear external circulation diagram. They also highlight the need to plan for deliveries and refuse collection; provide all year round routes to sports facilities; create unobtrusive car parking; and provide circulation routes that avoid disruption to learning spaces.

Many of the CABE criteria referred to above and detailed elsewhere in this report adopt an approach very similar to UD. Across all 10 criteria the CABE guidance demonstrates an inclusive, multi-faceted concern with design quality, that not only supports educational goals, but does so in a holistic, child and community-centred manner that seeks to fully integrate all uses and users on the school grounds.

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Providing the level of campus integration promoted in this chapter requires a whole-site approach to balance the needs of all users, and greater priority to pedestrians and cyclists, than that usually afforded. The concept of shared space design has already been mentioned previously in Section 4.5.2, here it was demonstrated how a Home Zone has been used successfully to integrate housing and schools in a pedestrian friendly neighbourhood. The Adamstown Street Design Guide (South Dublin County Council, 2010) carefully outlines a set of measures that can facilitate this approach, including the designation of 'side streets' and 'back streets' within the overall hierarchy of the urban structure. These minor streets are primarily for local access and certain streets have been designed using shared space measures to create child-friendly spaces adjacent to the schools.

Figure 20 - Cover image from Adamstown Street Design Guide (South Dublin County Council, 2010)

Beyond the immediate environs of the SEC, shared space design could also be considered within the entire campus area itself. This approach may be suitable on a number of fronts including;

- A campus often has a definable boundary and distinct entry / exit points and therefore creates a clearly delineated zone which creates the awareness in drivers and cyclists that they are in a specific environment.

- The overall concept of campus sharing has the potential to engender an overall philosophy which may create the right conditions for shared space design and support the intentions of this approach.

As discussed previously in Section 4.5.2, shared space design focuses on place-making and pedestrian prioritisation over traffic movement, and is therefore beneficial to the UD SEC concept. Research conducted on behalf of CEUD/NDA titled 'Shared Space, Shared Surfaces and Home Zones from a Universal Design Approach for the Urban Environment in Ireland' (Grey et al., 2012) contains a range of findings and many of these are applicable to the educational setting. Applying shared space design principles to the main circulation routes, within and adjacent to the campus, has the potential to create a calm, more child and community centred space, but careful consideration should be given to the following issues:

- **Awareness and education:** the intention behind shared space design must be clear to all campus users and this may require ongoing education for all students, staff, community member, or other users such as school bus or delivery vehicle drivers. This process must make people aware of how best to use the space and their rights and responsibilities, with

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particular emphasis on vulnerable pedestrians such as young children, people with disabilities, or older people.

- **Pedestrian and vehicular gateways**: the transition in movement from a standard street to shared space setting, adjacent to, or with an SEC must alert pedestrians, cyclists and drivers that they are entering a different environment. The use of transition zones and gateways created through raised surfaces, change of materials, carriageway narrowing, or the use of t tactile surfaces for pedestrian will deal with this issue. These transition zones must also be universally understandable by children, those with visual and cognitive difficulties or older people.

- **Comfort zones:** The creation of comfort zones that cater exclusively for pedestrians approaching, entering and moving around the campus will help young children or more vulnerable pedestrians. This comfort zone can be delineated using a traditional kerb, or possibly the combination of tactile paving and well placed street furniture such as seating, lighting or bike locking facilities.

- **Surface treatment**: Within the SEC it may be helpful to have a consistent surface treatment to identify shared spaces and associated comfort zones. This may include: tactile paving; the use of distinctive colour; tonal contrast or textural differences to differentiate one kind of space form another.

- **Kerbs:** shared space design schemes will often remove the traditional kerb to avoid segregation and delineation which is believed to prioritise the vehicle. The intention is to encourage pedestrians to occupy the entire carriageway thus forcing motorists to adapt their behaviour accordingly, reduce speed, drive with more caution and give way to other road users. (MVA & Department for Transport UK, 2009). If the removal of kerbs is deemed appropriate in an SEC, then viable replacement delineators will have to be used in the absence of traditional kerbs; this is of particular importance for people with visual difficulties. Studies carried out by the MVA Consultancy in the UK (MVA Concultancy, 2011a) which looked at newly laid tactile paving on the shared surfaces on Exhibition Road in London concluded that corduroy paving 800 mm wide was reliably detected by participants with visual difficulties.

- **Pedestrian crossings**: when approaching any school, controlled crossings offer safety and comfort, especially for younger children. Many shared space schemes remove these and rely instead on courtesy crossings where cars voluntarily give way to pedestrians.

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However the success of these is contingent upon the education of motorists and cyclists, proper public awareness and a change in driving culture, and therefore must be carefully considered in the context of an SEC. Where courtesy crossings are appropriate some form of way-finding techniques, or directional tactile paving may be required to direct people with visual difficulties or those with cognitive difficulties towards the crossing. Such way-finding elements were also discussed by many stakeholders in terms of directing certain pedestrians towards entrances, exits and other key parts of the environment.

- **Tactile paving:** shared space design relies heavily on the proper use of tactile paving to help delineate pedestrian zones and traffic zones, and to clearly mark pedestrian and vehicle crossing areas. Tactile paving needs to be very carefully located, properly installed, and requires absolute consistency in its use within the context of an SEC to avoid confusion.

- **Traffic volume and traffic speeds:** finally, traffic volume and traffic speed approaching, entering and circulating within an SEC are critical to the safety and comfort of all users. Guidelines from the UK suggest that a maximum design speed of 15 mph is preferable within shared space design, however, as this translates to 24 km/h, many consider to be too fast. The Home Zones in Adamstown which connect the housing to a school across the street, sets out maximum speeds of 10 km/h and this provides a very safe pedestrian environment adjacent to the school.

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While shared space design has its advantages, there are objections from many users to the removal of traditional pedestrian and vehicle segregation on safety and comfort terms. These challenges have been highlighted in the UK (Thomas Pocklington Trust, 2011) while the National Council for the Blind of Ireland (NCBI) states that shared space design "places the emphasis on eye contact and person-to-person negotiation between those using the space to decide on right of way" and therefore presents challenges for people with visual difficulties (NCBI, 2010). The NCBI also express concerns about the removal of kerbs from shared space design as typical footpath kerbs provide clear markers and boundaries for those using canes or guide dogs and the lack of such division can cause disorientation and anxiety (NCBI, 2011).

Considering the variety of users who may potentially use an SEC, including young children, people with disabilities, or older people, shared space design in this is therefore a complex design issue. In line with the collaborative and stakeholder driven UD approach advocated in

this research, the implementation of any shared space design should only be carried out in close consultation with students, staff and the local community to ensure that it supports the educational and community centred goals of the UD SEC.

This preceding section has examined the many dimensions associated with moving around on an educational campus and has attempted to draw in relevant UD literature and other best practice to inform this aspect of the SEC. The exterior circulation areas of an educational environment are not merely about getting from one part of the campus to another, they should also become an integral part of the social space of the campus and help connect the campus to the community. The shared space design approach presented in the latter part of this section seeks to redress the balance between the pedestrian and the driver, not just within the campus itself, but also in the community spaces that surround the campus and afford approach and access. A carefully design shared space approach, if carried out in consultation with all users, has the potential to support the overall concept of sharing and shift the emphasis from vehicular movement to place making.

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4.5.6. Technology on the campus
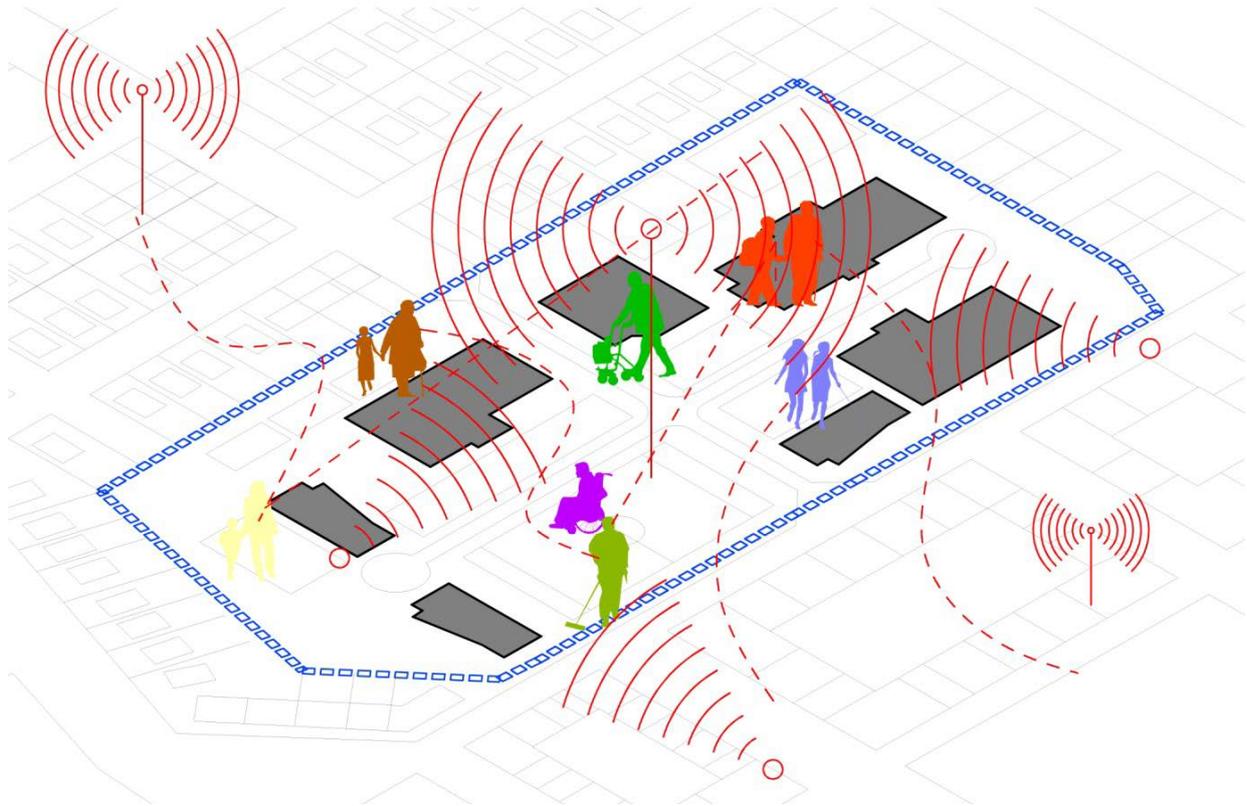
Information Communication Technology (ICT) is being increasingly used to help people navigate from one place to another. Indeed, Atkins (2010) suggests that Radio Frequency Identification (RFID) or Global Positioning Systems (GPS) technology could be used to imbed information in the built environment which could then be read by vulnerable pedestrians using a detection device such a smart phone.

Figure 21 - RFID and GPS technology as a navigation aid to those with visual difficulties (Atkin, 2010)

Willis describes an RFID information grid to assist people with a visual impairment with navigation and wayfinding in a campus setting (Willis and Helal, 2005). This involves the

installation of RFID tags along external circulation routes and an RFID reader integrated into a shoe and a long cane. While this system was focused on navigation for people with visual impairments, Willis, suggest other uses such as "aid in automated navigation for electronic wheelchair users, and supports service robotics that can use the RFID tags to determine exact location (p.1)

Mobile smart phone applications (apps) such as Navigon already exist in the market place and are popular with people with visual difficulties. This app transforms a smart phone into a mobile navigation device, providing text-to-speech voice guidance, pedestrian navigation, turn-by-turn route guidance and a take me home function (Leibs, 2012). Other smart phone apps such as NavPal are currently under development by researchers at Carnegie Mellon University, it combines GPS technology with audio and tactile cues to facilitate navigation (Pittsburg Post Gazette 2012).

These technological advances will inevitably benefit many users with sensory, mobility or cognitive difficulties as they will enable users to navigate through their environment with greater ease, comfort and safety. Whether it is through RFID or GPS technology directly linked to embedded technology in the street surface, walls or objects, or other assistive devices, users will be able to detect obstacles, dangers and safe routes in a far more reliable manner. Such technologies may be employed in areas functioning as Shared Space to help vulnerable pedestrians identify comfort zones, gateways to and from Shared Space, courtesy crossing points or street furniture and planting associated with shared space design.

However Atkins (2010) acknowledges that technology such as this could only be used to provide additional information rather than replacing traditional hard infrastructure way-finding mechanisms. If technology were the primary way-finding tool it would need to be unrealistically reliable or run the risk of leaving vulnerable pedestrians stranded in an unfamiliar and unsafe environment.

In terms of external activity and play spaces, Rudd (2008) examine ways in which technology can enhance these spaces as multi-sensory, interactive learning environments for children. Technologies used in the external environment include coloured lighting which changes patterns or moods, lighting or digital projections, proximity, or accelerometer sensors which trigger an object to react a child's behaviour, or acoustic devices which emanate sounds if they are touched.

Rudd presents some examples of this kind of technology such as Bishopswood Special School in South Oxfordshire in the UK, which has installed a dynamic sensory garden which uses seismic sensors set into coloured steps and which are activated by children's feet and emit various sounds. The John Hopkins Trust for special children in Glouster in the UK also uses similar technology to create a 'Whispering wall' which project natural sounds when triggered by children's activity.

Figure 22- Whispering wall in John Hopkins Trust School for special children
(http://www.rattraymosaics.co.uk/img/kitea.jpg)

4.6. Conclusion

While the 7 UD principles as outlined in the previous chapter provide a good framework for designing an SEC, it is also worth looking at the draft 'Universal Design Guidelines for Homes in Ireland' which are being currently finalised by the Centre for Excellence in Universal Design at the National Disability Authority (2012d). In this guidance they introduce the concept of neighbourhood integration and adaptability over time while condensing the 7 UD principles to produce the following four principles; 1) Integrated into the neighbourhood, 2) Easy to approach, enter and move about in, 3) Easy to understand, use and manage, and 4) Flexible, cost effective and adaptable over time. Considering the issues discussed in this chapter in relation to the SEC, particularly the need for integration into the community, these four principles are very relevant.

These four principles draw together the many strands that have been investigated throughout this chapter. In overall terms they broadly address the micro, meso and macro issues

discussed in relation to the spatial scales that influence UD. Section 4.1 and 4.2 illustrated that unless an SEC operates successfully across these scales, it will fail many of its users through lack of accessibility or usability on one or many levels. These four principles also help with the creation of child and community friendly environments as discussed in section 4.3.

'Integrated into the neighbourhood', highlights the importance of location and the relationship with community. The SEC and the local community must have a symbiotic relationship and the school must be viewed as a crucial piece of community-based social infrastructure to be celebrated and supported.

'Easy to approach, enter and move about in,' ties together the many dimensions covered in Sections 4.5 where various issues around the local environs, boundary conditions, entering and exiting, and on-campus circulation are examined in detail. One of the key concerns arising from this section is the delicate balance required between school safety and security, and the connection and integration with the community.

'Easy to understand, use and manage', covers a wide spectrum of considerations across various scales; from the wider issues around circulation and wayfinding, to more specific issues such as signage and ICT. If campus sharing between schools and the wider community happens in meaningful way, SEC will need to cater to a wide range of users including staff, students, and the general public. To be inviting to the community and fully supportive of all users, the SEC must not only be accessible in the physical sense, but also take cognisance of all sensory, intellectual and cognitive abilities to ensure it provides a usable, safe and friendly environment for all. This must also extend to the long term management of the SEC where it is critical to 'design out' potential barriers, hazards, or other physical or management features that may cause difficulties into the future.

In many ways, being 'Flexible, cost effective and adaptable over time', provides future proofing against potential management issues which may appear down the line. In broad terms, if schools are located within existing communities this creates more flexibility in terms of alternative or additional uses for the school building in future times. Breaking the campus into smaller schools such as the Dandenong High School, or Fielding's small learning community, also allows greater flexibility around converting one of the schools into another use, such as a community facility.

The cost effectiveness of the campus must be considered in terms of an overall life-cycle approach and therefore many of the issues raised above regarding flexibility and adaptability will contribute to cost effectiveness over the full life of the campus or individual buildings. Sustainable design measures which conserve energy through greater building efficiency or the use of centralised biomass boilers with district heating systems will also contribute to long term cost saving as witness in the Monaghan example.

This chapter has looked in detail at many planning and design issues which inform the SEC concept, while investigating the role that UD can play in creating a campus that is integrated into the neighbourhood; easy to approach, enter and move about in; easy to understand, use and manage, and, finally; flexible, cost effective and adaptable over time. While not exhaustive, the material presented gives a good overview of the key issues pertaining to SECs and the adoption of a UD approach, while also posing some further questions that need to be addressed as research into the SEC concept evolves.

4.6.1. Key issues arising from chapter 4

Planning, integration, and child/community friendly educational settings

- The planning and design of a UD SEC must be considered at the macro scale (city or county level), at the meso scale (neighbourhood and campus layout), and the micro scale (landscaping features, finishes etc) to ensure accessibility to, and within, the campus for all users and members of the community.

- Many international education and educational design experts are calling for greater integration between schools and the community to create community learning centres or networks of schools embedded, and distributed throughout the community. In either scenario the key objective revolves around breaking down barriers and engendering a collaborative relationship between community, educational bodies, local authority and business partners. This educational model supports, and will be supported by the UD SEC approach.

- The UD approach can be used to create both child-friendly and community-friendly settings. In this regard the design of age appropriate environments must be balanced with the wider needs of all school goers and the local community.

Spatial and physical attributes of UD educational environments

Location and access from the community

- Proximity to the local community is critical for community integration and facilitating sustainable forms of travel such as walking or cycling.

- In this regard, consideration must be given to local walking, cycling and public transport networks, the accessibility and usability of these networks, the distances and travel times from the furthest dwellings in the community, and the quality of the public realm associated with these networks.

- The local setting of an SEC will have an influence on its success. A noisy locality with ant- social issues will have a negative impact in terms of onsite environmental conditions, student, staff and community perception, or security, perceived or actual. On the other hand location within a more secure neighbourhood will enable greater integration between the SEC and the community.

- The design of an SEC must enhance the civic character, improve social cohesion and project a positive image of education to the local community.

Approach, boundary and existing or exiting the campus

- Following on from the issues outlined above, the approach routes and access points to the SEC must be provided in line with Booklet 1and 9 of CEUD's 'Building for Everyone'. This will ensure that all routes are accessible, easily understood and usable for all people.

- Provide as many entry points as possible for the local community to ensure maximum accessibility along local desire lines. It may also be possible to create a quieter and calmer access route for people who may experience hypersensitivity.

- Shared space design, or the creation of 'Home Zones' through a UD approach in the immediate locality surrounding the SEC, will help create pedestrian priority and a more people friendly environment in the approach spaces to the school.

- Where possible create permeable edges to the community to allow greater interaction with the community. To balance this openness with security concerns, the following is advisable; enhance passive security by ensuring that buildings overlook key spaces; create clearly defined circulation routes and delineation between private and public spaces to reinforce territoriality.

Campus Size

- The limited research that is available regarding the impact of school size on student welfare suggest that smaller schools (less than 500 students) perform better than larger schools (more than 1000 students). While there is a dearth of evidence regarding optimum campus size, there is much in the literature about the value of 'human-scale' educational settings where schools are broken into smaller units to make them more intimate and personalised.

Campus layout, key external spaces and architectural design

- As discussed above, the breakdown of the campus into smaller, more intimate units or 'neighbourhoods' may contribute to a more human scale environment.

- The 'sense of community' is helped by gathering spaces, sitting areas and green spaces. The provision of distinct and identifiable spaces will help create territoriality and a sense

- of ownership, while legibility (for orientation and safety) and mystery (opportunity and interest) will be generated by good landscaping

- The enhancement of the local topography, existing landscape features; and the micro-climate and ecology of the site, will help instil character and a sense of place.

- Provide safe outdoor space for a variety of different student social activities, interest ranges and group sizes; to allow imaginative and creative play; facilitate both informal and formal outdoor dining; and provide outdoor education as part of the curriculum.

- Provide appropriate sports pitches, opportunities for winter activities, and the integration of sports facilities into the landscape strategy.

- Provide opportunities for challenge and risk taking on the grounds as part of healthy childhood development.

- Provide external spaces that offer quiet and calm relief from the more active school spaces.

- Landscaping should offer multisensory stimulation, support maximum biodiversity for education, offer space for food growing, and provide calm natural space to be overlooked by internal spaces.

- Given the important role that external space plays in learning and socialisation across diverse ages and abilities, it is vital to design these properly with: a variety of surfaces (including soft non-grass surfaces, especially for younger children); variety of playground and sports equipment to cater for the needs of different pupil groups; and encourage adventure, curiosity and play, with challenges for a range of abilities.

- Manage the balance between risk, adventure and challenge, with the need to keep children safe from harm.

- It may be necessary to provide a secure dedicated play space for SEN children which are: locate close to SEN classrooms; contain soft and hard landscaping; provide specialised play equipment; offer multisensory experiences; and provide shade and shelter, and possibly a quiet area for certain children.

- Provide a sensory garden with raised wheelchair accessible planter beds, seating areas, and opportunities for multi-sensory experiences.

- The architecture of the campus should strive for a human scale with a coherent design concept allied with a careful use of colour, pattern, graphics and texture.

- Flexibility and adaptability (F&A)are key issues for a UD SEC - If it is located in a compact, diverse community it may avoid obsolescence and the need to be converted into another use. Notwithstanding this, F&A must still be built in to accommodate inevitable changing school and community needs. Finally, current pedagogical approaches demand F&A to cater for more dynamic and personalised teaching and learning.

Moving around the campus

- Provide all circulation in line with Booklet 1and 9 of CEUD's 'Building for Everyone' to ensure that all routes are accessible, easily understood and usable for all people.

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- In line with the above, provide clear external circulation areas with enhanced wayfinding and legibility which balance the needs of different users. Carefully plan for deliveries and refuse collection; provide all year round routes to sports facilities; create unobtrusive car parking; and provide circulation routes that avoid disruption to learning spaces.

- Consider a shared space design approach throughout the campus for key circulation areas to promote pedestrian priority and create a more people friendly environment.

Technology on the Campus the campus

- ICT can be used not only for on-site navigation, but also in providing multi-sensory, interactive learning environments.
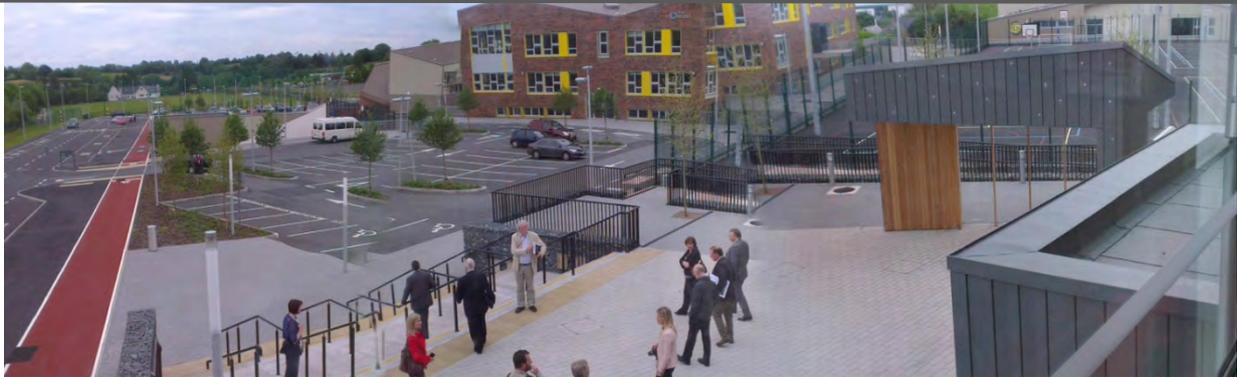
Part B
Case Studies
& Stakeholder
Engagement

5. Case Studies

A review of existing shared educational campuses

"..designers need to understand that they places that they create are to be inhabited by users who will not only be influenced by the design but, in turn, will also shape the way these places function " .

5.0. Introduction

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Different types of shared educational facilities and campuses were briefly discussed in Chapter 1 and Chapter 2, this current chapter now looks at some case studies which represent some of these educational facilities. Section 5.1 identifies a range of SEC types in Ireland and internationally, and then Section 5.2 looks at a number of these in greater detail to understand how these SECs work in practice, and to examine the strengths and weaknesses in each case. Section 5.3 presents a brief analysis of the selected cases studies based on a series of themes developed earlier in the report and this is used to draw out some findings to inform the overall research.

5.1. An overview of SEC examples

An initial list of Irish and international case studies were identified which aligned with definition of an SEC as defined in this research - a situation when two or more schools share an existing or new site and facilities in a meaningful manner. And where the site or facilities are typically shared with, or co-owned by the local community.

As referred to Chapter 1, there are many existing historical examples of schools sharing sites in Ireland and with more recent campus developments such as the Athy Educational Campus, which contains Athy Model School, Athy College, Gaelscoil Áth Í and Scoil Phádraig Naofa (Athy Model School, 2014).

The 'Fingal Schools Model' is now encouraging this site and facility sharing and an examination of the proposed projects on the governments school building programme shows many situations where two or three schools will share one site such as the development of new schools for Scoil Oilibhéir Naofa and the Educate Together Ballymakenny College in Drogheda (Department of Education and Science (IRL), 2012 #1509}.

On a larger scale the Grangegorman development in Dublin aims to create a new city quarter with a diverse mix of uses including a urban campus for Dublin Institute of Technology, new health services, mixed use development and a new Educate Together Primary school (Grangegorman Development Agency, 2014).

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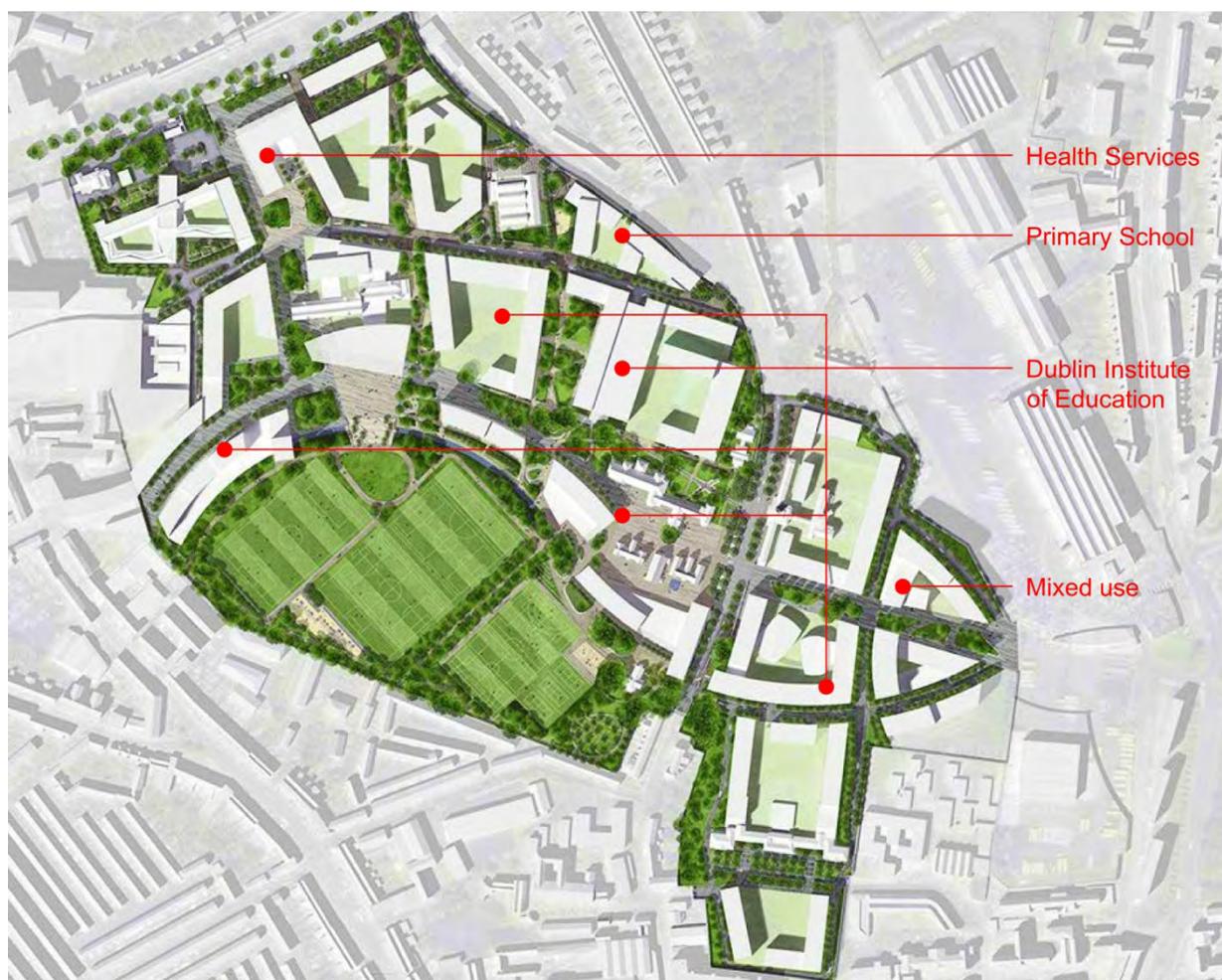
Figure 23 - Grangegorman masterplan showing key facilities

The OECD Compendium of Exemplary Educational Facilities (2011a) contains a chapter dedicated to what it calls 'Multiple level'. One of these, the publicly funded 'Instituto Technologico de Iztapalapa' in Mexico is designed as a campus with a swimming pool and a theatre which are both open to the local community. The 'Complexo Escolar dos Arcos' in Portugal, is described as "an educational, sporting and leisure complex" where after school hours the local residents can use the gymnasium, the library, and the music and computer rooms.

The 'École Internationale de Manosque', in France has facilities for nursery to upper post primary level students, while Hazelwood School in Glasgow, Scotland, provides for a similar wide range, but for children with multiple disabilities. The school grounds also contain a three-bedroom house which is used to develop life skills as part of the student learning experience.

The 'Holzkirchen Realschule und Grundschule' is a complex containing a daycare facility for younger children, a primary school and a post primary school, while the 'Liceo Aldea Educativa Rapa Nui' on Rapa Nui or Easter Island provides facilities for lower post primary to tertiary students and also provides for community education and serves as a meeting place outside school hours.

Figure 24 - Liceo Aldea Educativa Rapa Nui

Another educational campus providing both post primary and third level education is the 'Ekonomska šola Murska Sobota' campus in Slovenia which also serves the local community in terms of sporting, cultural and social activities. (OECD, 2011a)

5.2. Introduction to the case studies

Having looked at a range of SECS as outlined earlier, it was decided to select examples from Ireland and internationally that would represent a basis typology of SECs that includes: large scale existing campuses; large scale purpose built campuses; and smaller scale projects which illustrate either multi-age facilities or facilities that are shared with the public as a community resource. Some of the case studies in this typology do not align with the definition of an SEC as outlined above but are still included due to some unique attribute which may help inform this research.

In Ireland the case studies include;

- An existing large scale educational site located in an urban area which has evolved into a campus illustrated by ChildVision campus in Dublin

- A recently completed purpose built campus represented by the Monaghan shared educational campus which is located in a suburban area.

- A recently completed smaller scale site hosting two schools and a community centre in a suburban area represented by St. Mary's and Scoil Chriost Ri in Portlaoise.

The international case studies include;

- An purpose built large scale educational and community campus represented by the Tomeree Education Centre in Australia which illustrates a large complex bringing together two schools on one site with various health and community services. One of the main drivers was the relocation of these schools closer to their catchment community.

- A single building containing various age groups and community facilities, represented by the 'Schulanlage Leutschenbach' in Switzerland. This is included because it presents a high density six storey building in a suburban location acting as both a school and a community resource.

- While many of the examples described above bring different age groups together it was important to look at an example that catered specifically to older people as part of its broader brief. The Swampscott High School and Senior Community Centre in the US has been chosen to illustrate this situation.

- Finally, it was important to look at an educational facility with a very broad remit and also something that makes use of existing buildings. The Mexican 'Red de Innovación y Aprendizaje' example chosen provides a community centre with educational, local service and business community provision retro-fitted into an existing building. It also illustrates how disadvantaged communities can be served and supported by innovative educational facilities.

The Irish case studies were visited by the research team while the material for the international case studies was drawn from various literature sources. These case studies are now described in greater detail below.

5.2.1. Case Study 1 – ChildVision Campus

Gracepark Road, Drumcondra, Dublin 9, Ireland

Figure 25 - Child Vision Campus: view to garden centre and restaurant

ChildVision is an 'Education Centre for Blind Children' based in Drumcondra which has been in existence for over 100 years. The overall campus contains a wide variety of facilities including: a preschool; a primary school; a Post-Primary school; vocational training; low vision and assessment clinics; Braille production, a residential centre for visually impaired students; a petting farm; and public coffee shop and garden centre which are open to the public.

The Preschool and the primary school caters to children with visual impairments, while the post-primary school 'Pobalscoil Rosmini' is a mixed gender school which integrates mainstream students with visually impaired students.
(See http://www.childvision.ie/cms/campus/campus.html for more information)

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Key issues

The ChildVision campus is of relevance to this research for a number of reasons. Firstly it combines a wide range of ages and abilities on one campus as outlined above. Secondly, there is a very open relationship with the community where a centrally located coffee shop, petting farm and garden centre, invites the public into the heart of the campus (See Figure 25 and 27 below). Finally there is an overall ChildVision management team which manage the campus as a whole allowing each school to operate with a lot of autonomy.

As outlined above the campus caters for mainstream and students with visual difficulties across a wide variety of age groups. The coffee shop, the associated garden area (See Figure 25), the garden shop and stables (See Figure 26 below) provide shared space for the whole school and the community. When discussing this with some staff members it was pointed out

that the students are typically well behaved in these spaces - it is suspected that the potential presence of the student's family members or neighbours in these areas might have a moderating effect!

Figure 26 – Main public entrance to garden centre, stables and coffee shop.

When speaking with the campus management it became clear that bringing the public into the campus in this way was part of a strategy to break down barriers between the SEN students and the community, between mainstream children and SEN students, and between the school as an institution and the wider community. While the campus contains a permeable boundary and is readily open to the public, all staff members are made aware of their role in providing supervision at all times. Thus, as opposed to providing security at the perimeter, a passive security strategy is employed throughout the campus.

As mentioned above, the ChildVision campus is managed under a single management structure. However, each school has its own principal and individual boards of management, which helps to protect the identity and autonomy of each school. This management provides overall maintenance for the campus and ongoing strategic direction through a management team which includes principals from the campus schools.

Finally, there is much interaction between the ChildVision campus and the third level institute 'All Hallows College'.[10] which is directly across the road, and where many staff from ChildVision study to increase their knowledge of SEN. It was mentioned by campus

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[10] All Hallows College is a third level institution located on Grace Park Road directly across from the ChildVision campus (See http://www.allhallows.ie/).

management that there is a desire to increase this interaction while possibly creating greater spatial unity between the two campuses.
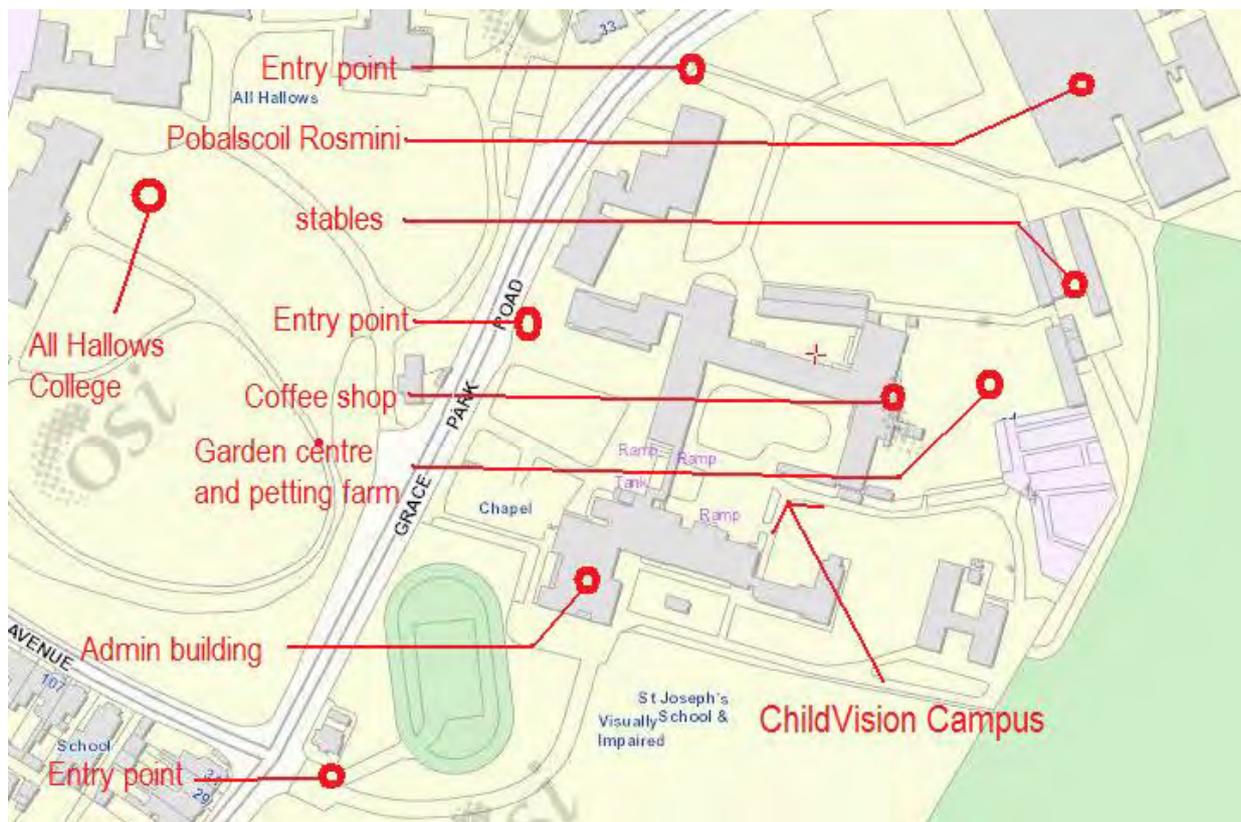

Figure 27 - ChildVision Campus

Discussion

The ChildVision campus offers much insight into this research and provides a practical and successful model for an integrated campus, with a single campus management structure which provides community facilities as a way of inviting the public into the campus and breaking down barriers between the school as a closed institution and its host community. The issue of security and student safety is understandably a major concern for many schools and results in the traditional security fence approach. However this is dealt with on the ChildVision campus through an effective passive security strategy which maintains an open and welcoming atmosphere.

5.2.2. Case Study 2 – Monaghan Shared Educational Campus

Knockaconny, Armagh Road, Monaghan Town, Ireland

**Figure 28 -** View across Monaghan Shared Educational Campus

This project has been mentioned on a number of occasions in this report as it is represents one of the first large scale shared educational campuses built in Ireland. In 2009 Co. Monaghan VEC was selected by the Irish government to manage and oversee the procurement, planning and building of a multi-user education campus on the site of the former military barracks outside Monaghan Town. This campus, which was completed in 2013; provides a 16 classroom all Irish primary school for Gaelscoil Ultain, a 400 pupil all Irish post primary school for Colaiste Oiriall, the Monaghan Institute of Further Education & Training that will replace the existing PLC College and a central sports Hall and gymnasium, and a public theatre. (Monaghan VEC, 2012).

The Co. Monaghan VEC was also the first education authority in the country to be sanctioned by the DES to manage the project on a "devolved pilot basis" As described by the DES "A central tenet of the "devolved" arrangements is that the VEC, as the project manager and client, is required to manage the project within budget parameters assigned by the Department during the various stages of development and delivery." (Department of Education and Science (IRL), 2011) Knockaconny Armagh Road, Monaghan Town

Key issues

The Monaghan Education Campus offers many obvious advantages in terms of combing a number of schools in one location and providing them with high quality shared facilities that

may not be feasible for individual schools on separate sites. The range of schools from primary through to further education also creates a wide spread of age groups while the public theatre, which is housed in a state of the art building, adds to this diversity by drawing in the general public.
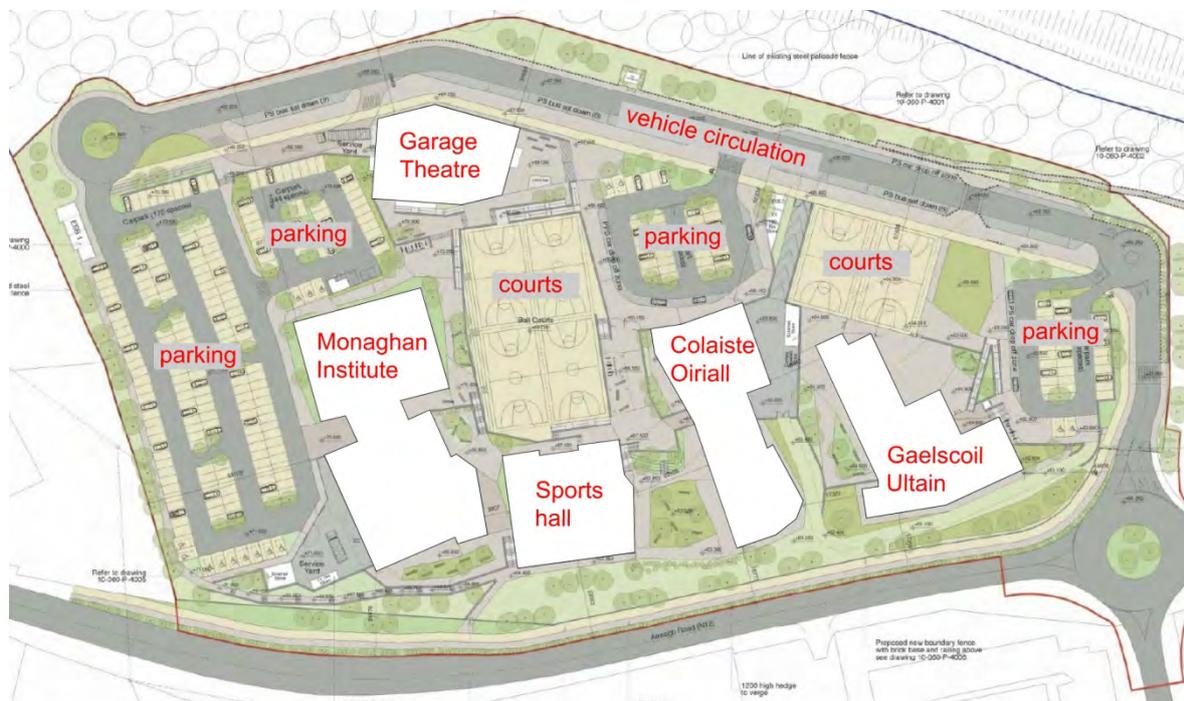
**Figure 29** - Site plan for Monaghan Educational Campus

The site layout maintains all traffic flow and parking to the east, north and west periphery of the site. This allows large parts of the site to remain car free and dedicate key spaces to external social areas and playing courts. These central social spaces and playing courts framed by the theatre, Colaiste Oiriall, the sports hall and the Monaghan Institute to create a space that will be frequently occupied and subject to passive security from the adjacent buildings. The architectural design of each school or facility breaks down the overall building massing to create a comfortable people friendly scale to the overall campus. Upon visiting the site with a group it was the opinion of some visitors that some of the external cladding materials conveyed a more commercial tone rather than an educational or child friendly tone.

Figure 30 - View from Garage Theatre to and parking area in front of Colaiste Oiriall

The energy provision for the campus has already been described in Section 2.3.4.where the campus energy centre comprising of wood chip boilers feeding a district heating system was detailed. In the context of the other case studies examined this space and water heating system is one of the most efficient encountered.

The campus layout and the onsite facilities largely create a very positive environment and provide excellent educational opportunities for all who attend, and thus offers much insight to this current research. However, it is the location of the campus that causes some level of concern given the findings emerging from this research. The campus is located on the Armagh Road (the N12), approximately 2 Kilometres to the North East of the town. The organisations that are now located on the campus have moved from locations within the town centre as illustrated below in Figure 21 below.
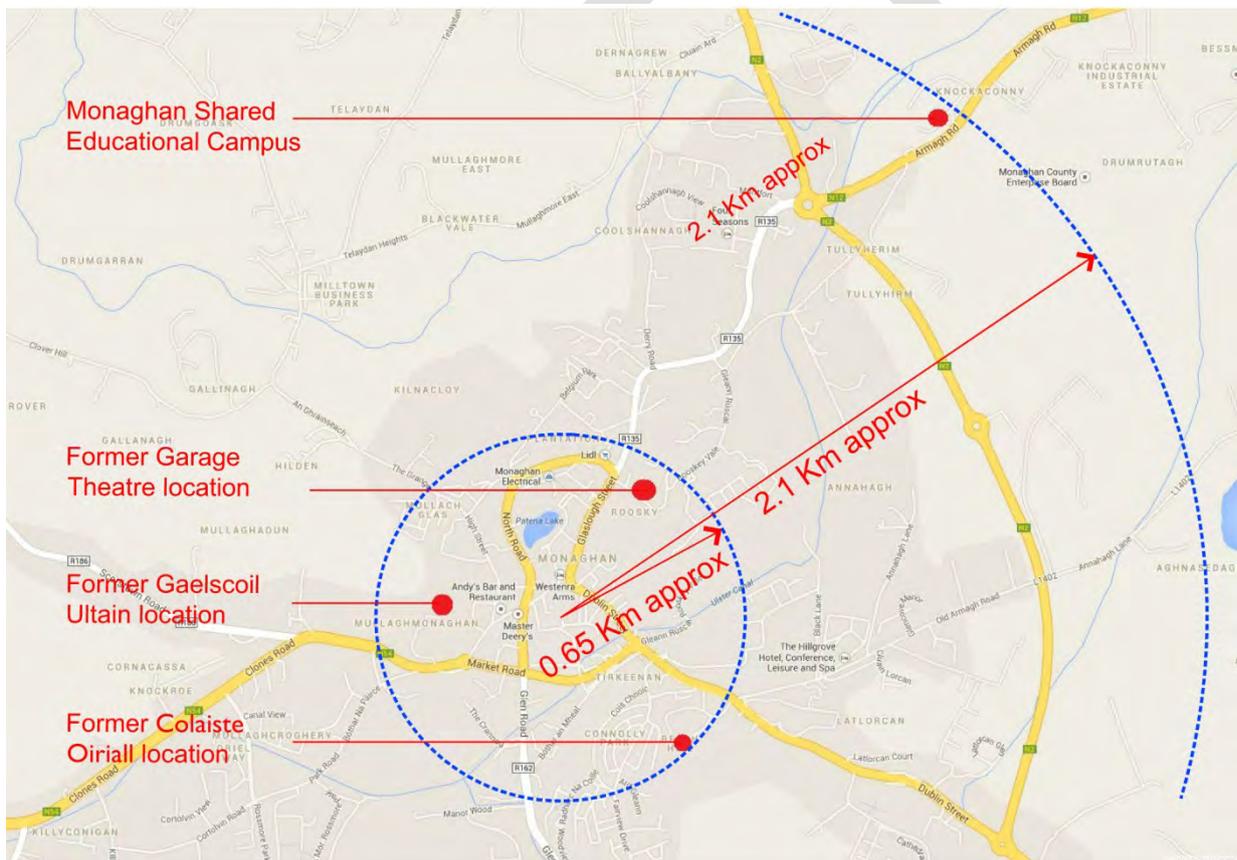
Figure 31 - Location of campus in relation to Monaghan Town

It could be argued that campus places the schools a location that may not facilitate walking or cycling for many students and staff, and removes these organisations from the heart of the town and the associated social, cultural and commercial activities that they would have generated. In light of the current draft 'Monaghan Town Development Plan 2013-2019'

(Monaghan County Council, 2013) it appears that this location for the development may not support the plans objectives around creating a critical mass in the town.

> "However, Monaghan Town struggles to accumulate a critical mass and urban population that will ensure that existing services are retained in the town and new industries, retail and services are attracted to the town"(p.207).

> "Protecting the overall vitality and viability of town centres is both a national objective and a local objective within this plan" (p.213).

Discussion

As mentioned above the Monaghan Shared Educational Campus offers much valuable direction to this research. It is again the issue of location, which has emerged from this research as a key dimension of a successful SEC, which is of greatest interest in the context of the Monaghan campus. While the campus is not an excessive distance from the town, it is considerably further than the locations of the previous schools. It is located on the N12, which is a busy road and forms the main route from Monaghan to Armagh. Approaching from the town, any cyclist or pedestrian must pass through a large roundabout and then travel along a road with very little housing on either side, which if housing were present, might offer some passive security to the road. Referring back to research earlier in this report which supports integration of schools into their community and greater use of school facilities for the public, it was highlighted how proximity and ease of access for all people regardless of age, size, ability or disability was an essential ingredient. It would be hard to argue that the Monaghan campus is in a location that encourages such interaction and integration.

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5.2.3. Case Study 3 – Portlaoise

Borris Road, Portlaoise, Co. Laois, Ireland

This project, completed in 2009, was for the re-accommodation of two existing Post Primary schools in Portlaoise on a SEC located in the eastern suburbs of the town. The schools are St. Mary's CBS (Boys school for 850 pupils) and Scoil Chriost Ri (Girls school for 850 pupils) along with a Shared Facilities (Sport) Building. Access to the school is off secondary roads. Both schools were relocated from substandard accommodation in the centre of Portlaoise town. The concept of a shared campus appears to have been reluctantly accepted and the potential of such an arrangement not fully exploited.

The main design concept for the campus was to arrange the two schools and the Shared Facilities Building as separate buildings around a south facing piazza off which all buildings can be entered and overlooked.
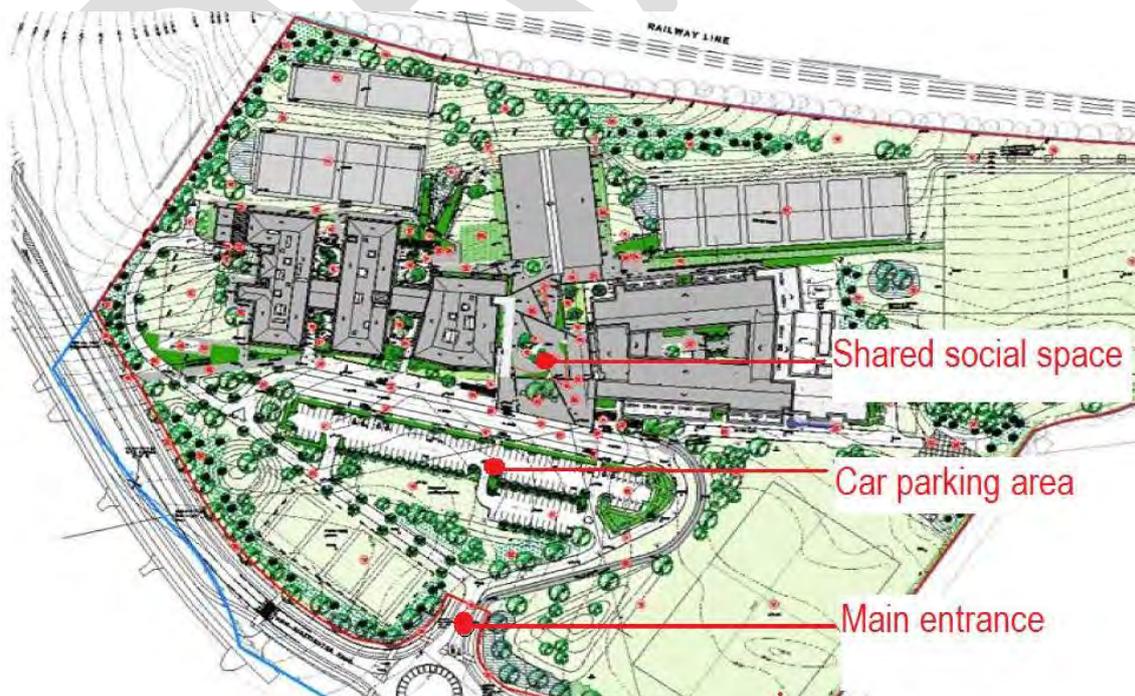
Figure 32 – Campus Layout

The design provides each school with its own identity and provides them with their own outdoor sports facilities.

The central piazza relates directly to the general purpose room in St. Mary's CBS with doors connecting one to the other (See Figure 37 below). The single Shared / Sports Facilities Building, which provides a back-drop to the piazza, provides superior facilities to those possible if provided separately and it creates a common area for interaction between pupils. The entrance to the Shared Facilities Building from the piazza leads into the hall by the use of the central 'toblerone' roof light which extends along the full length of the building (See Figure 34 below).

Figure 33 – Relationship between the piazza and St. Mary's

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Figure 34 – View to shared facility building

Key issues

The solution accommodated the schools in new state-of-the-art accommodation without the difficulties of redeveloping town centre sites which did not have adequate space for sports fields etc., and as a result the new campus contains superior outdoor facilities. The site was also developed without barriers between the schools to encourage interaction between student bodies.

However, the concept of an SEC does not appear to have been enthusiastically received by either school and therefore it's potential is not being exploited with the result that there is little community / extracurricular activity apparent on the campus. There does not appear to be a common management structure for the overall campus other than the public, private partnership (PPP) maintenance company.

As the school is remote from the town centre most pupils and staff arrive by car or private bus and there does not appear to be any public transport points nearby. This creates significant traffic congestion at the start and end of the academic day.

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Discussion

The Portlaoise SEC is relevant to research on SECs because the concept focused on the accommodation of two existing post primary schools on a new shared site. However the overall concept of an SEC does not appear to have been adopted by the schools, and the lack of a common management structure for the campus means that the potential of a shared campus is not fully exploited. The location of the site at the edge of Portlaoise has generated significant traffic congestion within and outside the site and has removed activity from the commercial heart of the town.

5.2.4. Case Study 4 – Tomeree Education Centre

Salamander Bay, New South Wales, Australia

The Tomeree Education Centre was built to house a primary school and a post primary school on a larger site which can handle expansion and is nearer to the catchment area. The site also contains a special education unit, a health clinic and a technical and further education school.

Key issues

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"Tomaree Education Centre, despite its large size, is an excellent example of a versatile and pleasant small-scale learning environment. The siting of the buildings takes into account the area's natural setting, creating a distinctive and sheltered neighbourhood for every school level and activity." (OECD, 2001.p.21)

The Tomeree Education Centre caters for a wide range of groups from 5 years to older adults and integrates the complex with the community through the provision of public services, a multipurpose centre and sports field for public use. From the perspective of this research the fact that the site was chosen to bring the schools closer to their catchment areas is significant. There also seems to be a meaningful sharing of the site and the campus resources with a shared common space learners of all ages, while the inclusion of a special education unit helps to break down barriers between SEN and mainstream students, and also between SEN and the wider community.

The centre is careful to maximise winter sun and sea breezes while photovoltaic panels provide electricity to heat water with any excess being fed back to the electricity grid. A ground source heat pump is used for space and heating and cooling while rain water run-off is used to irrigate the agricultural plot.

Discussion

While it could be argued that the development of this campus had the luxury of space in a relatively low density setting, the objectives around bringing the schools physically closer and creating a community resource is very relevant to this research as it illustrates the benefits of selecting an appropriate site in close proximity to the community.

5.2.5. Case Study 5 – Schulanlage Leutschenbach

Zurich, Switzerland

Figure 35 - View to school from adjacent street (Department of Structural Engineering Zurich, 2009)

This school which was completed in 2009 contains a primary school and a lower post primary school. Community facilities are also provided including: a public cafeteria; a child day care room: a library; multipurpose hall; and a gymnasium (OECD, 2011a).

Key issues

This project is unique as usually a school building of this height is driven by a lack of space or the constraints imposed by a high density urban location. The vertical approach for this school was consciously adopted to minimise the building footprint to free up a majority of the site to create an open playground in a public park. The school itself has publicly accessible community facilities on the ground, fourth and fifth floor. By allowing a community park to wrap around the school, and by spreading community facilities throughout a number of floors, including the top floor, the school is integrated into the community both in plan and in section. By making many of these facilities available from 7am to 10pm every day of the week, the school is knitted into the community in a very meaningful way.

Discussion

This school, while not a campus, has a lot to offer this research. This report has found that campus developments may be forced out of the heart of the community due to the lack of large sites within existing neighbourhoods. It could be argued though that schools are often no more than 2 stories high and this has an obvious impact on the building footprint and the amount of site space required. The Schulanlage Leutschenbach illustrates how a 6 storey structure can provide a successful educational setting, and this is in the context of primary school children. The fact that the glass façade enables extensive views from the classrooms is another unusual feature that gives the students an outlook rarely encountered in school design. This project also shows how a school can sit in an open park environment with minimum security measures and thus convey a message of integration with the community.

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5.2.6. Case Study 6 – Swampscott High School & Senior Community Centre

Swampscott, Massachusetts, USA

Figure 36 - Aerial view to school and senior community centre (Energy Usage, 2012)

This school is discussed by Lippman (2010) as an example of facility that caters to the needs of post primary or 'high school' students and the senior community in what Lippman refers to as an 'intergenerational learning community' (p.312). The high school has a floor area over 18,000 m2 while the senior centre, which is located on the ground floor to the north of the building, has a floor area of approximately 700m2.

Key issues

The 'intergenerational learning community' formed by this project is of great interest to this current research. Looking at the ground floor plan as illustrated in Figure 26 below shows the high school itself, entered from the west, takes up a majority of the building, while the senior community centre located to the north with its own entrance. The auditorium is located centrally and is shared by both facilities.
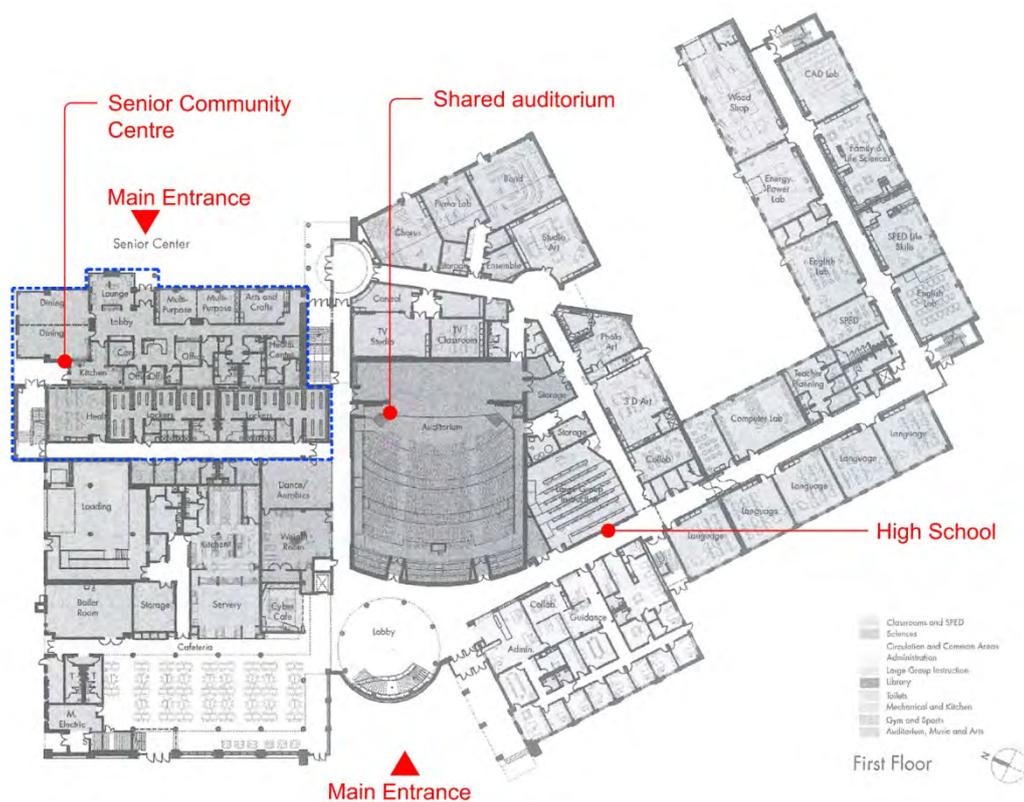
Figure 37 - Ground floor plan of school and senior community school (after Lippman, 2010)

The rationale behind the separate entrances is to provide each community with its own identity and independence, while using the internal spaces such as the auditorium to provide common areas for both.

The high school is designed around providing flexible and easily personalised learning environments or 'homes' while the community centre is open to all senior citizens and provides health, social and creative activities (Swampscott Patch, 2014).

The aerial view above show that the roof is fitted with a large 383 kW array of photovoltaic panels which were installed in 2011 to supply electricity to the school and have already generated over 900,000 kW hours to date (Energy Usage, 2012).

Discussion

This project brings two different communities together in the one location and Lippman points out that the design team of 'Symmes Maini & McKee' carried out an extensive evaluation of the town and community needs to determine the 'logistical, financial, and social considerations of collocation" (p.315). With two separate building and site entrances it would

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be interesting to examine how much interaction takes place between the two groups, from the literature reviewed it is not possible to tell. The overall building design itself is quite large in scale and mass and one wonders if the high school, auditorium and senior community centre were broken into distinct buildings gathered around a common external courtyard or similar space, would it reduce the institutional feeling and generate more interaction? While counter intuitive, could it be the case that in this scenario that separate buildings could create greater unity?

5.2.7. Case Study 7 – Red de Innovación y Aprendizaje

Estado De México, Mexico

Figure 38 - Internal view of Red de Innovación y Aprendizaje (Proacceso, 2014)

This final case study looks at the Red de Innovación y Aprendizaje (RIA) which is a network of community centres in the State of Mexico, in Mexico which creates a community hub and offers resources to low income communities in the form of computers, internet access, and education. Each centre is located in an existing building in dense urban areas with high pedestrian and vehicle traffic (OECD, 2011a).

Key issues

While the RIA is neither a campus, nor even a school in the pure sense of the word it offers a lot to this research in illustrating the power of educational facilities embedded in the community. Following analysis of population density, income and education level, location of schools, public transport and other urban transport infrastructure, the centres are placed in

urban 'pressure points' to help the community and in making use of existing building can respond quickly and cheaply to community needs.

> "By strategically placing the centers in some of the most densely populated, low-income communities in Mexico, the RIA generates positive chain reactions to heal the city body; we call this "urban acupuncture." This untraditional and holistic approach to urban interventions informs the creation of a growing network of points that activate social change" (Proacceso, 2014).

While sometimes small in scale, these centres align with the dispersed and 'distributed space' discussed by Harrison and Hutton (2014) in their examination of the changing educational landscape. The RIA liaise with neighbouring schools and provide courses to supplement their curriculum while also providing facilities for local businesses for conferences and staff training.

Discussion

Using detailed analysis of community needs, these centres respond in direct way placing the centre where it needs to go and using whatever space or facility is available to achieve this. The design of the RIA centres is driven by the very simple goal of providing community support in the fastest and most economical manner possible. It is not driven by any particular design model so therefore is open to using the resources to hand which typically consist of disused existing buildings which can be quickly adapted to create a centre.

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5.3. Analysis of case studies based on key elements

In the context of a UD SEC and in light of some of the key spatial, physical and managerial aspects of educational environments identified in earlier chapters, the case studies are now analysed based on the following elements: (1) Location and access from the community; (2) Approach and entering or exiting the campus; (3) Campus size; (4) Campus layout, key external spaces and architectural design; (5) moving around the campus; (6) Technology on the Campus the campus; and (7) Campus Management.

For each of these elements, any associated positive design features or approaches from the case studies are highlighted to illustrate practical examples of how educational environments can be designed to support the UD SEC concept. These examples are presented in table 5 below. As mentioned at beginning of this chapter, some of the case studies do not align with the definition of an SEC as adopted in this research, however they are still included due to unique attributes that would be beneficial to a UD SEC.

Table 5 - Positive design features or approaches from the case studies

Spatial, physical and managerial elements	Positive design features or specific approaches from case studies
Location and access from the community	• The ChildVision campus is located within the community and invites in the locals by virtue of its public café and garden centre that are also shared with the students. • The site for the Tomaree Education Centre was chosen to bring it closer to the catchment area thus reinforcing community integration. • Schulanlage Leutschenbach sits in an open park and uses vertical zoning over its 6 floors to balance community access and more private school spaces. This also demonstrates how a taller structure provide a successful educational environment. • Swampscott High School & Senior Community Centre provides an 'intergenerational learning community' and shows how the student community and the senior community can share resources while maintaining their independence. • Finally, the Red de Innovación y Aprendizaje demonstrates how small educational facilities carefully located in response to certain 'pressure points' can provide powerful, small-scale, dispersed and

	community-embedded facilities.
Approach, boundary and entering or exiting the campus	• The ChildVision campus provides a permeable perimeter and invites the public into the heart of the school. This helps to break down barriers on many levels including between the school and the community. • While Schulanlage Leutschenbach has some level of enclosure around the immediate school, it is largely open to the public who use the cafeteria and childcare room on the ground floor, the library and multipurpose hall on the fourth floor, and gymnasium on the fifth. The school playground is part of the open park on which the school sits and this helps to foster greater integration with the community.
Campus size	• The case studies illustrate small-scale interventions such as the Red de Innovación y Aprendizaje, and larger scale campuses such as the Tomaree Education Centre. However, it is not necessarily the size of the campus that matters but the manner in which it is designed. For instance, the Monaghan Shared Educational Campus presents a good example of how a relatively large campus is sensitively broken down into five different buildings to create a range of more intimate spaces throughout the campus.
Campus layout, key external spaces and architectural design	• As outlined above, the Monaghan Shared Educational Campus provides some good examples in relation to campus layout. The five buildings are gathered around a number of ball courts with smaller social spaces dispersed around the edges. Car parking is predominantly kept to the periphery and therefore large portions of the site are dedicated as pedestrian only areas. • The central social space and shared facilities building at the centre of the Portlaoise campus provides a barrier free interaction space for all students between the two schools and the users of the shared hall.
Moving around the campus	• As described previously, the Monaghan Shared Educational provides Campus large areas of pedestrian only space and thus creates people friendly circulation areas within the campus. Wide, dedicated, clearly delineated cycle lanes are also provided on-site. • While the Schulanlage Leutschenbach is composed of a single building, the manner in which it successfully utilises 6 floors with public access to the ground, fourth and fifth floors, is instructive to this research. Vertical circulation is carefully provided, broken down into stairs for older children and younger children. Many school buildings often rise no higher than two floors and thus force

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	a larger footprint and longer horizontal internal and external travel distances. In appropriate circumstances, consideration should be given to well designed multi-storey schools such as Schulanlage Leutschenbach.
Technology on the Campus	• The technology encountered in these case studies was largely related to energy efficiency and demonstrated on economies of scale can be beneficial to the sustainable design of schools. For example the Monaghan campus utilises a centralised wood chip fired energy centre which supplies the campus with space and water heating in a very efficient manner.
Campus Management	• The ChildVision campus management structure enables a number of schools to work effectively and efficiently together. This facilitates meaningful campus sharing and a communal sense of stewardship which then permits activities such as the public café or garden centre, while also supporting non intrusive security and safety strategies such as passive surveillance.

5.4. Conclusion

The various case studies reviewed in this chapter range from large scale to small scale developments; from campus layouts with multiple buildings, to single buildings; and from projects that represent a huge investment over a long time span, to rapidly deployed low cost interventions in existing buildings.

This current research focuses on the creation of shared educational campuses and defines this as 'any situation when two or more schools share an existing or new site and facilities in a meaningful manner. And where the site or facilities are typically shared with, or co-owned by the local community'. A few of the case studies reviewed do not fit into this category but are included because they offer some unique dimensions that inform the SEC approach.

There are a number of key issues that arise from these case studies that reinforce findings from the research. The overall management structure highlighted in the ChildVision campus emerges as a real strength and in many ways facilitates to open and inviting nature of the campus. Its location within an existing community helps with this integration and it is this question around location that is the main area of concern for the Monaghan campus. Does its

location on the outskirts of the town on a busy road with little pedestrian or cycling infrastructure undermine the potential to provide meaningful community integration? In contrast the Tomeree campus in Australia brought the schools closer to the community and reinforced the community integration with the provision of health clinics, further education and SEN facilities. The Schulanlage Leutschenbach, while occupying a single building, demonstrates how a 6 story contemporary structure can facilitate the education of young children while also providing a school that is embedded in the community. Another single building, the Swampscott High School and Senior Community Centre, presents what could potentially be an intergeneration environment, but that maybe undermined by the physical design of the building. This may be a good example of a situation where a campus approach with smaller individual buildings could have created a more integrated environment. Finally, the RIA centres, which are neither campuses nor a schools per se, may offer an important lesson in how an educational or community facility can be strategically located and embedded into a community with minimum cost and maximum impact.

Overall, while many of the case studies are presented in the literature as shared, integrated and community based facilities, quite a few are removed from the community or contain in-built structures that prevent meaningful integration between the onsite users and the community. This is the lack of integration lamented by Harrison and Hutton (2014) who as discussed earlier, believe that while learning should become the hub of any community, there is little evidence of this happening on the ground.

"It is notable that while there has been a great deal of innovation within building types – and a lot of talk about shared community resources and partnerships – there is little concerted effort to take an overview about holistic learning and remarkably little concentration on the spatial implications of any cross-cultural partnering that does exist – in short, an absence of integration" (p.viii).

5.4.1. Key issues arising from chapter 5

- Having examined a number of case studies it is apparent that many educational facilities are not integrated with the community in the manner called for by the various international educational experts encountered in this research.

- The geographical location of campuses or schools plays a large part in the level of community integration achieved.

- Careful examination of key urban issues and existing urban infrastructures may allow strategic placement of an educational facility for maximum benefit to the community. This approach optimises the mutual benefits that may accrue for the community and for the school when a school, or similar is strategically located within the urban environment.

- The size of the campus is not as critical as the layout, massing and architectural design. The larger schools or campuses examined that were broken down into smaller units were often more successful in terms of planning and design.

- In appropriate circumstances, consideration should be given to well designed multi-storey schools which may provide benefits: in terms of a reduced footprint and the potential to be located on smaller infill sites;

- Sustainability and energy efficient technology often becomes more viable when a number or organisations come together.

- An overall management structure is critical to the level of meaningful on-site sharing and integration with the community. If properly implemented, this management structure will protect the identity and autonomy of different organisations while engendering a shared strategic vision for the campus.

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6. Stakeholder Interviews

A view from the ground

"School must be seen as a microcosm of society where children aren't overly cocooned" (Stakeholder quote)

6.0. Introduction

This chapter describes the discussions that took place with a range of Irish educational and educational design stakeholders regarding the Shared Educational Campus (SEC) through a Universal Design (UD) approach. The main objectives of these interviews were as follows;

- To determine the extent to which the shared educational campus approach will be implemented in Ireland as part of future school provision

- To examine some of the main drivers in education facility design in the twenty first century

- To outline the main benefits and challenges of the shared campus approach

- Use these findings to inform the findings for research.

The research team spoke to diverse stakeholders to; get a strategic view on the planning and location of SECs, understand the operational issues that may be associated with SECs, and to get a sense of the experiences of both teachers and students of the typical school environment. In each case we outlined the main thrust of the research and discussed with each individual their view on the SEC approach.

The organisations and individuals spoken to include;

- Department of Education and Skills

- Department of the Environment, Heritage and Local Government

- The National Transport Authority

- The National Council for Special Education

- Educate Together

- The Royal Institute of Architects of Ireland (RIAI) Design for Education Group

- Primary school principals (urban and rural locations)

- Primary school teachers (urban and rural locations)

- Post primary School Principals (urban and rural locations)

- Post primary school teachers (urban and rural locations)

- Home - school liaison officers

- Further Education Principals (urban and rural locations)

- Special education teachers (in both special schools and mainstream)

- Students (at both primary and post primary level)

- The Irish Police Force/An Garda Siochana (with regard to safety and security on school campuses)

- The Gaelic Athletic Association (GAA)

- Various building professionals with educational design experience including architects, landscape architects and engineers

A wide spectrum of issues emerged from these interviews and these have been broken down into a number of themes. Sections 6.1 to 6.7 below outline these themes under which the main findings are summarized. In general the individuals interviewed spoke about the positive aspects of the SEC concept and but also discussed the potential difficulties as they saw it. In response to this the following sections contain a general overview of the main issues and then a brief summary of the key benefits and challenges as expressed by interviewees.

6.1. SECs, service integration and government policy

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While the SEC with integrated local services or community facilities, may be seen by the government as the preferred option in appropriate cases this will not always necessarily translate into practice, and indeed it may not be supported by all stakeholders involved in the provision and operation of educational facilities. The following sections outline some of the main topics that arose with the stakeholders in terms of the potential implementation of the SEC approach in Ireland.

6.1.1. Site availability and site location

Discussions with stakeholders suggested that the campus approach may be influenced by the lack of suitable sites in existing urban areas throughout the country. With the increase in birth rate experienced over the last few years many areas are experiencing a shortage in school places and this is exacerbated by a very poor existing building stock including the use of many prefabs which are not fit for use.

Many stakeholders acknowledge that while the shared educational campus approach will not be the predominant model of school provision, they believe that it will form one of the main strands of school construction into the future. This will be driven by the local context of each school, the space available on each existing school site and the availability of suitable sites adjacent to the existing site, in close proximity to the local population, or elsewhere in the school catchment area.

The requirement for larger school sites to accommodate the campus approach causes concern for many stakeholders who point out that a larger site will often not be available within local communities and therefore the campus will have to be located on the outskirts of a town, or a location further from the local community to be served. It has been suggested that schools should be stitched into their community in a location so that it is walkable and bikeable for local children. This is especially true for primary schools where smaller children may have a shorter travel range. Locating a primary school on a campus with other schools will necessitate a larger site and therefore there is a better chance that this will be pushed further away from the homes of the children. (These issues are examined in greater detail in Section 5.4).

This issue of location was also discussed by representatives of 'Educate Together' schools who would support the idea of schools remaining close to the community. Educate Together,

who are well represented on the five year major project list are nonetheless supportive of the shared educational campus as long as it is in an appropriate location. An example quoted was the approved 'Ballymakenny College' project where an Educate Together post primary school is to be built on a shared site with the recently completed Scoil Oilibhéir Naofa in Drogheda, Co. Louth.

Site location was also discussed with stakeholders who highlighted the role of the local authority in terms of for zoning land for educational use as part of their development plan. In many cases the local authority will provide the sites, or will be heavily involved in the site acquisition process. This process is not always transparent and the location of educational sites is not always in the best interest of the community as commercial interests can often influence the process.

Benefits

A larger campus site provides much needed space for the provision of schools within a catchment area which may not be otherwise available, resulting in the delay of school building projects.

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There are plenty of traditional examples around the country where primary and post primary share a site, and in some cases there are pre-school facilities also provided in conjunction with the primary school. To some extent, the SEC model exists; the challenge is to get the schools to properly share the site, facilities and resources

Challenges

While the SEC is government policy many stakeholders others believe that the shared campus on the scale of the Monaghan project will only be applicable in a handful of cases.

The issue of school location and proximity to the local community is a key concern and there is a fear that the campus approach will push schools further away from the community it serves.

"What does the location of a school say to children?"

(Quote from stakeholder who contends that putting children out on the periphery on a busy relief road or similar segregates them from the rest of society, especially adult society)

6.1.2. Site and facility sharing

Over the course of these conversations with the stakeholders, the view was expressed by many that the idea of a site shared by primary, post primary, further education, and community facilities seemed quite idealistic or aspirational and there was the fear that it would prove impractical in reality. On more than one occasion the interviewees asked whether the shared educational campus was similar to hospital co-location, an opinion which manifests a certain amount of suspicion. Some stakeholders believed that while the SEC is government policy it may be quite aspirational and may be applicable to no more than a handful of schools.

There was also concern expressed about different schools cooperating in the manner required for a truly shared campus. While the location of primary and a post primary school on the same site is not untypical in Ireland. In addition to this some primary schools have preschool facilities (mainstream or special needs such as an Autism Spectrum Disorder (henceforth referred to as ASD) Unit) onsite or included in the building which act as feeder schools. The critical difference between these arrangements and the SEC is that there is rarely any more than pre-school, primary and post primary schools and there is very little interaction between the two.

School designers and management who were contacted reported that in many cases, where primary and post primary schools share the one site, there is typically a desire expressed by boards of management and school principals, to keep the two schools very separated and to minimise any contact between the students, unless it is strictly controlled. This was echoed by the teachers interviewed, who expressed concerns about increased student numbers of various ages sharing facilities and the resulting lack of control and possible vulnerability of the younger students. However, it was also recognised that some of concern is based upon fear of the unknown and the some interviewees acknowledged that a culture of excessive student control and overzealous duty of care may also influence management in terms of how responsibility is delineated and schools are managed.

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Beyond this some stakeholders expressed concerns about losing their schools identity and the danger of a shared campus becoming more anonymous due to enlarged campuses with various entities.

It was acknowledged by many stakeholders that the higher density of facilities on one site offers a critical mass in terms of greater service provision that might not be possible for single facilities in single sites. While this sharing of educational, sporting and recreational facilities and potential application for shared funding etc. has obvious benefits, it is the sharing of facilities, expertise and resources between special schools and mainstream schools where many stakeholders saw potential benefits. It was agreed that many special schools are isolated from mainstream schools and society and that the possibility of greater integration and interaction may be realised if these schools shared a campus.

Benefits

If a special school is located adjacent to a mainstream school this proximity, if properly coordinated will allow borderline students to interact in both environments and therefore the boundary between mainstream and special schools are blurred in a positive way.

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Shared facilities / resources could be provided that both schools could benefit from (one scenario outlined was where girls from the ASD Unit in the senior school come down to the junior school for literacy, numeracy, and even story time etc. – the students come with their Special Needs Assessment (henceforth referred to as SNA) and resources so the benefits are mutual)

There are often frustrations among SEN teachers that while they are expected to cater for SEN students, they are not adequately resourced to do this. Having a Special School next door might increase access to specialist services (educational psychologist), facilities and resources.

Sporting, social and recreational activities could be shared.

In terms of acceptability, if a child would genuinely be better in a special school then it may be more acceptable to that child and the parents, if the child was going to school on a mainstream campus. This might also allow the child to be closer to siblings and be able to travel to and from school with them etc.

Many stakeholders expressed the view that adults and especially some teachers underestimate the maturity of many students and do not trust them enough, especially in relation to how they interact with students with special educational needs.

Challenges

The SEC was compared by some stakeholders to the hospital co-location model, an opinion which manifests a certain amount of suspicion.

Many stakeholders believed it would be very difficult to get school staff and boards of management to co-operate to the extent needed for a meaningful sharing of the campus. Stakeholders expressed the fear of losing their identity on a large campus especially in terms of school traditions and sporting activities.

6.2. Educational design in the twenty first century

The Shared Educational Campus concept presents complex questions, many of which have been addressed so far in this report. However in terms of specific matters relating to the design of educational buildings, the consequences of adopting an SEC approach needs to be examined. For the purposes of this research some key areas relating to Pedagogy, Policy and Planning and Design have been identified as some of the key drivers in educational design for the twenty first century. The Shared Educational Campus concept is examined in this context and a brief summary of the main benefits and challenges are outlined in each case.

6.2.1. Integration and inclusion

The concept of sharing different educational facilities across a wider range of age groups on one campus is gaining in popularity internationally Blyth (2011a) reflects on the evolution of learning environments and questions how shared educational spaces will handle mixed student populations. "Whilst primary, post primary and higher education are seen as distinctly separate, the closer engagement between universities and upper post primary schools, for example, and their use of shared teaching spaces, raises intriguing questions about how university facilities for the future will need to accommodate increasingly mixed populations."

Benefits

The shared campus concept seems to align well with many characteristics for the design of educational spaces for effective learning in the twenty first Century. In discussing effective learning, Atkins points to the need for cross-sector collaboration, co-ordination and integration, and stresses the need to "Maximise integration and shared use of educational, wider community and recreational services and facilities through co-location and collaborative approaches to management and shared use agreements." (Atkins, 2011)

Many of the exemplar schools described in the 'Designing for Education: Compendium of Exemplary Educational Facilities 2011' (OECD, 2011a) are based on this shared principle and are categorized as "multiple level" facilities which are institutions that cater for a range of educational levels and age groups.

As outlined by many stakeholders the location of special schools adjacent to mainstream schools provides opportunities for greater integration between students with special educational needs and mainstream students. A representative from the PBU stated that Educational policy is now geared towards the education of as many children with Special Education Needs (SEN) or disabilities as possible in mainstream classrooms. While this is appropriate for children with mild to moderate learning difficulties or disabilities, it may not be appropriate for children with severe to profound disabilities or learning difficulties. Therefore there will always be the need for special needs schools and it is important that these are not isolated from mainstream schools. The campus approach offers the chance to locate special need schools adjacent to mainstream schools and provide carefully managed interaction between them. Some of issues raised were as follows:

1. Sharing a campus would allow interaction between students and possibly assist in breaking down barriers between people and help in 'normalising' disabilities and special needs.

2. Interactions between students can result in 'Buddy Partnerships' which is a programme where older kids might mentor another child or take them 'under their wing'.

3. On the campus there would be opportunities for play integration

4. Mobility zones could be threaded through the campus for individuals with mobility or sensory difficulties.

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The advantages of campus sharing between special schools and mainstream schools arose in conversations with most stakeholders and it would appear to have much support among designers, school management and teachers.

The shared educational campus has the opportunity to create a sense of community within the campus through the integration of many age groups and thus exposing children to real life.

"School must be seen as a microcosm of society where children aren't overly cocooned".

(Quote by stakeholder who believes schools should provide some real life experiences)

Challenges

One of the main challenges around shared educational campuses and integration and inclusion centres on the issue of location. Community interaction is critical to an inclusive educational approach and if a shared educational campus ends up in a location removed from the local community then this will have obvious negative consequences.

6.2.2. Lifelong learning

As discussed in Section 2.4.1 lifelong learning is an important part of the educational landscape and that the SEC concept if integrated into the community could support the objectives around lifelong learning and education. Many of the stakeholders acknowledged this and pointed to some key benefits and challenges as outlined below.

Benefits

The life-cycle campus approach has the potential to cater to a wide range of age groups and levels of education and thus makes this concept of lifelong learning visible and provides a tangible environment for people of all ages to interact, learn from each other and witness first-hand the continuum of learning that is possible throughout one's life.

Challenges

Again, one of the main challenges around shared educational campuses and lifelong learning revolves around the issue of location. The success of lifelong learning may be closely aligned with community interaction and education which is embedded into people's everyday lives. As stated earlier, if the shared educational campus is dislocated from the local community it intends to serve then lifelong learning may become a victim of this dislocation.

6.3. Planning and Design

The geographical location, the relationship to local context and physical design of school building and associated outdoor spaces is critical to successful education. This is particularly relevant to the more inclusive, child centred and community driven educational models that are now evolving.

6.3.1. Spatial Planning

It has become apparent that the location of schools and school sites is greatly influenced by zoning, local development plans and the provision of sites by local authorities. While national policy and local authority policy promotes more compact urban development and the provision of educational facilities in the heart of communities the shared educational campus has consequences for spatial planning and the provision of infrastructure such as public utilities and public transport.

One of the interviewees commented that instead of limiting the research to the campus approach, it may be useful to look at existing urban areas and examine the existing school facilities, community facilities, sports facilities etc. and see how these can be optimised to meet the education needs of people. This approach embeds the facilities into the fabric of the community, and locates them within communities where they are needed. This also provides facilities within the 'ped shed'.[11] or walkable catchment area of the highest number of local

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[11] Ped-shed is a term used in the context of walkability in urban areas and describes walking distances from a central point in a community by defining an area, or boundary, to a pedestrian catchment area. It comes from the geographical term 'watershed' which describes the boundary or dividing lines between two drainage basins.

people. This is particularly important for primary children who have a shorter travel range (independent or accompanied), whether this is walking, cycling or in a 'walking school bus'.

It may be worth looking at the pilot 'School inventory project' which was launched by the DES in 2012 to carry out a detailed survey of a five pilot locations throughout the country and to look at the accommodation associated with the existing school facilities in these areas. The project also involved an appraisal of school sites, the feasibility of school expansion, adjacent and local site options and an overview of community assets and public amenities which may complement the school facilities (Department of Education and Skills (IRL), 2012d).

This pilot project has the potential to take an integrated approach to school provision within a community and to leverage existing community resources and assets as part of the educational solution. Notwithstanding this approach the following sections outline the benefits and challenges of the shared educational campus approach in terms of spatial planning.

Benefits

The location of a number of educational facilities on one site has a number of advantages for the provision of services where the critical mass associated with a shared educational campus enable efficient provision of public utilities and public transport.

In line with the issue of public transport, a shared educational campus will provide schools across a wide spectrum of ages, therefore parents will have one drop-off point, or older siblings can accompany younger children to school. In fact with the provision of adult education, it may be the case that older family members such as uncles or grandparents may be attending the campus and therefore escort children to school. Walking school buses, or dedicated cycle lanes can also be provided because of critical mass.

The proximity of schools to the local population may be less of an issue at post primary and further education level where many students travel to the school form a wide catchment area despite the presence of other schools closer to them. This is often a matter of a choice and individuals choosing a school that best fits their educational needs (see appendix one for further discussion on enrolment policies and catchment areas)

Challenges

If however, the shared educational campus demands a larger site this may force the relocation of facilities to the outskirts of a community to green field site which is at odds with much compact urban planning policy. A school located further from the heart of the community may increase private car use and the associated energy consumption and CO_2 emissions.

Many schools are an essential part of the local community and bring pedestrians and cyclists onto the street along with the ambience of youthful activity. Many stakeholders referred to the benefit of schools to the local economy in terms of lunch time activity and parents who are bringing their children to school then shopping locally. If these schools are moved to the periphery this would have a detrimental impact on local businesses and services and also to the atmosphere in the town and the associated passive security and public realm activity. As an example, one of the stakeholders objected to the location of the Monaghan campus citing its location its location which is over 2km outside the town, on the N12, (a very busy road) and near a large roundabout, as not the most appropriate and child centred approach to educational facilities.

"There can be a fairly negative attitude to school provision and are often seen as a problem to be dealt with…. listen to the amount of complaining that's done when the schools go back after holidays and it effects traffic!"

(Quote from stakeholder who believes that the attitude towards school provision and school sites needs to change towards a more positive outlook)

6.4. Campus design

Campus design and educational architecture is evolving in line with pedagogical development and more open plan, child centred, learning–by-doing teaching practices are having an impact on the layout and form of schools. While this project focuses on primary and post primary education, it is important to look at third level campuses, especially some of the very attractive university campuses that are typically admired by users or visitors. Some stakeholders suggested that while school design is often pre-occupied with getting a high level

of parking in a centralised location (often taking up prime space within the campus, university campuses are often the complete opposite. Cars are often restricted from the campus, or maintained to the periphery, while the central spaces are dedicated to large squares or quadrangles which give a very collegial atmosphere while providing high quality social spaces as a focus for the university community.

Benefits

The shared educational campus provides greater opportunity for integrated facility provision and shared facilities which would not be possible on a single school site.

If designed properly, taking a lead from many universities, the campus environment could provide attractive centralised social spaces to create a thriving heart for the campus community and a child friendly social space for the broader community.

Challenges

Many stakeholders have expressed frustration with the typical interaction and design process that takes place during a school design project. It was agreed that the briefing process and stakeholder engagement process would have to be greatly improved to capture user needs and the design goals for the new or renovated/ extended school. The experiences to date of some of the principals and designers interviewed did no inspire confidence that the complex design requirements across the wider spectrum of needs of a shared educational campus could be accommodated successfully by the existing design process.

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It has been stated that successful design for primary school children is achieved by smaller scale, age appropriate more intimate environments which take cognisance of the educational, social and physical needs of small children. This may not be achievable if these facilities are to be shared by users across a broader spectrum of ages.

It may transpire that many school spaces such as classrooms, play areas, libraries etc, will need to be age appropriate. The design will need to reflect the specific needs of specific age groups. This may not be such an issue for post primary schools but may certainly be an issue at the primary level.

This issue could be overcome by providing distinct spaces or buildings for each school with dedicated external spaces and play areas which are designed specifically for certain age groups.

In line with this, the areas of the campus that are shared amongst all users might be limited to the external campus areas and specific shared faculties.

6.5. Sustainability in particular energy

Sustainability and in particular, energy consumption have become mainstream design concerns. However in the educational setting these concerns take on additional significance when the built environment is not only relevant in terms of efficiency and responsible resource use, but also as an educator for the students who interact with it on a daily basis. The shared educational campus has an impact on these complex issues and needs to be carefully considered.

Benefits

As discussed earlier, the higher density of facilities on a site enable greater critical mass for certain services. In terms of sustainable design a campus approach may allow an integrated environmental design where economies of scale facilitate onsite waste water treatment, recycling and waste to energy, food growing and use of waste to compost, rain water recycling, or district heating schemes using highly efficient centralised biomass boilers etc. This economy of scale may also enable greater procurement power and ongoing management efficiencies.

Challenges

Again, many of the challenges refer to location and the negative impact of a more peripheral site which entails new service provision to a green field or even Brownfield location.
There is also the issue of new build as opposed to the reuse of existing buildings and all the embodied energy and material saving s that entails.

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6.6. Increased demand for education and reduced budgets

6.6.1. Increased need for school places

The growth of the Irish population is putting enormous pressure on the existing educational infrastructure which is already dependent on many prefabs and dilapidated buildings. The school building programme will provide 275 new schools up to 2016 but it is acknowledged that this will not completely deal with the issue of increasing school demand, especially at post primary level.

Benefits

The provision of shared educational campus if provided on new sites may provide larger sites for the provision of larger schools and thus cater to greater numbers of students.

Challenges

New sites for shared educational campus will require rezoning and planning permissions which will slow down the process and add costs.

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6.6.2. Limited budgets

Benefits

Out of town green field sites with no existing buildings are far more attractive for Public Private Partnerships as there are fewer unknowns in terms of site or building conditions and site access and working hour conditions are rarely as restrictive as urban sites. Also new build is often cheaper than retrofitting and in many cases it is cheaper to achieve higher standards in terms of energy, accessibility and the provision of ICT.

Once the existing schools are vacated then these buildings and sites may be available to the market thus generating funds to be re-invested in schools.

Challenges

If school is to be maintained by the department or they cannot sell it, then the use or renovation of the existing school for other purposes becomes an issue.

6.7. Conclusion

At the beginning of this chapter a number of questions were set out. These included: the need to determine the extent to which SECs will be implemented in Ireland; an examination of some of the main drivers in education design; and an investigation of the main benefits and challenges of the SEC approach.

While a the key benefits and challenges are presented above in Section 6. there are a few outstanding issues which require careful consideration in the context of a UD SEC.

The issue of how to define an SEC and whether there is a minimum threshold for the number of schools which must be present was discussed at length with many stakeholders. While the Monaghan Campus approach may not be adopted on a wide scale it is very likely than many new schools will share a site with an existing school or another new school. On the face of it this looks like a simple proposition. However, if the site and facilities are shared between these two schools in any kind of a meaningful way, then this becomes an SEC.

If this happens at primary and post primary level then the age groups of the day students alone will range from five years to eighteen years with all the special educational needs that mainstream schools are now embracing. If the school is open in the evenings, or during school holidays for night classes, or if the sports facilities are open to the public, then the user needs must include for older people/younger people and therefore factor in reduced mobility, sensory difficulties and impaired cognitive abilities such as dementia.
If the provision of preschool facilities are included on the campus, as witnessed in some schools which formed part of this consultation, the age profile will then extend down to children who are as young as three years of age.

 In addition to this, if special schools are incorporated onto the campus in the integrated manner as proposed by many stakeholders, then another range of more severe or profound special educational needs will need to be included into the design of the campus and individual buildings.

Without getting into crèches or third level educational facilities, a SEC as outlined above is already a very complex environment which must meet a wide spectrum of ages and educational needs.

As pointed out by many stakeholders, there are many existing situations where 2 or more schools share the site. Also, as referred to above, many new school developments will result in two or more schools sharing a site and therefore it was agreed that the definition of an SEC should expand further than applying only to very large campuses with many schools and public facilities.

A shared educational campus comes into play when two or more schools share the existing or new site and facilities in a meaningful manner. The shared educational campus approach can thus arises very quickly and requires careful design to ensure the existing or the new site caters to a wide range of user needs, regardless of age, size, ability or disability, through a Universal Design approach

As illustrated in throughout this chapter the interviewees expressed views about the SEC concept both in terms of benefits and challenges. The main benefits of the SEC revolve around providing integrated services on one site for a wide range of users and for a wide spectrum of ages. The SEC was seen as an opportunity to break down the barriers not only between SEN and mainstream education, but also between schools and their communities.

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Location was seen as one of the key considerations for the SEC. The demand for larger sites could result in the campus being pushed to the periphery of the community and therefore undermining many social, environmental and economic sustainability objectives such as walkability, proximity to the users of the school, preservation of the community, and supporting local businesses in inner urban areas. The issue is not so much about the campus approach, but the location of the campus.

The SEC approach supports many aspects of effective and inclusive education for the twenty first century. However, location, integration into, and with the community are critical. The SEC must be an integral part of the community.

Overall the UD approach, which seeks to balance the needs of all users, and to maximise inclusion and social participation provides an ideal framework to address many issues relating

to the SEC. Concerns about age appropriate spaces may be dealt with by ensuring that distinct spaces or buildings are provided for each school with dedicated external spaces and play areas which are designed specifically for certain age groups. The areas of the campus that are shared among all users might be limited to the general external campus areas and specifically designed shared play / amenity areas and faculties.

The main concerns outlined in this chapter which among others involve: appropriate and safe interaction between different age groups on the campus; the level of interaction with the community; and the safety and security issues that come with this, are design and management issues that can be addressed through the UD approach.

6.7.1.   Key issues arising from chapter 6

Key Benefits as perceived by the Stakeholders

- Provides greater integration across age groups and with the community.
- Potential for greater integration between mainstream and special schools if they are located on the same site in order to break down barriers and the share of facilities, resources and expertise.
- The location of primary schools, post primary schools, and in some cases pre-schools, on one site is not that uncommon so the concept is not entirely new. The issue is more around getting schools to share facilities in a more integrated manner.
- The Shared Educational Campus has the potential to create a real sense of community on the campus and thus reinforce the school as microcosm of society where children are not overly isolated from other groups in the community.
- In support of the above, if designed properly, taking a lead from many universities, the campus environment could provide attractive centralised social spaces to create a thriving heart for the campus community and a child friendly social space for the broader community.
- Supports the concept of lifelong learning and provides a tangible example of learning as a continuum throughout a person's life.
- Supports the government's policy on shared educational campuses in areas of demographic growth and also aligns with other international educational campus models
- Provides integration of services on one site and in turn provides an economy of scale for integrated sustainable design measures which may not be feasible on a single school basis.
- Supports aging policies and aligns with the 'life course' perspective promoted by aging advocacy groups.
- Single sites with high densities of users makes public transport or improved cycle infrastructure in addition to parents or guardians benefiting from a single drop off point

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- for more than one child, or the opportunity for older siblings to accompany younger children to school.

- If the campus is composed of a larger site then there is the opportunity to provide larger more spacious modern schools which are fit for purpose in the context of effective teaching. This would address increased demand and provide better facilities.

- Larger green-field, or brown-field sites are often more attractive to private Public Partnerships due less complicated construction conditions and fewer unknowns and therefore can result in lower construction costs and improved delivery times,

Key Challenges as perceived by the Stakeholders

- If the shared educational campus is forced to the periphery due to larger site needs this will have a negative impact across the board in terms of dislocation from community, developing Greenfield sites and reinforcing unsustainable patterns of travel.

- In line with the above there are concerns about schools leaving central urban areas and the negative impact on local businesses and the public realm through the absence of school related pedestrians, cyclists and general activity

- Issues with multi-school co-operation and governance and management

- Fear of losing school identity and the creation of more anonymous school environments.

- Concerns about increased onsite traffic, greater numbers of students and the potential for problematic interaction between younger and older children, especially around children with special educational needs, in terms of boisterous play and injuries. There are also concerns about adult students interacting with younger students in relation to over sexual abuse or inappropriate contact.

- The existing briefing and design process is considered inadequate to deal with the complexities of meeting multiple needs across a wide spectrum of ages for various schools

- The need for age specific and age appropriate design for school spaces, especially for primary schools, may reduce the capacity to share spaces other than the campus in general and certain shared facilities, with other users and age groups on the site.

Overall view as expressed by the Stakeholders

- A shared educational campus will need to provide Universally Designed age appropriate spaces which can operate with some level of independence within the context of a shared campus with graduated levels of sharing. Many concerns around identity and safe interaction of age groups could be handled in this context by graduated sharing where the issues are around the combination of Universal Design and good management.

- In line with this, a new culture must develop around the briefing and design process which engenders meaningful stakeholder engagement. This must take place, not only throughout the planning and design phase, but also through the ongoing management, adaptation and evolution of the SEC.

- New management structures will also have to be created to achieve the level of integration and sharing required if a the SEC concept is to work in a meaningful manner.

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7. Stakeholder Workshops

Bringing different disciplines together

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7.0. Introduction

Two stakeholder workshops were held during 2013, both of which were held at the National Disability Authority, Dublin. The first took place on December 16th 2013 and the second on March 11th 2014. The primary aim of these workshops was to engage once again with stakeholders in relation to the Universal Design (UD) of Shared Educational Campus (SEC) , and to keep them abreast of the research findings while gathering feedback to inform the research process and findings.

7.1. Workshop 1 – Aims and Outcomes

Workshop 1 was attended by over 25 individuals and comprised school principals, teachers, members of the Department of Education and Skills, Department of the Environment, Community and Local Government, special education and disability representative bodies, architects, planners, landscape architects and engineers.

The aims of workshop 1 included the following;

- To discuss the Shared Educational Campus (SEC) concept using national and international examples and to gather feedback from the stakeholders about their experiences, needs and preferences in relation to the SEC concept

- To consider how Universal Design can inform location, local access, and masterplanning of an SEC to create an inclusive learning environment for all users regardless of age, size, ability or disability, while also helping to break down the barriers between mainstream and special education needs

- To use feedback from the workshop to inform and direct the research findings and recommendations which will be prepared on behalf of the Centre for Excellence in Universal Design at the NDA

To help with these process group activities were conducted using a hypothetical school campus. The workshop attendees were broken into groups and each individual within the group was given an information sheet which outlined a 'persona', which described a typical campus user and outlined their specific situation in relation to the hypothetical campus.
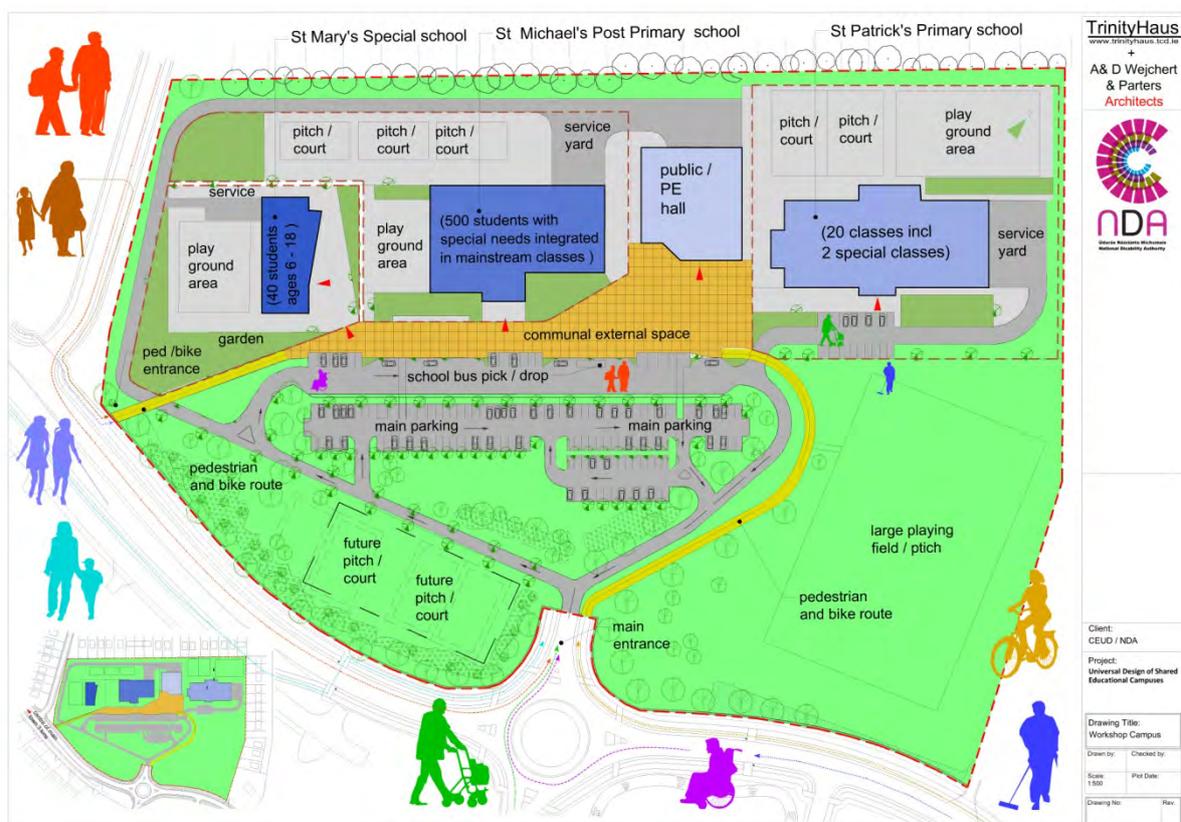
Figure 39 - Hypothetical school campus provided to stakeholder groups

Margaret

Name – Margaret

Age – 55 yrs

School – Margaret teaches junior cycle maths and science in St. Michaels

Margaret cycles most days a distance of 5 kms but doesn't really enjoy the stretch of road leading up to the school. While there is a cycle path the road is very exposed and not that pleasant a cycle. She also laments the lack of covered bicycle storage and hates dealing with a wet saddle!

Figure 40 - An example of one of the workshop personas

Each individual was asked to consider the educational campus from the perspective of the persona they were given and to provide feedback on this basis using an A4 handout which contained a number of key themes under which the participants could structure their responses. Feedback was recorded using these A4 handouts, and during the workshop from feedback via rapporteurs from each group who presented the issues emerging from each group.

7.1.1. Main outcomes

While the participants were asked to comment on the hypothetical campus, much of the feedback had broader significance for the SEC concept regardless of the specific campus design or location. Therefore in order to make the feedback usable in the wider context of this research the comments have been generalised to make them applicable to this research in

the widest sense. For consistency, the feedback from this workshop is summarized under the same heading as those contained in the A4 handout mentioned above.

General Issues

- School provision and the design of educational environments must first and foremost support holistic educational objectives and should not be about adopting any particular design model for the sake of it. Is a single campus the right way to go?

- It is critical to adopt a cross sectoral decision making process to develop the design brief including site selection

- The size of the campus must be carefully considered. While very large schools or campuses may be too institutional, there may also be advantages for education in terms of economy of scale

- The school environment should reflect 'normal life' and facilitate 'real life' experiences

- The school should promote integration of all users especially between SEN and mainstream

- Encourage inter-generational mixing on the campus

- Reuse existing assets within towns rather than move to green field sites for convenience of construction

- Creating an environment that supports the independence of all campus users must underpin the location and design of the SEC

- Diversity of school provision and design is important as one size does not fit all

- Choice of schools and location is important for all users including students and parents

- The hierarchy of travel must change away from prioritising cars towards more people friendly solutions which support walking and cycling

- Provide efficient transport options in terms of public transport

- Overall the campus should allow the user to fully experience the environment and provide a link between the senses and the local environment / community / external space

- Promote the idea of citizenship and promote community ownership of the school

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- The SEC approach will require new campus wide management structures

Location

- Ideally the SEC must be central or at least close to the community as opposed to edge of town locations

- Ease of access from community and general accessibility is vital. It is also important to provide alternate access points from the community to the campus

- The location should be safe for all users including access routes and approach

- The location should allow prioritization of pedestrians and cyclists

- The campus should promote meaningful connections between individuals and their local environment or community

Approach and Boundary Conditions

- Re-configure the hierarchy so that pedestrians and cyclists are prioritized over cars

- Provide proper walking and cycling infrastructure to ensure sustainable forms of transport

- Campus security is often too reliant on a secure boundary and single controlled points for entry. A more integrated approach to security is required

Entering and Exiting Campus

- Increase of access points from the community

- Take sensory engagement into account when considering entering and exiting points

- Provide mechanisms to support way-finding in relation to reaching the campus or entering and exiting

- Provide people-friendly routes which support pedestrians and cyclists

- Again safety for all users is critical in entering and exiting the campus

Moving Around Campus

- Carefully consider wayfinding and provide clear signage, maps and good levels of artificial lighting

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- Reduce conflicting routes that may exist between various groups on the campus to encourage effective and comfortable movement around campus

- Maximise accessibility for all users on the campus

- Design circulation routes with maximum surveillance for passive security

- Incorporate elements that engage with the senses and which can aid circulation and navigation

- Make provision to address wet days (i.e. covered outdoor space)

- Facilitate activities that promote and encourage movement (i.e. physical exercise) that are also aligned with learning (i.e. nature walks, horticultural sites)

- Investigate technology-based solutions such as RFID for wayfinding and orientation on the campus

External spaces including play areas, communal spaces, sports fields or courts, parking, etc

- Accessibility to and within key external spaces for all users is critical

- Consider a 'village like' layout for school campuses

- Encourage integration of all users on the campus (reduce isolation by addressing barriers to effective integration)

- Use various surfaces and planting to engage with the senses and create a softer, more natural environment

- Promote engagement with external spaces and in turn among the campus users (i.e. include more social spaces / areas / seating; art spaces; horticultural spaces; natural play areas, etc)

- Consider colour-code areas to provide visual cues about the use and ownership of various spaces

- Again make provision to address wet days (i.e. covered outdoor space)

Approach to individual buildings

- Safety of all individuals is critical in terms of approaching and entering on-campus buildings

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- Make sure there is a clear logic in terms of building layout, signage and lighting

- Accessibility to all buildings is critical for all users (i.e. for visual impairment consider surface textures to address this)

- Provide carefully designed social spaces and play areas (including passive play areas) to promote interaction

7.1.2. Conclusion to Workshop 1

Overall the feedback from the workshop reinforced many of the issues raised during the stakeholders interviews. Some of the workshop participants questioned the campus approach in principle asking whether this was necessarily the right format at all. This concern was of particular relevance when the campus location was not central to the community and participants suggested that existing school facilities and local building assets should be maximised before any green-field options are examined. In line with this the issue of location was critical and all stakeholders agreed that any school should be central to the community and integrated with the community in manner that places the child in the community and provides real life experiences. The workshop also identified a range of design measures that must be considered as part of any UD approach but the issues around cross-sectoral decision making, a shared briefing process, and new forms of management emerged as critical factors to the successful implementation of the SEC approach.

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7.2. Workshop 2 – Aims and Outcomes

Workshop 2, which took place on March 11th 2014, was attended by many of the stakeholder who were present at the first workshop. There were over 25 individuals which comprised a mix of organisations and individuals including: school principals; members of the Department of Education and Skills; the National Transport Authority; special education and disability representative bodies; architects, planners, landscape architects and engineers.

In advance of workshop 2 a document was circulated to all stakeholders which included an executive summary of the preliminary research report, and a summary of the key research findings up to that point. This document formed the basis for discussions at the workshop and was used to structure the workshop activities and capture feedback.

Overall the aims of workshop 2 included the following;

1. To recap on the first workshop and briefly outline the Shared Educational Campus (SEC) concept in the context of UD.

2. To prioritise the key themes and findings contained in the preliminary research report, and summary of the key findings, as circulated to all stakeholders prior to the event

3. To identify routes and opportunities for implementation based on stakeholder feedback.

4. To use feedback from the workshop to inform and direct the final research findings and recommendations report.

7.2.1. Main outcomes

As described above a document was circulated to all stakeholders and this formed the basis for the workshop. The key themes contained within this document included the following;

- Evidence based educational provision

- The challenges around bringing different schools and organisations together on a shared site

- Location of an SEC and integration into the community

- Breaking down barriers between mainstream and special educational needs

- Creating child and community friendly educational environments that support student-centred learning and lifelong learning

- Students, educators and the community shaping their own schools

- Design of key spatial and physical dimensions of an SEC

Following a presentation which outlined the research key findings up to that point, the workshop participants, who had been organised into groups similar to workshop 1, were furnished with copies of the preliminary finding and asked to complete two tasks. The first task involved a review of the research findings to identify gaps, suggest changes, and priorities the findings in accordance to their importance.

Evidence based educational provision	• School provision must first and foremost serve the best interest of the child, the family and the community, while facilitating age appropriate, child-centred, lifelong education which is an extension of the home and a preparation for life. The adoption of any planning or design model must be not be driven by any specific approach but instead grounded in the needs and preferences of the community and reinforced by evidence based decision making.
The challenges around bringing different schools and organisations together on a shared site	• Recognise the challenges around bringing together various educational or community organisations where there may be a difference in objectives, tradition, or ethos. • Identify an appropriate structure for overall campus management and integration while maintaining individual school identity and autonomy
Location of an SEC &integration into the community	• There is a conversation required about the relationship between schools and the community to agree on where to locate schools how best to integrate them into the community in a meaningful way. • The geographical location of an SEC in relation to the catchment area is critical to its success. Generally it must be located centrally within the community to ensure community integration and ease of access for pedestrians, cyclists and public transport. The size of a campus, which is determined by land availability, the overall student numbers and facilities to be accommodated, permitted or desired building heights, parking requirements, connection to public sewer and other such factors, will also influence the location depending on whether or not a suitable site is available within the community. A balance

Figure 41 - Sample of research findings handout as provided in workshop 2

The second task focused on the proposal of recommendations that would help identify routes and opportunities for implementing the key findings. It was suggested to the groups that these recommendations could involve different design and operation levels and incorporate aspects of planning, design or management. It was also suggested that the recommendations should include various means of implementation such as research, legislation, policy, or guidelines. The outcomes from these two exercises helped greatly in refining the findings and also in providing a wide range of both aspirational and pragmatic recommendations that have been used to inform the final research findings and recommendations as presented in this

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document. These amended and refined findings along with the recommendations generated in Workshop 2 are detailed in the next and final chapter of this report.

Without getting into the details of these findings at this stage it is worth highlighting a few key issues which emerged strongly from the workshop, these are outlined briefly below.

Student and Community Centred School Provision

- This point reiterates one of the first issues emerging from the interview process and Workshop 1, that school provision should be about providing a holistic education for all students in an optimum location that provides support, and is supported by the community. As such school provision should not be driven by economic, planning, or infrastructural issues; these should instead serve the education system.

The Shared Education Campus Approach and Policy Framework

- It was suggested by many attendees that before any detailed consideration is given specifically to the SEC approach, it may be worth stepping back from the campus concept and firstly considering a framework to fully understand the needs of all stakeholders to determine the best approach for the community. For example, in certain locations, it may be important to consider which would present a better solution - a single campus versus a 'distributed learning' approach.

- In line with the SEC proposal in the programme for government it would be useful for the DES and other relevant government departments to issue a policy statement on SECs to help define the campus approach, establish policy objectives and set out a framework to engage with key stakeholders and provide further guidance for the relevant departments and local authorities.

Location and Community Integration

- In line with various government policy and planning and design guidelines which promote more compact development, there was universal support for the idea that schools should be at the heart of the community and should be considered as a vital piece of social infrastructure.

- In support of the above it was argued that schools should use existing community facilities and while also adapting existing non-educational buildings as schools where available and appropriate.

Design Process and Engagement

- The school planning and design process needs to be community driven and the briefing process must identify, communicate and implement community needs. It was widely acknowledged that the existing design process does not engage sufficiently with the community or the school and that the decision making process must be changed to reflect a prioritisation of educational and community needs.

- To enable this process a framework to engage with key stakeholders must be developed such as community forums, staff liaisons, or 'design champions' who can advocate for certain groups and take part in the design process.

Planning

- Due to demographic pressures and years of underinvestment current school provision is largely reactive as opposed to proactive and while this is now changing it was argued that a more integrated approach to school location, planning and public transport is required for future development.

- Local authorities are critical to the delivery of an integrated school planning approach. As such, implementation of all school policy pertaining to local authority Development Plans, Local Area Plans or those contained within the various national urban design or planning guidelines is vital. If necessary additional measures to implement or enforce these policies may need to need to be put in place.

Governance, Management and Liability Issues

- New management structures required for overall campus management and integration while maintaining individual school identity and autonomy.

- Many stakeholders raised concerns over excessive control of children's natural behaviour, play and exercise during school hours which may stunt child development and limit meaningful integration. Liability and legislation relating to litigation which impacts on children's physical activity in school must be carefully handled, or amended if required, to enable enhanced integration, and an environment that supports healthy child development.

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- In light of this any management structures must incorporate liability and insurance issues between the various organisations without creating segregation.

Information Communications Technology (ICT)

- The use of ICT needs to be considered from the very start and throughout the entire design and engagement process. ICT should be considered at the macro-, meso-, and micro- scale in terms of planning and design of SECs.

Implementation and Next Steps

- As mentioned above a policy framework outlining the key SEC objectives would help bring more clarity to the issue.

- Use case studies and to evidence based research of exemplars to inform future policy.

7.2.2. Conclusion to Workshop 2

Workshop 2 proved to be a very informative event where there was broadly a consensus in relation to the main themes presented. As discussed above, some key themes from the interviews and the first workshop were reiterated, while some new issues were introduced. Overall the second workshop brought greater clarity to the research findings and helped prioritise the key issues; all themes are fully described in the next chapter.

7.3. Summary and overall conclusions

To summarise, both workshops were well attended and the stakeholders provided detailed and often passionate feedback. The aims of the workshops included: informing attendees about the SEC concept nationally and internationally; gathering feedback from stakeholders about their needs and preferences; examining how the UD approach could support integrated planning and design; and, finally using stakeholder feedback to inform and shape the research findings. The workshops achieved these aims but also indicated a greater concern around school provision generally. The attendees expressed clearly that education should be a national and local priority and that schools should be viewed as key pieces of social infrastructure where decision making involves all stakeholders at all levels.

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7.3.1. Key issues arising from chapter

- School provision must prioritise holistic educational objectives that best serve the student and the community

- Students, staff and communities must play a key role in shaping their own schools through stakeholder consultation and participatory design process and this must be allied with a cross-sectoral approach to school planning.

- Ideally a school should be located in the heart of the community to maximise integration, provide access for all members of the community, and promote sustainable modes of travel.

- An SEC should strive to break down barriers between mainstream and SEN, and between the school and the community.

- The key to a successful SEC will involve innovative campus management structures that protect each schools identity but facilitate enhanced co-operation.

- An SEC must strive to create child and community friendly environments built at a human scale that generate a sense of community.

- The planning and design of an SEC must provide environments that are accessible, usable and easily understood by all users. Increased access points to the campus from the community, well designed circulation supported by good wayfinding, and design that engages with all the senses were seen as important components for many stakeholders.

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Part C
Key Findings & Recommendations

8. Key findings & recommendations

A synthesis of stakeholder findings and literature review

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"To be successful, campus planning must span an extremely long development life and must allow for the fact that future growth needs cannot be precisely defined. Campus plans must therefore provide a simple, easy-to-understand framework that both guides and unifies current work and is highly adaptable to changing demographics." (Kriken et al., 2010.p.21)

8.0. Introduction

This chapter draws together the main findings from the literature review, stakeholder interviews and stakeholder workshops, and the case studies. The first few sections look at general feedback from the stakeholders including the perceived benefit and challenges inherent in the SEC approach. Following this are seven sections, each one dedicated to a theme that has emerged from the research a provides a synthesis of associated findings arising from the literature review and the stakeholder process. The first six sections provide objectives for, and underpin the last theme which concentrates on key UD SEC planning and design issues. Each section also includes some key recommendations to help identify opportunities to implement the relevant findings.

8.0.1. The SEC in the Irish context – Using the UD approach to create inclusive and integrated educational environments

As discussed in Chapter 1 the SEC concept is part of the Irish Programme for Government and is also gaining popularity internationally as an educational planning and design approach. Whether this is called an 'Extended School' as it is known in the UK or a 'Full Service Community School' as it appears in the US, the overall intention revolves around the integration of services and greater collaboration with the community.

In the Irish context, it appears that the SEC model comprising of a large number of schools on a large site may not necessarily become the dominant form of school project delivery, but nonetheless, it will still play a relatively significant role in educational projects. However, the critical thing is not the scale of the project, but rather the efficient delivery of public services, integration with the community and the integration of mainstream and special educational needs. The issue of special education and integration is critical, and no matter what form an SEC takes, it must support the entire student journey from access, to participation and progress (NCSE, 2013b).

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As outlined in the rationale for this research, many schools in Ireland already share a site with other schools, and it has been established that many new school projects involve the construction of a new school adjacent to an existing school. In addition, there is growing support for the greater use of school facilities by the local community and in turn greater integration. As discussed, this will bring about a more diverse campus community and form a complex environment which must meet a wide spectrum of ages and educational needs.

In line with this it can be argued that the definition of an SEC should expand further than the typical definition which refers to larger campuses with multiple schools and public facilities, and should also apply to the scenario outlined below.

A shared educational campus comes into play when two or more schools share the existing or new site and facilities in a meaningful manner. The Shared Educational Campus approach can thus arise very quickly and it requires careful design to ensure the existing or the new site caters to a wide range of user needs through a Universal Design approach

8.0.2. Stakeholder perceptions of the SEC

For many stakeholders the idea of creating an SEC merely for the sake of creating a sine campus environment was not really supported. Generally Stakeholders only supported the SEC model when it achieved educational objectives otherwise not possible. This was not deemed acceptable if it meant sacrificing other key qualities such as community engagement or school identity.

Many stakeholders acknowledged that the SEC approach has the potential to support various aspects of effective and inclusive education for the twenty first century. The other main benefit of the SEC revolves around providing integrated services on one site for a wide range of users and ages and to use this as an opportunity to break down barriers, not only between SEN and mainstream education, but also between schools and their communities.

Location is one of the key considerations for the SEC. The demand for larger sites could result in the campus being pushed to the periphery of the community and therefore undermining many social, environmental and economic sustainability objectives such as walkability, proximity to the users of the school, and preservation of community, and supporting local businesses in inner urban areas. The issue is not so much about the SEC approach, but the location of the campus.

While discussing this research with stakeholders many suggested that some fundamental questions must be asked about the rationale for adopting the SEC approach and whether it was fundamentally the right model in terms of providing school facilities.

Key question
- Firstly, taking full consideration of educational and societal priorities, what educational provision best serves the interest of the child, the family and the community, and facilitates child-centred, lifelong education?

- How should the SEC concept serve these goals? Or should the focus be on individual schools which serve specific age groups in locations closest to the home and in locations most appropriate to the age groups served?

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The following key benefits are a summary of the positive aspects of the SEC model which were identified by the stakeholders.

Key benefits

- Provides for greater integration across age groups and with the community.

- Potential for greater integration between mainstream and special schools if they are located on the same site, which will help to break down barriers and allow the sharing of facilities, resources and expertise.

- The location of primary schools, post primary schools, and in some cases pre-schools, on one site is not that uncommon so the concept is not entirely new. The real issue is around getting schools to share facilities in a more integrated manner.

- The shared educational campus has the potential to create a sense of community on the campus and thus reinforce the school as microcosm of society where children are not overly isolated from other groups in the community.

- In support of the above, if designed properly, taking a lead from many universities, the campus environment could provide attractive centralised social spaces to create a thriving heart for the campus community and a child friendly social space for the broader community.

- Supports the concept of lifelong learning and provides a tangible example of learning as a continuum throughout a person's life.

- Supports the government's policy on shared educational campuses in areas of demographic growth and also aligns with other international educational campus models

- Provides integration of services on one site and in turn provides an economy of scale for integrated sustainable design measures which may not be feasible on a single school basis.

- Supports aging policies and aligns with the 'life course' perspective promoted by aging advocacy groups.

- Single sites with high densities of users makes public transport or improved cycle infrastructure ore viable. In addition, parents or guardians will benefit from a single drop off point for all their childrenchild, or the opportunity for older siblings to accompany younger children to school.

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- If the campus is composed of a larger site then there is the opportunity to provide larger, more spacious modern schools which are fit for purpose in the context of effective teaching. This would address increased demand and provide better facilities.

- Larger green-field, or brown-field sites are often more attractive to Public-Private-Partnerships due to less complicated construction conditions and fewer unknowns. This can therefore result in lower construction costs and improved delivery times.

The following key challenges provide an overview of the concerns that stakeholders expressed in relation to the SEC approach.

Key Challenges

- If the shared educational campus is forced to the periphery due to larger site needs this will have a negative impact across the board in terms of dislocation from community, unsustainable development of green-field sites and reinforcing unsustainable patterns of travel.

- In line with the above there are concerns about schools leaving central urban areas and the negative impact on local businesses and the public realm through the absence of school related pedestrians, cyclists and general activity.

- Issues and challenges around with multi-school co-operation and governance.

- Fear of losing school identity and the creation of more anonymous school environments.

- Concerns about increased onsite traffic, greater numbers of students and the potential for problematic interaction between younger and older children in terms of boisterous play and injuries. There are also concerns about adult students interacting with younger students in relation to sexual abuse or inappropriate contact.

- The existing briefing and design process is considered inadequate to deal with the complexities of meeting multiple needs across a wide spectrum of ages for various schools

- The need for age specific and age appropriate design for school spaces, especially for primary schools, may reduce the capacity for meaningful sharing, other than sharing a location in general and certain limited shared facilities, with other users and age groups on the site.

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- What to do with existing schools and sites in a depressed property market?

Having regard to the literature review, stakeholder feedback, and the case studies, the following Sections 8.1 to 8.7 now provide a synthesis of the main research findings. These findings have been organised into a number of themes, with associated findings and key recommendations to help identify opportunities to implement the findings. While there is substantial overlap between some themes (e.g. 1 and 2), the decision was made to create certain independent themes to distinguish subtle differences and to emphasise the importance of these sets of findings

In addition, these themes have been organised in a sequence (See Figure 42 below) that progress towards, provide objectives for, and underpin the seventh and final theme titled 'UD & key spatial and physical dimensions of an SEC'. This last theme outlines the main planning issues and a range of practical design features that should be examined as part of a UD SEC.
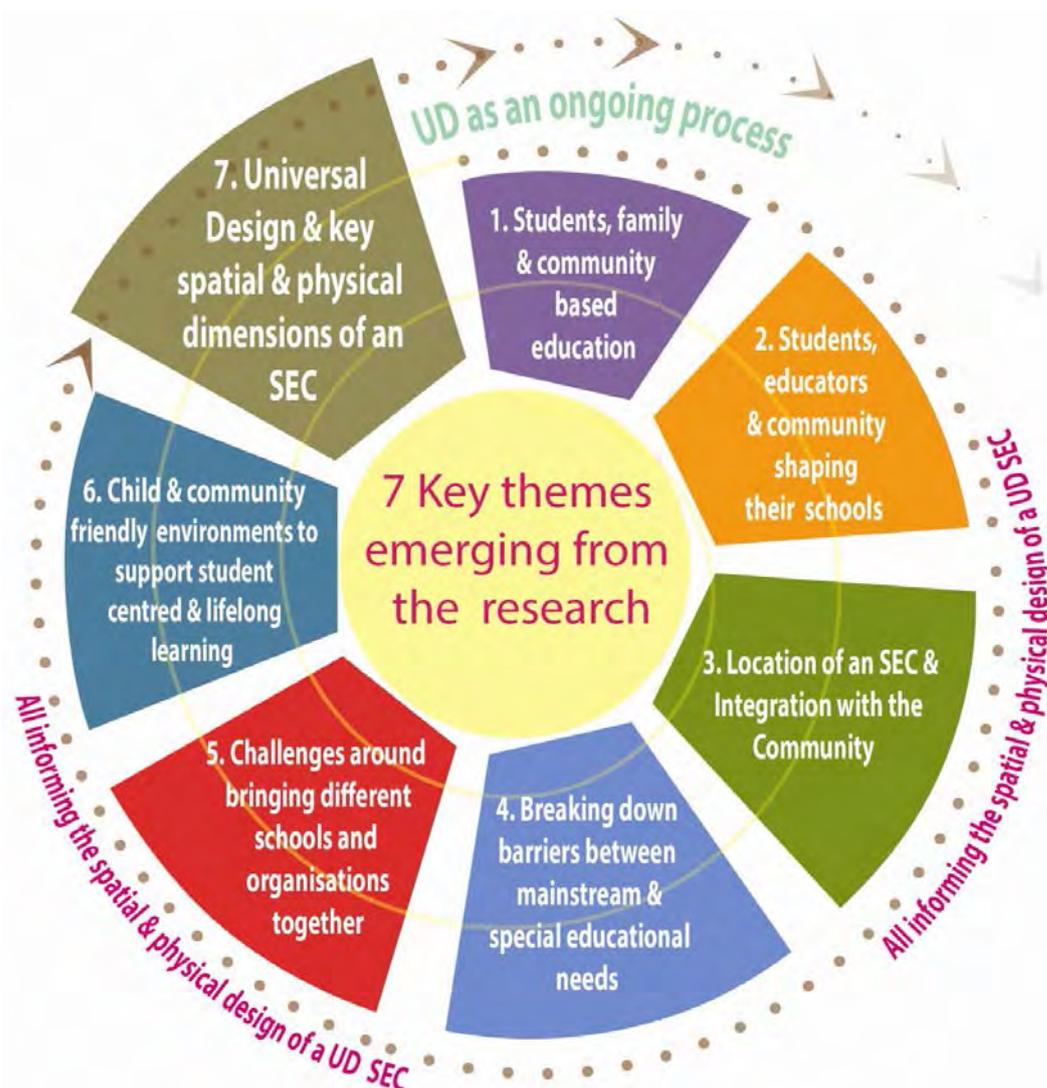
Figure 42- Key Themes emerging from the research

8.1. Student, family and community based educational provision

8.1.1. **School provision must first and foremost serve the best interest of the child, the family and the community, while facilitating age-appropriate, student-centred and lifelong education which is an extension of the home and a preparation for life:** Throughout the literature review (See Sections 2.3.1, 2.3.2, 3.1& 4.3), leading international education experts promote a child-centred, community-integrated education that is influenced by the local context and can be personalised to suit individual learning needs. This dynamic and personalised pedagogical approach demands very contextualised design which is not compatible with any prescriptive design models but instead must respond in a more organic way to the community.

In line with this approach, key stakeholders argue that the adoption of any planning or design strategy must be not be driven by any specific campus model but instead should be grounded in the needs and preferences of the community, reinforced by evidence based decision making and supported by the UD approach.

8.1.2. **Use the UD approach to identify a framework and process to fully understand the needs of all stakeholders to determine the best long term educational strategy for the community:** Based on the international best practice encountered in the literature review (See Sections 3.1, 3.3, 4.5.4), and stakeholder feedback, any long term approach to education in the community should involve a cross-sectoral, consultative process underpinned by community engagement. Community engagement has emerged as one of the most pressing issues from the literature with various international educationalists and government departments arguing for consultation and design participation at a number of levels to build trust and to create a better sense of community and stewardship around educational facilities (See Sections 3.1, 3.3, 4.5.4). This was also highlighted as a major concern for

all the stakeholders engaged in this research who felt that there is often a disconnect between school provision and the needs and preferences of the community.

In this regard it is important to consider all options including the single campus, or a 'distributed campus' or 'distributed learning' approach.

8.1.3. Develop a national policy framework around the SEC approach: Having regard to the SEC proposal in the programme for government, it would be useful for the DES and other relevant government departments to issue a policy statement on SECs to help define the campus approach, establish policy objectives and set out a framework to engage with key stakeholders and provide further guidance for the relevant departments and local authorities,

Key recommendations

- Use the UD approach to identify a community based stakeholder engagement process to determine the best long term educational strategy for the community.

- Develop a national policy framework around the SEC model to help define the campus approach, establish policy objectives, set out a framework to engage with key stakeholders, and provide further planning and design guidance for the relevant departments and local authorities.

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8.2. Students, educators & the community shaping their own schools

8.2.1. Adopt the UD process as a participatory framework for stakeholder engagement including a 'briefing process' to provide a structured approach to ensuring that key school and community needs and preferences are identified and integrated with each other: Section 3.3 of the literature review discusses the UD process and the need to consider the four stages of 'Discover'

'Define' 'Develop' and 'Deliver' as part of an inclusive and participatory process. The literature reinforces the importance of this process, while many stakeholders spoke about the need to include the full school community in the decision making, planning, and design process. As an example, in the UK the DfES document Schools for the Future - Designs for Learning Communities' (DfES (UK), 2002) promotes a participatory design approach involving students, staff, the local community, and other schools in the locality (See Section 3.3).

It is also argued in the literature (See Section 3.3), .and by key stakeholders, that this consultation and design participation process should move beyond the traditional and static preparation of a final brief, to a more dynamic and evolutionary 'briefing process' with ongoing involvement of key stakeholders. This process should continue throughout the design and construction process with newsletters, websites and displays used to keep all stakeholders informed. Where works are being carried out to an existing school it is suggested that linking the project to the curriculum may benefit the students and engender a more positive attitude to the works

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The consensus between the key stakeholders and the literature reviewed is that the engagement process may be strengthened by the use of community forums, student, parent and staff liaisons, or 'design champions' who can advocate for certain groups and take part in the design process.

Key recommendations
- Develop a UD briefing process to facilitate stakeholder participation throughout the planning, design process and construction process which creates specific roles for community forums and student, parent and staff design champions.

8.3. Location of an SEC & Integration into the Community

8.3.1. There is a conversation required about the relationship between schools and the community to agree on where to locate schools how best to integrate them into the community in a meaningful way:.The literature review identified a growing desire for greater integration between schools and their host community. In addition to this 21st century pedagogical approaches are looking to ground education in the community context as part of a community-based child-centred approach. (See Sections 2.3.1, 2.3.2, 3.1& 4.3). It was also argued by some stakeholders that greater school-community interaction may support lifelong education by providing intergenerational mixing and by making lifelong learning visible. Referring back to Harrison and Hutton (2014) and their concept of learning as the hub of a community, it is argued here that the UD approach can enable this spatial integration by providing the supporting environment which can be accessed, understood and used by all people regardless of their age, size, ability or disability.

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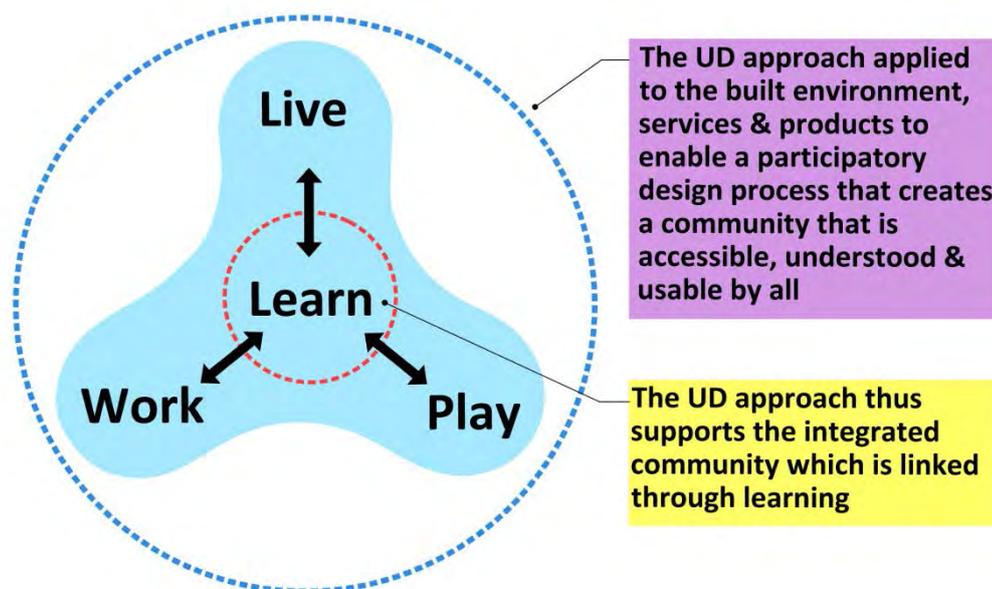
Figure 43 - The Universal Design approach supporting the integrated community linked by learning (based on Harrison and Hutton 2014)

As discussed in Section 2.1 there are certain education institutions who operate a 'distributed campus' with various facilities dispersed throughout an urban area. This model is also being adopted by organisations seeking to create more community-centred, and community-integrated educational facilities and examples such as Dumfries have are examined in Section 4.3. Consideration should be given to this 'distributed campus' model where appropriate, as there may be benefits in terms of smaller site requirements, the reuse of existing buildings, leveraging existing community infrastructure, and greater proximity and integration with the community.

8.3.2. The geographical location of an SEC in relation to the catchment area is critical to its success. Generally it must be located centrally within the community to ensure community integration and ease of access for pedestrians, cyclists and public transport: Sections 2.3.4 and 4.3 of the literature review highlight national guidelines and international literature contending that schools should be located at the heart of their communities to support integration and sustainable development. However, as pointed out by key stakeholders, the potential location of the SEC is wholly dependent on the site area required and the availability of suitable land and sites zoned by the local authority for educational use. The site area required by campus, is determined by the overall student numbers and facilities to be accommodated, permitted or desired building heights, parking requirements, and technical issues such as connection to public sewer (determines the need to dedicate site area to onsite waste water treatment systems). Therefore, a balance must be struck between the optimum campus size and the optimum location as community integration, community and child-centred education, parental involvement, and lifelong learning opportunities are all greatly influenced by the location of an SEC. With regard to planning and sustainable design, the proximity of a school to its users impacts on sustainable travel patterns and opportunities to walk, cycle, or use public transport. This also has an impact on the health of students, parents; staff and community users who may choose to walk or cycle to an SEC if it was within a reasonable distance. Beyond physical health issues, there are also social, emotional and psychological benefits that accrue from children walking to school with their friends or siblings.

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Many stakeholders highlighted the advantages conferred by an SEC in terms of a single location when parents, guardians, or older siblings are bringing children of different age groups to school or collecting them. This may help mitigate problems with the current situation where siblings of different ages are attending schools in dispersed locations.

It was also pointed out that this density of users in one location may justify the provision of public transport, or the provision of high quality cycling infrastructure.

National planning and transport policy needs to be strengthened around the integrated provision of school sites. At a local authority level, Local Area Plans must reflect this and suitably located sites must be identified as a development priority. Existing national policy pertaining to school provision exists in this regard but is not always applied. Therefore implementation of all relevant school location policy pertaining to local authority Development Plans, Local Area Plans or those contained within the various national urban design or planning guidelines is vital. If necessary additional measures to implement or enforce these policies may need to need to be put in place.

8.3.3. Consider the benefits of locating schools within a compact, mixed use, diverse community in terms of residential lifecycle and the associated lifecycle of schools: The literature review suggests that schools located in lower density suburbs with homogeneous households are more at risk from the negative effects of residential lifecycles which can result in cycles of high demand and decline due to homogeneity of household composition and child age groups. Section 2.3.4 of the literature review illustrates how compact, higher density, mixed-use communities with diverse household composition provide a more stable long term environment that are more likely to sustain local services as they are not subject to the same forces of population surge and decline outlined above. Thus locating a school in such a community may mitigate the problematic school life cycle effect.

In this context, it is important to present school provision as an intrinsic part of a strategic and integrated approach to sustainable development. Schools are not only essential to high quality compact communities, they will also benefit from the greater household diversity experienced in compact communities.

8.3.4. Use the SEC to provide facilities that are missing in the community while at the same time utilising community services or resources for educational purposes: Many stakeholders spoke about the need for greater partnership between schools and their communities to leverage all existing facilities and budgets, especially in the context of a constrained economy.

Key recommendations

- Examine ways to commence a dialogue about school provision and the community values that should inform how schools are located, designed and managed.

- National and local development policy must ensure that SECs are located centrally within the community to ensure community integration and ease of access for pedestrians, cyclists and public transport.

- Consider the benefits of locating schools within compact, mixed-use, and diverse communities to mitigate the effects of residential lifecycle and the associated impact on the lifecycle of schools. Schools located in lower density suburbs with homogeneous households are at greater risk from the negative effects of residential lifecycles which can result in cycles of high demand and decline due to homogeneity of household composition and child age groups.

- At a local authority level, suitably located sites with the right onsite conditions must be identified as a development priority.

- All relevant school location policy pertaining to local authority Development Plans, Local Area Plans or those contained within the various national urban design or planning guidelines must be implemented. If necessary additional measures must be put in place enforce these policies.

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8.4. Breaking down barriers between mainstream & special educational needs

8.4.1. Where possible mainstream and special schools should be located on the one campus or in close proximity to each other to encourage greater integration. This will be enhanced by an overall management structure with a shared vision and objectives for the campus: As discussed in Section 2.3.1 and Section 4.4 of the literature review, the EPSEN Act promotes the education of SEN students in an inclusive environment with mainstream children - through careful design this can be achieved on a UD SEC (see Section 8.7 for details). However, it is acknowledged that special schools will also be required, and in this regard the NCSE recommends the location of special schools adjacent to mainstream schools as a way of leveraging resources and helping to break down barriers. This was also a priority for many stakeholders and was viewed as one of the most important potential benefits of an SEC. This approach will be supported by an overall management structure with a shared vision and shared objectives for the overall campus. This will be discussed in greater detail in Section 8.5.

In line with greater school-community integration, the provision of special schools on a campus at the heart of the community will also help break down barriers between SEN students and the local community. Some stakeholders who work with SEN students spoke about the benefits of bringing these students out into the wider community in a controlled manner as part of a life skills training programme.

8.4.2. Ensure that a campus shared by mainstream and special schools is planned and designed to maximise key resources and to provide shared play and social spaces: As discussed above, the NCSE promotes the idea of site sharing, to leverage facilities and resources, and to break down barriers. To achieve this stakeholders suggest that the schools must be in close proximity and should be provided with convenient and accessible routes to maximise interaction; and to enable

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the sharing of facilities and resources, or movement of staff or students between the facilities as appropriate. Additionally it is vital to provide shared play and social spaces that balance interaction with the safety and well-being of all students.(see Section 8.7 for details on how this can be achieved).

Key recommendations

- The SEC model should be used to integrate mainstream and special educational needs students who share appropriately designed external spaces. This could be helped by a shared management structure as outlined later in Section 8.5

8.5. The challenges around bringing different schools & organisations together

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8.5.1. Recognise the challenges around bringing together various educational or community organisations where there may be a difference in objectives, tradition, or ethos: Some of the stakeholders who engaged with this research were school principals or architects who had experience in relation to projects which brought together a number of different organisations on one site. They related potential difficulties regarding cooperation between individual schools where there may be differences in tradition, ethos, or educational objectives. These differences may manifest as obstacles to meaningful campus sharing and result in a segregated campus where schools have their own entrances, parking and possibly separate sports facilities.

8.5.2. Recognise the challenges around different age groups sharing facilities:
Section 3.1.6. of literature review identified a number of concerns around intergenerational shared sites (IGSS), where older people and children shared a facility. In certain cases older people believed that children were prioritised in these facilities, and they were seen as invading older people's territory, or causing overcrowding and noise. In these IGSS sound as an environmental stressor was deemed as a major

negative factor due to age related hearing loss and a decreased ability to inhibit competing noise resulting in a negative impact on cognitive processes.

It is therefore important to fully consider the interaction between older people and children on an SEC, paying particular attention to acoustic conditions, to ensure a positive environment for both.

8.5.3. Identify appropriate new structures for overall campus management and integration while maintaining individual school identity and autonomy:

Section 2.3.2 of the literature review points out that greater school-community integration has implications for on-site management. For example, longer opening hours will require different cleaning and maintenance regimes, while the role of caretakers or grounds staff will need to evolve in order to deal with greater public access

In addition to this, the sharing of facilities and resources on the SEC will require very different management structures than those currently employed in typical school settings. While there was very little about this in the literature, it was stressed by stakeholders that multiple schools, community-based facilities, a wider range of campus users, and greater integration with the community, will require new management systems. It may transpire that one overall campus manager is required to oversee the campus in its entirety, which may possibly include public facilities. While individual boards of management take responsibility for each individual school. This may alleviate some concerns expressed by various stakeholders around the loss of identity that may transpire on a larger SEC. A practical example of successful overall campus management can be seen in the ChildVision campus where a single management structure enables a number of schools to work effectively and efficiently together (see Section 5.2). This facilitates meaningful campus sharing and a communal sense of stewardship which then permits innovative activities, which in this case involve a public café and a garden centre. This single management also supports non intrusive security and safety strategies such as passive surveillance across the whole campus.

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Section 2.3.4 of the literature review details a number of sustainability and energy efficiency measures that may be appropriate to the SEC. The economies of scale represented by an SEC may present opportunities for high efficiency, centralised, single energy centres using combined heat and power (CHP) or similar, to provide a number of facilities, or parts of the local community, with electrical power or hot water through a district heating system. Such systems will necessitate evolved management structures to handle the added complexity of this approach.

8.5.4. Examine legislation around litigation, liability, and insurances issues that impact on a child's freedom in terms of physical activity and natural play:

Material examined in Section 3.1.1 of the literature review demonstrates the importance of children to engaging in active play with a certain degree of risk and adventure as part of their physical, cognitive and social development. Excessive control and fears over the safety of children can result in the elimination of all risk and may stunt child development and curtail meaningful student integration. Stakeholder feedback echoed these concerns and suggested that interaction between mainstream and SEN students may be limited on the SEC unless these issues are dealt with by the school management, It was also stated by the stakeholders that the overall campus management structure proposed in Finding 8.5.3 above would help in this regard.

Key recommendations

- Identify appropriate new structures for overall campus management to facilitate meaningful onsite and community integration.

- Examine legislation, liability and insurance issues to enable healthy physical activity and greater interaction between children of various ages and abilities.

8.6. Creating child & community friendly educational environments to support student-centred & lifelong learning

8.6.1. **Adopt a UD approach to design for diversity and inclusion for students, staff and local community:** The UD approach underpins this research and therefore automatically takes full cognisance of human diversity in terms of age, size, ability or disability. However it is crucial that the design of an SEC adopts this UD approach and carefully considers all stakeholders in terms of physical abilities, sensory abilities, mental and cognitive abilities, age, and size. In light of the age groups who will attend a SEC, it is vital to consider the various child developmental stages experienced in primary and post primary education. While these are covered by the age, size and cognitive ability, criteria defined in the UD approach, it is worth reiterating the relevancy of this with regard to child friendly environments.

8.6.2. **Layout, size and scale must be child friendly and create a sense of community:** Section 4.5.3 of the literature review examined the optimum size of a campus in terms of student welfare. While there is a dearth of data in relation to optimum campus size, there is a little more literature regarding school size, and this suggests that smaller schools may result in better student outcomes. Where a larger student number exists, it is recommended that this is broken down into smaller school units to create a campus of individual buildings each at more intimate scale. Examples such as Dandenong High School or the 'Small learning community' demonstrate this concern for smaller scale developments which are capable of fostering a sense of intimacy and participation. In addition, many stakeholders expressed concerns that schools are often too institutional and that a more 'home-like' setting is more appropriate for educational purposes, especially younger children. (see Section 8.7 for further details).

8.6.3. **Architectural form and materials must reinforce the child friendly nature of the SEC:** Sections 4.4, 4.5.3 and 4.5.4 of the literature review look at a various

considerations in relation to child friendly environments. While the SEC should be designed to cater for all age groups in line with the UD approach, there will be certain areas within the campus that may need to be age appropriate. The height, mass, form, and finishes of a building should convey a sense of scale and purpose and the design language employed can be used to reinforce, not only the child friendly nature of the space, but also a human friendly approach. (see Section 8.7 for further details).

Key recommendations

- Adopt the UD approach to ensure that any national level strategy for SECs fully consider human diversity in terms of age, size, ability or disability

- Use the UD approach to create a balance between age appropriate design and design for the whole community. This will ensure a child friendly, and more generally, a human friendly educational setting.

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8.7. Universal Design & key spatial & physical dimensions of an SEC

8.7.1. **The planning and design of an SEC must be considered at the macro, meso, and micro level while focusing on access, understanding and usability for all people regardless of age, size ability or disability:** As discussed in Section 4.0, the DES already incorporates 'universal access' into its design guidelines but this may need to be strengthened and recast to adopt a more integrated approach. This approach must not only include access but also understanding and usability. The UD approach also needs to be considered at all spatial scales from the macro-level (the city), through the meso-level (the neighbourhood and campus level) and the micro-level (finishes, physical objects etc). In this way the UD approach must be built into integrated planning and transport policy at the national, regional and local authority level.

Overall the SEC must place learning at the heart of the community, both in terms of community participation and in terms of strategic and integrated planning. This must take account of planning and design at the Macro, Meso, and Micro spatial scales to ensure that the entire student journey – Access, Participation, Progression – is supported in educational and physical terms by the built environment, products and services, at all levels.

To achieve this integrated approach the planning and design of SECs must combine engagement and design processes with strategic and integrated planning in a mutually supportive manner to align with, and inform all levels of the planning hierarchy.

Firstly, the UD Process must **comprise a multi-stakeholder, multi-scale engagement and design process** and should include the following;

- The UD process must operate across Macro, Meso and Micro Spatial scales to involve all stakeholders.

- These stakeholders must include: students and families; school staff and management; the local community; the DES and other relevant government

agencies, such the Department of Health (in line with health and healthy aging strategies) ; and local authorities.

- This process requires a new engagement framework to bring stakeholders together to understand key needs and preferences and to help to inform the design process. This process will need new tools such as 'briefing process' methodologies and defined roles such as student, staff and community design champions, or community forums.

Secondly, and in terms of **Strategic and Integrated Planning,** the UD process must take account of the following;

- Regional Planning Guidelines

- Local Authority Development Plans

- Local Area Plans

- Strategic Development Zones (if required)

- Planning Schemes (if required)

- Strategic Development Zones (if required)

- Urban Masterplans (if required)

Both parts of this integrated approach should take cognisance of the various planning and urban design guidelines that are currently in place such as;

- Urban Design Manual (2007)

- Sustainable Residential Development i Urban Areas (2009)

- Design Manual for Urban Roads and Streets (2013)

- The National Cycle Manual (2011

- Development Plans - Guidelines for Local Authorities (2007)

- Local Area Plans - Guidelines for Planning Authorities (2013)

- DES School Design Guides (various)

Figure 44 Illustrates this integrated approach and outlines the two main components: the engagement and design process; and the integrated and strategic planning approach.
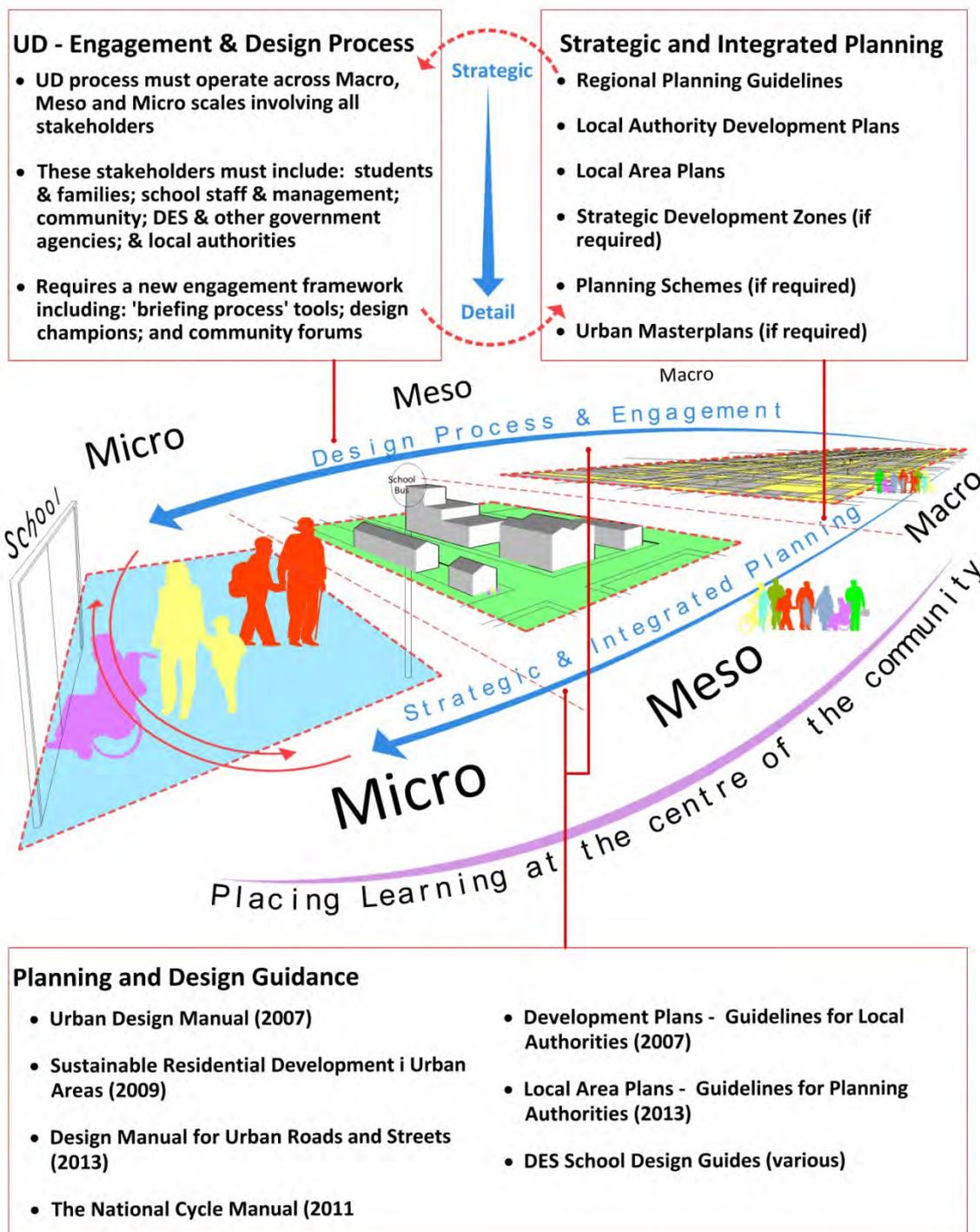
Figure 44 – The Universal Design approach to planning and design for education and learning
With this integrated approach in mind, some of the key specific spatial and physical attributes of a UD-SEC are now discussed in more detail in the following findings.

8.7.2. Appropriate location and access from the community: The optimum location of an SEC has already been discussed previously in Finding 8.3 and in Sections 2.3.4 and 4.3 of the literature review. However, it must be stressed that the location must also be considered in the context of the UD approach and the three spatial levels as outlined above. A UD SEC must be in close proximity to the homes of its users and this requirement takes on added significance when very young users, older users, and people with physical, sensory, and mental or cognitive impairments are accounted for. The primary goals of the UD approach, as discussed in Section 3.2 are centred on human performance, health & wellness and social participation. If these goals are to be achieved then the location of the SEC must ensure that the opportunities for supporting human performance, protecting health and wellness, and encouraging social participation are maximised. Any location that isolates certain users by way of excessive travel distances, poor pedestrian or cycling infrastructure, or lack of public transport is in conflict with the UD goals.

In relation to appropriate location and access from the community consider the following:

- Proximity to the local community is critical for community integration and facilitating sustainable forms of travel such as walking or cycling.

- In this regard, consideration must be given to local walking, cycling and public transport networks, the accessibility and usability of these networks, the distances and travel times from the furthest dwellings in the community, and the quality of the public realm associated with these networks.

- The local setting of an SEC will have an influence on its success. A noisy locality with ant-social issues will have a negative impact in terms of onsite environmental conditions, student, staff and community perception, or security, perceived or actual. On the other hand location within a more secure neighbourhood will enable greater integration between the SEC and the community.

- The design of an SEC must enhance the civic character, improve social cohesion and project a positive image of education to the local community.

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Existing and forthcoming guidance from the DES underscore the importance of school location in terms of sustainable planning and transport and these should be used to inform the planning and design of a UD SEC.

8.7.3. Campus approach, boundary conditions and entry points must encourage community integration: While the location of an SEC is vital for community integration, the material reviewed in Section 4.5.2 of the literature review shows that its interface and boundary conditions with the community must not present an unreasonable barrier to this integration. Depending on the circumstances, permeable boundary conditions which invite greater visibility and community interaction will help with community integration and help communicate the right message in terms of trust, community engagement and opportunities for lifelong learning. Examples from the literature and case studies such as the ChildVision campus provide practical examples of how this can be achieved without compromising child safety and school security. It was also stated by many stakeholders that the current approach to school safety which typically includes fences and gates discourages community integration.

In terms of campus approach, boundary conditions and entry points consider the following:

- The approach routes and access points to the SEC must be provided in line with Booklet 1and 9 of CEUD's 'Building for Everyone'. This will ensure that all routes are accessible, easily understood and usable for all people.

- Provide as many entry points as possible for the local community to ensure maximum accessibility along local desire lines. It may also be possible to create a quieter and calmer access route for people who may experience hypersensitivity.

- Shared space design, or the creation of 'Home Zones' through a UD approach in the immediate locality surrounding the SEC, will help create pedestrian priority and a more people friendly environment in the approach spaces to the school.

8.7.4. A balance must be struck between security and safety, and community integration: Community integration and issues around child safety and security must be carefully considered. The 'crime prevention through environmental design' or the CPTED approach should be used to 'design out' the fear of crime and opportunities for crime. Management strategies can also be put in place to reinforce maintenance,

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passive security, surveillance and 'target-hardening'.[12]. When discussing this with An Garda Siochana, they urged that contact should be made with An Garda Siochana and their CPTED advisor as early as possible around the design of campuses to ensure that CPTED principles are employed at all spatial scales and throughout all phases of the project.

Examples from the literature review, and again the ChildVision campus, illustrate how this balance between security and integration might be achieved. While ChildVision encouraged the public into the heart of the campus, there was an agreed strategy among staff about their role in passive surveillance and security.

In terms of balancing safety and security with community integration consider the following:

- Where possible create permeable edges to the community to allow greater interaction with the community. To balance this openness with security concerns, the following is advisable; enhance passive security by ensuring that buildings overlook key spaces; create clearly defined circulation routes and delineation between private and public spaces to reinforce territoriality.

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8.7.5. UD Planning and design for campus size, layout, key external spaces and architectural design: Campus scale was discussed above in Finding in Section 4.5.3 of the literature review which looked at school sizes. It was recommended that the campus layout should create smaller clusters of buildings, or individual buildings with their own identity and outdoor space such as the Dandenong High School. However, these should be organised around a central social space shared by the whole campus community. Some stakeholders suggested that much can be learned from university campuses where vehicle access is often restricted to peripheral areas and where the social spaces and pedestrian spaces are prioritised. This would represent a marked change from many school designs where car parking is in a central and dominant position, often taking up prime space on the site while social spaces or playing fields are consigned to the periphery

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[12] Target-hardening refers to security measures which secure specific buildings or objects as opposed to providing security to the general area.

In terms of the overall site design a shared space design approach might provide a more pedestrian friendly environment in locations where access for cars cannot be avoided .

In terms of balancing safety and security with community integration consider the following:

- As discussed above, the breakdown of the campus into smaller, more intimate units or 'neighbourhoods' may contribute to a more human scale environment.

- The 'sense of community' is helped by gathering spaces, sitting areas and green spaces. The provision of distinct and identifiable spaces will help create territoriality and a sense of ownership, while the balance between legibility (for orientation and safety) and mystery (opportunity and interest) will be generated by good landscaping

- The enhancement of the local topography, existing landscape features, and the micro-climate and ecology of the site, will help instil character and a sense of place.

- Provide safe outdoor space for a variety of different student social activities, interest ranges and group sizes; to allow imaginative and creative play; facilitate both informal and formal outdoor dining; and provide outdoor education as part of the curriculum.

- Provide appropriate sports pitches, opportunities for winter activities, and the integration of sports facilities into the landscape strategy.

- Provide opportunities for challenge and risk taking on the grounds as part of healthy childhood development.

- Provide external spaces that offer quiet and calm relief from the more active school spaces (see Findings 8.7.5 and 8.7.6 below)

- Landscaping should offer multisensory stimulation, support maximum biodiversity for education, offer space for food growing, and provide calm natural space to be overlooked by internal spaces.

- Given the important role that external space plays in learning and socialisation across diverse ages and abilities, it is vital to design these properly with: a variety of surfaces (including soft non-grass surfaces, especially for younger children); variety

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of playground and sports equipment to cater for the needs of different pupil groups; and encourage adventure, curiosity and play, with challenges for a range of abilities.

- Manage the balance between risk, adventure and challenge, with the need to keep children safe from harm.

- It may be necessary to provide a secure dedicated play space for SEN children which are: located close to SEN classrooms; contain soft and hard landscaping; provide specialised play equipment; offer multisensory experiences; and provide shade and shelter, and possibly a quiet area for certain children (see Findings 8.7.5 and 8.7.6 below).

- Provide a sensory garden with raised wheelchair accessible planter beds, seating areas, and opportunities for multi-sensory experiences. (see Findings 8.7.5 and 8.7.6 below)

- The architecture of the campus should strive for a human scale with a coherent design concept allied with a careful use of colour, pattern, graphics and texture.

- Flexibility and adaptability (F&A)are key issues for a UD SEC - If it is located in a compact, diverse community it may avoid obsolescence and the need to be converted into another use. Notwithstanding this, F&A must still be built in to accommodate inevitable changing school and community needs. Finally, current pedagogical approaches demand F&A to cater for more dynamic and personalised teaching and learning.

8.7.6. Shared external spaces must be provided between mainstream and special schools on the SEC: In line with the literature review in Section, many stakeholders discussed the need to provide inclusive and shared external play and social spaces within the SEC, where mainstream students and SEN students could interact in a safe and appropriate manner.

Section 3.1 of the literature review looked at the various needs of specific users including all children, SEN students, people with various disabilities, older people, and others to ascertain the design features and approaches that they might need. As part of this, Section 3.1.9 looked at the convergence and potential conflict between these users and found that many of the design features aimed at specific users are beneficial

to all users, or at minimum have a neutral effect and do not have an impact one way or another.

To support such integration in the overall campus, it is important to provide dedicated spaces to support SEN students or people with specific needs, to offer a choice and access to specialised areas when required. These are now discussed below in Section 8.4.3.

8.7.7. Dedicated spaces and careful circulation for specific users: Notwithstanding the compatibility of design features for various users, and the desire to break down barriers, it is important to provide dedicated spaces to cater for specific user needs. This is consistent with the UD approach espoused in this research which considers personalisation as a critical component of UD. Section 3.1 identifies a range of key design features for specific users, while Section 4.5.4 refers to DES guidelines and international documents for the provision of safe outdoor play areas for SEN pupils.

Furthermore, while key stakeholders argued for shared and inclusive play space, as discussed above, they also advocated innovative solutions such as the creation of secure perimeter walkways around the main playground, or similar safe areas where more vulnerable children could feel comfortable and secure, but still part of the action. The literature review supports this position and references were found to protected play or circulation areas for more vulnerable children that also factored integration and transition from protected spaces to shared spaces. UK based guidelines advocate respite spaces through seating or covered areas in playgrounds, social spaces, or circulation areas, to which a person can retreat but still maintain a view to activities to avoid being totally removed or isolated. For a greater level of retreat, it is advisable to provide quiet withdrawal spaces which are acoustically separated from the main activity.

In terms of creating a calm environment for children on the autistic spectrum, certain guidelines suggest alternative arrival routes for people who may be hypersensitive and have trouble dealing with typical activity associated with the start or the finish of the school day. These guidelines also promote the idea of threshold spaces that introduce

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environmental change as a transition to allow a person to prepare and reorient themselves for a new set of conditions.

These protected play or circulation areas, respite spaces, retreat spaces, alternative routes, and threshold or transition areas will provide a level of scaffolding required to support specific needs in an inclusive environment.

8.7.8. Ensure that moving around the campus is easy for all people by providing circulation routes that are accessible, easily understood and usable regardless of age, size, ability or disability: The size and layout of the campus determines mobility and ease of access. If the travel distance from one key facility or building to another is too great for individuals with specific impairments, or for young children, then the campus is neither accessible nor usable. A range of issues were outlined in Section 4.5.4 of the literature review including: accessible and usable external circulation routes; lighting (particularly for night time uses); defined edgeways; a clutter free environment; the avoidance of excessively reflective materials or strong surface patterns or signage; and, wayfinding. These all contribute to the accessibility, understanding, and usability of the campus.

The concept of shared space design was introduced and it was argued that such an approach could support the sharing ethos of an SEC. As pointed out though the shared space approach is not without its critics and it needs to be very carefully handled in conjunction with key stakeholder engagement, particularly those with visual and cognitive impairments. As detailed in this report Shared Space Design must take cognisance of the following: Appropriate locations; Tactile paving; Pedestrian gateways; Comfort zones; Alertness zones; Surface treatment; Kerbs; Delineators to replace kerbs; Pedestrian Crossings; Wayfinding at crossings; and, Traffic volume and speed.

In terms of circulation consider the following;
- Provide all circulation in line with Booklet 1and 9 of CEUD's 'Building for Everyone' to ensure that all routes are accessible, easily understood and usable for all people.

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- In line with the above, provide clear external circulation areas with enhanced wayfinding and legibility which balance the needs of different users. Carefully plan for deliveries and refuse collection; provide all year round routes to sports facilities; create unobtrusive car parking; and provide circulation routes that avoid disruption to learning spaces.

- Consider a shared space design approach throughout the campus for key circulation areas to promote pedestrian priority and create a more people friendly environment

8.7.9. Adopt an integrated approach to Information and Communications Technology (ICT): The use of ICT in relation to SECs needs to be considered from the very start and throughout the entire design and engagement process. ICT should be considered at the macro, meso, and micro scale in terms of planning and design of SECs. ICT must be examined as part of design process to ensure all stakeholder needs and preferences are included.

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8.7.10. Provide campus technology for improved wayfinding and navigation, but also to create interactive external learning environments: While ICT and assistive technology is now used frequently in education, the use of technology for wayfinding and orientation, or for the creation of interactive child centred external space, has not been investigated to the same extent. Section 4.5.5. looks at some technological solutions for wayfinding such as smart phone applications, GPS, or the use of RFID as a navigation aid for those with visual impairments. It must be stressed however that such technologies should be used to support a legible, accessible and usable physical environment, and should not be seen as a replacement for these fundamental environmental qualities. Section 4.5.5 also looked at a number of interactive lighting and acoustic technologies which can be used to create multi-sensory experiences for children and enhance play spaces. These technologies can be tailored and personalised to the specific needs of children, especially those with sensory or cognitive impairments.

8.7.11. In terms of sustainable design, use the economy of scale associated with the SEC to exploit sustainable energy technologies: The extended daily and annual opening hours, and the greater integration with the community to examine combined heat and power technology, district heating systems, photovoltaic panels, solar thermal panels, or other energy efficiency or renewable energy options. While these may not be viable for single schools, they may be feasible for an SEC due to economies of scale and the fact that it would be used more intensely, and all year round by the community. It may also be viable for certain energy systems to be integrated with the community energy infrastructure.

As discussed in Finding Section 8.5.3 earlier, such systems will necessitate evolved management structures to handle the added complexity of this approach.

Key recommendations

- Develop a set of national Universal Design guidelines for the planning and design of SECs in Ireland which may form part of the Department of Education and Skills School Design Guidance.

- The UD guidance should refer to issues such as: stakeholder participation and the briefing process, suitable and sustainable site location and site conditions; community access; approach, boundary conditions and entry/exit; campus size, layout and design of external spaces; campus circulation; ICT; and sustainable design.

8.8. Conclusion

The main issues emerging from the research include: firstly, the suitability of the SEC in terms of educational provision as opposed to individual schools; secondly, the location of an SEC and its integration with the community; and thirdly, the difficulties encountered finding suitable solutions to the integration of different educational and social communities on one campus. The fourth issue emphasises the importance of an engagement process that brings together key stakeholders across all sectors and at various spatial and administrative scales in a strategic and integrated planning approach that takes a long term view. The final issue focuses on how the Universal Design (UD) approach can be used to frame an integrated response to the previous issues in terms of strategic spatial planning at a macro scale, and spatial masterplanning and the design of specific features at a site level.

The integration of organisations can often depend on developing a fundamental understanding of the cultural, historical, economical, managerial and geographical dimensions that currently exist for the separate communities before an integrated solution can be identified. To achieve this understanding a great deal of investment is needed in both time and resources to develop an accurate design brief before preliminary planning or design takes place. Otherwise there is a danger of creating an unworkable solution.

On the positive side many stakeholders pointed to certain benefits such as greater integration across age groups and between mainstream and special educational needs, or the efficiencies achieved through integration of services on one site.

The Universal Design approach was investigated as a systematic framework for developing an empathetic method to understand the community context, and where the SEC is deemed appropriate, in helping to create an SEC that was accessible, understandable and useable for cross-generational users from primary school children up to grandparents, regardless of size, ability or disability.

The findings and recommendations are based on a comprehensive literature review, and feedback from an extensive set of stakeholder interviews and parallel workshops. The main message was not to underestimate the time and resources required to understand the

fundamental needs of the different stakeholders and communities before considering any planning or design response.

This research examines the UD SEC in the context of 'strategic spatial planning' at the macro scale (city or county level), and 'spatial masterplanning' at the meso scale (neighbourhood and campus layout) and micro scale (landscaping features, finishes etc). The UD approach must ensure that the SEC is accessible, usable and easily understood at the Macro-level (in terms of location, access, transport etc.), at the Meso-level (in terms the local public realm, boundaries, on-site circulation, etc.), and the Micro-level (onsite physical features, way-finding, signage etc). This systems approach drawing on both strategic spatial planning and 'spatial masterplanning' will facilitate a more integrated, people-friendly and sustainable design solution that:

- Facilitates an engagement and design process that operates across all spatial scales and includes input from, and interaction between stakeholders at all levels

- Is based on integrated & strategic long term planning that operates across various spatial and temporal scales and considers how the physical journey from home to classroom caters for student 'access, participation & progress' within the education system

- Enables integration with the local community to achieve accessibility and usability for all local users

- Provides better integration between mainstream and special schools, and between mainstream students and SEN students

- Integrates with pedestrian, cycling and public transport networks

- Provides a UD masterplan to encourage maximum inclusion for all students, including those with special educational needs, and the public

- Provides a UD masterplan to ensure optimum relationships between the various schools, campus users and the local community

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10.Appendices

Appendix A – Glossary and Abbreviations

Appendix B – Universal Design Principles and Guidelines

The UD principles are supported by a number of guidelines which provide more detailed guidance for each of the UD principles (Centre for Universal Design, North Carolina, 1997). These are contained below.

Universal Design Principles	Universal Design Guidelines
1. Equitable Use	Provides the same means as far as possible for all users
	Provide the same means of use for all users: identical whenever possible, equivalent when not
	Avoid segregating or stigmatizing any users
	Provisions for privacy, security, and safety should be equally available to all users
	Make the design appealing to all users
2. Flexibility in Use	Provide choice in methods of use
	Accommodate right- or left-handed access and use
	Facilitate the user's accuracy and precision
	Provide adaptability to the user's pace
3. Simple and Intuitive	Eliminate unnecessary complexity
	Be consistent with user expectations and intuition
	Accommodate a wide range of literacy and language skills
	Arrange information consistent with its importance
	Provide effective prompting and feedback during and after task completion
4. Perceptible Information	Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information
	Provide adequate contrast between essential information and its surroundings
	Maximize "legibility" of essential information
	Differentiate elements in ways that can be described

	(i.e., make it easy to give instructions or directions)
	Provide compatibility with a variety of techniques or devices used by people with sensory limitations
5. Tolerance of Error	Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded
	Provide warnings of hazards and errors
	Provide fail safe features
	Discourage unconscious action in tasks that require vigilance
6. Low Physical Effort	Allow user to maintain a neutral body position
	Use reasonable operating forces
	Minimize repetitive actions
	Minimize sustained physical effort
7. Size and Space for Approach and Use	Provide a clear line of sight to important elements for any seated or standing user
	Make reach to all components comfortable for any seated or standing user
	Accommodate variations in hand and grip size
	Provide adequate space for the use of assistive devices or personal assistance

Table 6 - UD principles © Copyright 2008 Center for Universal Design, College of Design, North Carolina State University

Appendix B – List of Interviewees

Appendix B– List of Workshop 1 Participants

Appendix C – Hypothetical Campus used for Workshop 1

Appendix D – Personas used for Workshop 1

Appendix E – List of Workshop 2 Participants

Appendix F – Workshop 2 Feedback Pro Forma Hand Outs

Appendix G – Preliminary Research Executive Summary and Key Findings

Executive Summary

In response to the future use of the shared educational campus (SEC) approach in Ireland, a research study was carried out into the SEC model on behalf of the Centre for Excellence in Universal Design at the National Disability Authority. Based on an in-depth review of international best practice supported by interviews and workshops, the study found many benefits and equally many challenges facing the SEC concept.

The three main issues emerging from the research include: firstly the suitability of the SEC in terms of educational provision as opposed to individual schools; secondly the location of an SEC and its integration with the community; and, finally the difficulties encountered finding suitable solutions to the integration of different educational and social communities on one campus.

The integration of organisations can often depend on developing a fundamental understanding of the cultural, historical, economical, managerial and geographical dimensions that currently exist for the separate communities before an integrated solution can be identified. To achieve this understanding a great deal of investment is needed in both time and resources to develop an accurate design brief before preliminary planning or design takes place. Otherwise there is a danger of creating an unworkable solution.

On the positive side many stakeholders pointed to certain benefits such as greater integration across age groups and between mainstream and special educational needs, or the efficiencies achieved through integration of services on one site.

The Universal Design approach was investigated as a systematic framework for developing an empathetic method to understand the community context, and where the SEC is deemed appropriate, in helping to create an SEC that was accessible, understandable and useable for cross-generational users from primary school children up to grandparents, regardless of size, ability or disability.

The findings and recommendations are based on feedback from an extensive set of stakeholder interviews and parallel workshops. The main message was not to underestimate the time and resources required to understand the fundamental needs of the different stakeholders and communities before considering any planning or design response.

Summary of key findings

Following a review of international and national literature, stakeholder interviews, workshops, and the examination of various case studies, the following key findings have been drawn out from the research process. These findings address the main concerns expressed by the stakeholders and present some of the key planning and design approaches encountered in the literature.

1. Evidence based educational provision

- School provision must first and foremost serve the best interest of the child, the family and the community, while facilitating age appropriate, child-centred, lifelong education which is an extension of the home and a preparation for life. The adoption of any planning or design model must be not be driven by any specific approach but instead grounded in the needs and preferences of the community and reinforced by evidence based decision making.

2. The challenges around bringing different schools and organisations together on a shared site

- Recognise the challenges around bringing together various educational or community organisations where there may be a difference in objectives, tradition, or ethos.

- Identify an appropriate structure for overall campus management and integration while maintaining individual school identity and autonomy.

3. Location of an SEC and integration into the community

- There is a conversation required about the relationship between schools and the community to agree on where to locate schools how best to integrate them into the community in a meaningful way.

- The geographical location of an SEC in relation to the catchment area is critical to its success. Generally it must be located centrally within the community to ensure community integration and ease of access for pedestrians, cyclists and public transport. The size of a campus, which is determined by land availability, the overall student numbers and facilities to be accommodated, permitted or desired building heights, parking requirements, connection to public sewer and other such factors, will also influence the location depending on whether or not a suitable site is available within the

community. A balance must be struck therefore between the optimum campus size and the optimum location.

- Use the SEC to provide facilities that are missing in the community while at the same time utilising community services or resources for educational purposes.

- Campus boundary conditions and entry points must encourage community integration.

- A balance must be struck between security and safety, and community integration.

4. Breaking down barriers between mainstream and special educational needs

- Mainstream and special schools must be located on the one site or in close proximity with an overall management structure as outlined in theme 2 above.

- Shared external spaces must be provided between mainstream and special schools on the SEC.

5. Creating child and community friendly educational environments that support student-centred learning and lifelong learning

- Adopt a UD approach to design for maximum diversity and inclusion for students, staff and local community.

- Layout, size and scale must be child friendly and create a sense of community. Much research points towards the benefits of smaller schools and where a larger student number exists, it is recommended that this is broken down into smaller school units to create a campus of individual buildings each at more intimate scale.

- Architectural form and materials must reinforce the child friendly scale and nature of the SEC.

6. Students, educators and the community shaping their own schools

- Encourage and facilitate community engagement to raise awareness of school and local community needs, and the benefits of greater integration.

- Adopt the UD process as a participatory framework for stakeholder engagement including a 'briefing process' to provide a structured approach for ensuring key school and community needs and preferences are identified and integrated with each other.

7. Design of key spatial and physical dimensions of an SEC

- The selected site must be fit for purpose in terms of location, size and physical site conditions.

- The planning and design of an SEC must be considered at the macro, meso, and micro level while focusing on access, understanding and usability for all people regardless of age, size ability or disability.

- Provide campus technology for improved wayfinding and navigation and also to create interactive external learning environments.

- In terms of sustainable design, use the economy of scale associated with the SEC, the extended daily and annual opening hours, and the greater integration with the community to examine combined heat and power technology, district heating systems, photovoltaic panels, solar thermal panels, or other energy efficiency or renewable energy options. While these may not be viable for single schools they may be feasible for an SEC which is used more intensely and all year round by the community and where certain energy systems may be integrated with community energy infrastructure.

Appendix H – CABE: 10 criteria for successful school design

The Commission for Architects and the Built Environment (henceforth referred to as CABE) sets out its '10 that criteria for successful school design (CABE, 2011) which starts at the broader community level and then zones in gradually to interior design and the use of sustainable design strategies. CABE outline the following set of criteria that contribute to good school design:

1. Identity and context: making a school the students and community can be proud of.

2. Site plan: making the best use of the site.

3. School grounds: making assets of the outdoor spaces.

4. Organisation: creating a clear diagram for the buildings.

5. Buildings: making form, massing and appearance work together.

6. Interiors: creating excellent spaces for learning and teaching.

7. Resources: deploying convincing environmental strategies.

8. Long life, loose fit: creating a school that can adapt and evolve in the future.

9. Successful whole: making a design that works in the round.

For each criterion there are a range of questions organised into themes within each criterion which allow create a framework for reviewing school design proposals. These ten criteria will be examined in further detail as appropriate in the following sections.

The first CABE criterion (CABE, 2008) – i.e., 'Identity and context: making a school the students and community can be proud of' – includes questions about the school ethos and identity and asks whether the school is inviting to the community and whether it responds positively to the locality. In terms of relating to the neighbourhood, the following questions are posed:

- Does the design respond and contribute positively to its locality?
- Does the design enhance the character of the neighbourhood?
- How does the massing of the design contribute to the adjacent streetscape or landscape?
- How does the design improve local movement routes?
- How does the design address planning issues?

- How does the school relate to local buildings and landmarks?
- How does the design impact on local views?
- How does the proposal respond to the grain of the context?
- How does the design relate to a holistic vision for the area in relation to the school enhancing the local character? (CABE, 2008).

In relation to the 'civic character' of the school, CABE present the following questions:

- Does the scheme establish an appropriate civic presence for the school in the neighbourhood?
- Will the design strengthen the image of education locally?
- How does the design communicate that this is a public building?
- What will the first impressions of the building be?
- How does the school relate to the street?
- How does the school improve social cohesion in the community? (CABE, 2008).

The CABE criterion for 'Site Plan: making the best use of the site' (CABE, 2008) also contains issues and questions relevant to the overall layout of the UD SEC. The first theme 'Enhancing the character of the site' asks the following questions;

- Does the design foster a sense of place?
- How does the scheme enhance the topography and existing landscape features?
- How does the scheme enhance the micro-climate and ecology of the site?
- Does the scheme make the most of its position and views?
- Does the scheme relate well to buildings outside the site?
- Does the scheme provide shelter from the prevailing wind, rain and sun?

The third CABE criterion for successful school design 'School grounds: making assets of the outdoor spaces'(CABE, 2008) contains a theme which focuses on the 'Relationship between the grounds and the buildings and

- Do the grounds and planting contribute to creating a sense of place?
- Have the outside spaces been designed in conjunction with the building form?
- Do the grounds support a sustainability strategy?
- Does the scheme provide a rich sensory environment?
- Will the school grounds change with the seasons?
- Does the planting enhance the micro-climate to create habitable spaces?
- Have the maintenance and management implications of the design been considered?

- Are there views out over the surrounding landscape?

- Are external shelters well-incorporated with the design to provide robust and practical transitions?

In terms of 'Social spaces and play' CABE pose the following:

- Are outdoor spaces provided for a variety of different student social activities, interest ranges and group sizes?

- Are there spaces which allow imaginative and creative play?

- Are some social spaces sheltered from wind, rain and sun?

- Are social spaces safe?

- Does the design provide outdoor dining both formally and informally?

- Is external seating and storage provided?

For 'Outdoor learning' it is asked whether there are:

- Are there provisions for outdoor learning?

- How do the outdoor learning spaces support the curriculum?

- How do the learning spaces support the school's pedagogy?

- Are there clear links between the indoor and outdoor learning environments?

- Can food be grown in the grounds?

In terms of 'Physical activity' the following questions must be addressed:

- Are there opportunities for a wide range of physical activities?

- Are there opportunities for challenge and risk taking in the grounds?

- Are sports facilities integrated into the overall landscape strategy?

- Does the design maximise the area for sports pitches?

- Has access to other local facilities been considered?

- Do the grounds facilitate community use?

- Can the areas for physical activity be easily used during the winter months?

In relation to the eight criterion 'Feeling safe: creating a secure and welcoming place, CABE pose the following questions in relation to the external environment:

- Are external routes and boundaries clear and well defined?

- Is the security strategy balanced with openness?

- Can all users access the site safely?

- Is it clear which areas are open to the community and which are not?

- How does the boundary treatment facilitate the school's approach to security?

- Are entrances welcoming for all users of the building, well located and capable of passive surveillance?

- Can boundaries between zones change to suit activities?

- Are pedestrian routes overlooked and safe throughout the day and evenings (CABE, 2008)

CABE also refer specifically to external circulation routes and are worth highlighting as follows;

- Are the external circulation routes clear and do they balance the needs of different users?

- Does the design provide safe on-site pedestrian routes?

- Is there a clear external circulation diagram?

- What are the entrance sequences for users arriving by different modes of transport?

- Are there discrete arrangements for deliveries and refuse collection?

- Are routes to sports facilities safe throughout the year?

- Is any car parking on the site unobtrusive?

- Have sensible routes to key areas of the grounds been planned to avoid disruption to learning spaces?