

# **A Digital Learning Community: Elementary School Design**

by

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## **Abstract**

The current generations of children are being taught in schools which are not relevant to their daily lived experiences. “Schools and the curricula that exist today are more suited to the needs of the industrial age than those of the information age” (Yelland, 9). As a result, students are becoming disengaged from the learning process. The vast permeation of digital media into our surroundings and a shrinking global society demand a new typology in learning environments. This typology must address students' creativity, social needs, and the importance of community and sense of place. How can these needs be met through the incorporation of technology – often controversial and deemed isolative and disconnecting? Can technology be used as a social tool to create healthy and productive learning spaces?

This proposal responds to these questions by presenting a conceptual re-design of an elementary school in Winnipeg. The supporting theoretical framework outlines literature which examines education, technology and society, and space and place. Workshops and interviews with students and teachers are analyzed, and design precedents, strategies and methods are discussed. Collectively, the theories, concept, and research presented provide insight into the creation of an interactive, flexible, and community-focused learning environment.

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# **1.0 Introduction**

## **1.1 Topic Overview**

Focusing on Western societies, this practicum examines rapidly changing community needs due to the vast permeation of technology into the daily lives of the general public. Technology has invaded our society to the point that it is involved in our lives on a day to day and even minute to minute basis. This practicum is a proposal for the design of a community-centred and technologically-focused elementary school in Winnipeg, Manitoba. Although the design will be created for the Winnipeg context, it can be considered a new typology in terms of educational design.

According to William J. Mitchell, Professor of Architecture and Media Arts and Sciences at the Massachusetts Institute of Technology, boundaries between physical and digital space are dissolving (2004). Although architecture and computing have converged, many individuals are not content with constant technological bombardment (Mitchell, 2004). Part of the change that has occurred includes a “turn from the fast and far reaching to the close and slow (McCullough, ix). In the field of education, curricula remain based in traditional teaching practices and are not currently reflecting student’s life-worlds and experiences outside the classroom. Professor of Education at Victoria University in Australia, Nicola Yelland, believes that children are not being adequately exposed to and prepared for the reality of living in the twenty-first century (2007). Redeveloped curricula and learning

environments are becoming crucial. Concurrently, an approach to design which incorporates a sense of context, multi-sensory environments, interactivity, and technology used as a tool to promote interaction, rather than isolation, is needed. These changes need to be palatable to the learner, and reflect and support the needs of the child in the twenty-first century.

How can design be used as a social tool to create healthy and productive learning environments which supplement and optimize both educational and technological experience? How can the integration of technology into elementary schools support the intellectual and public life of the school community? How can design facilitate learning involving a responsible balance between the old and the new?

In the proposed design, an attempt will be made to encourage users to see beyond things as they are, and to create multi-sensory and interactive learning experiences. Sheila Kennedy, architect and professor at the Harvard Graduate School of Design, states that information infrastructure does not simply consist of wires – it is programmatic and spatial and is therefore a catalyst to improve the efficiency and spatial organization of schools, classrooms, and furniture (2002). The design will attempt to move away from the conventional “appliance approach” to the computer, which does not acknowledge the ways digital learning can be inscribed into the space of the classroom (Kennedy, 2002). As a result, the way children acquire information, relate to teachers and peers, and understand relationships

between the classroom and curriculum will change.

The proposed design will avoid the segregated approach of the computer room, and reconsider locations and the use of technology in a school. A focus will be placed on how technology, integrated with learning, can be used as a tool for collaboration within the school and beyond, into the larger community. Consequently, this expands the definition of a learning environment and traditional hours of usage beyond the school day. In addition, small and large scale technology can be integrated. Choosing materials will also be crucial. Sustainable materials will provide enhanced tactile stimulus in the classroom. Because technology is far from a predictable medium, educational programs that institute a technological basis and the environments that support them need to be flexible, rather than regime-like, as these schools will have to change along with the technology that is supporting them (Haar, 2002, 6).

The client for the proposed project is a culturally diverse elementary school in the inner city district of Winnipeg School Division One, the largest of six public school divisions in Winnipeg. The division serves seventy-seven schools in the north, south, central and inner city districts of Winnipeg ("About Us," 2007). Consequently, this division must deal with a diversity of cultural and economic needs. Users of the proposed design will be elementary students (nursery school through grade six), parents, teachers, service staff, and community leaders and members.

According to statistical data, the inner city area includes the largest lower-income segment of Winnipeg. This area (figure 1) has the highest concentration of average household incomes under \$25,000 (City of Winnipeg, 2006, “Average household income”). Unemployment rates in the

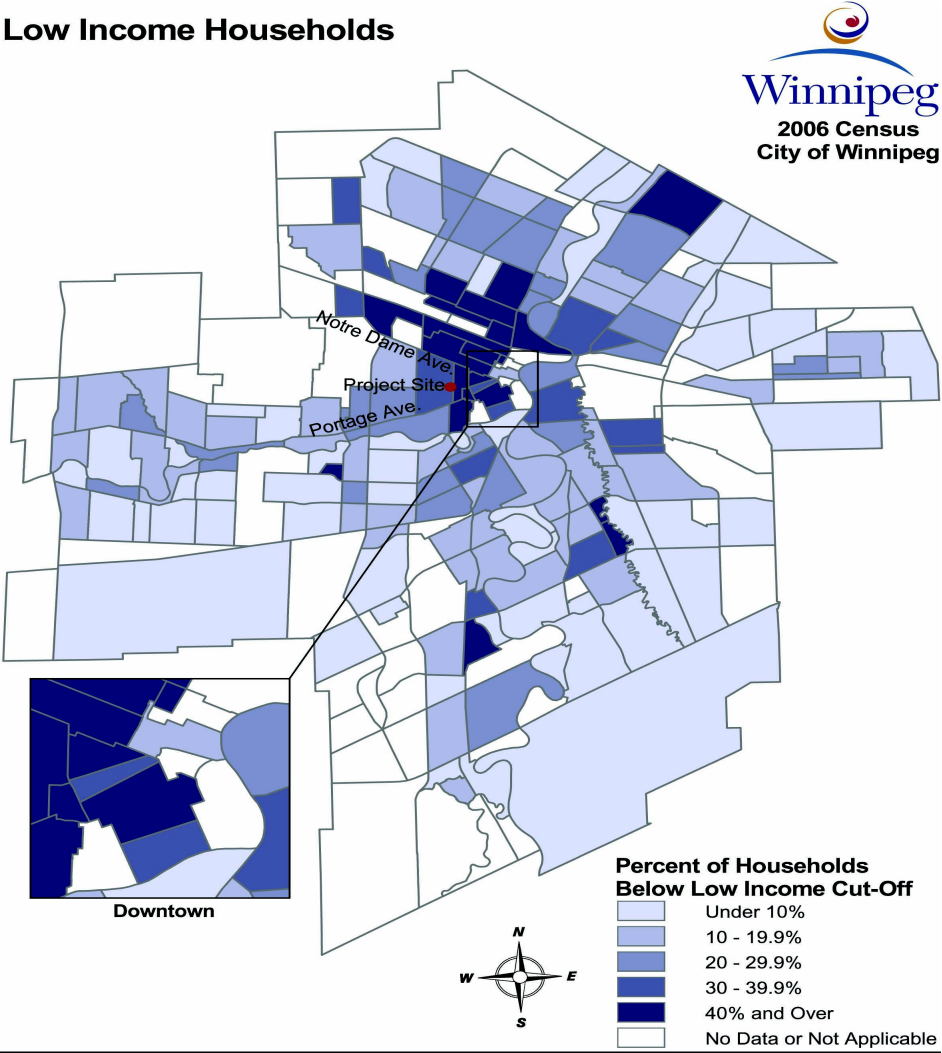


Figure 1. Low Income Households. This figure illustrates that the majority of low-income households are concentrated in and around the downtown core of Winnipeg.

Permission to use image obtained on October 15, 2009. ©Statistics Canada

area vary greatly over short distance, but the highest level of unemployment also occurs in the downtown inner city (City of Winnipeg, 2006, “Unemployment rate age 25 and over”).

### Aboriginal Identity

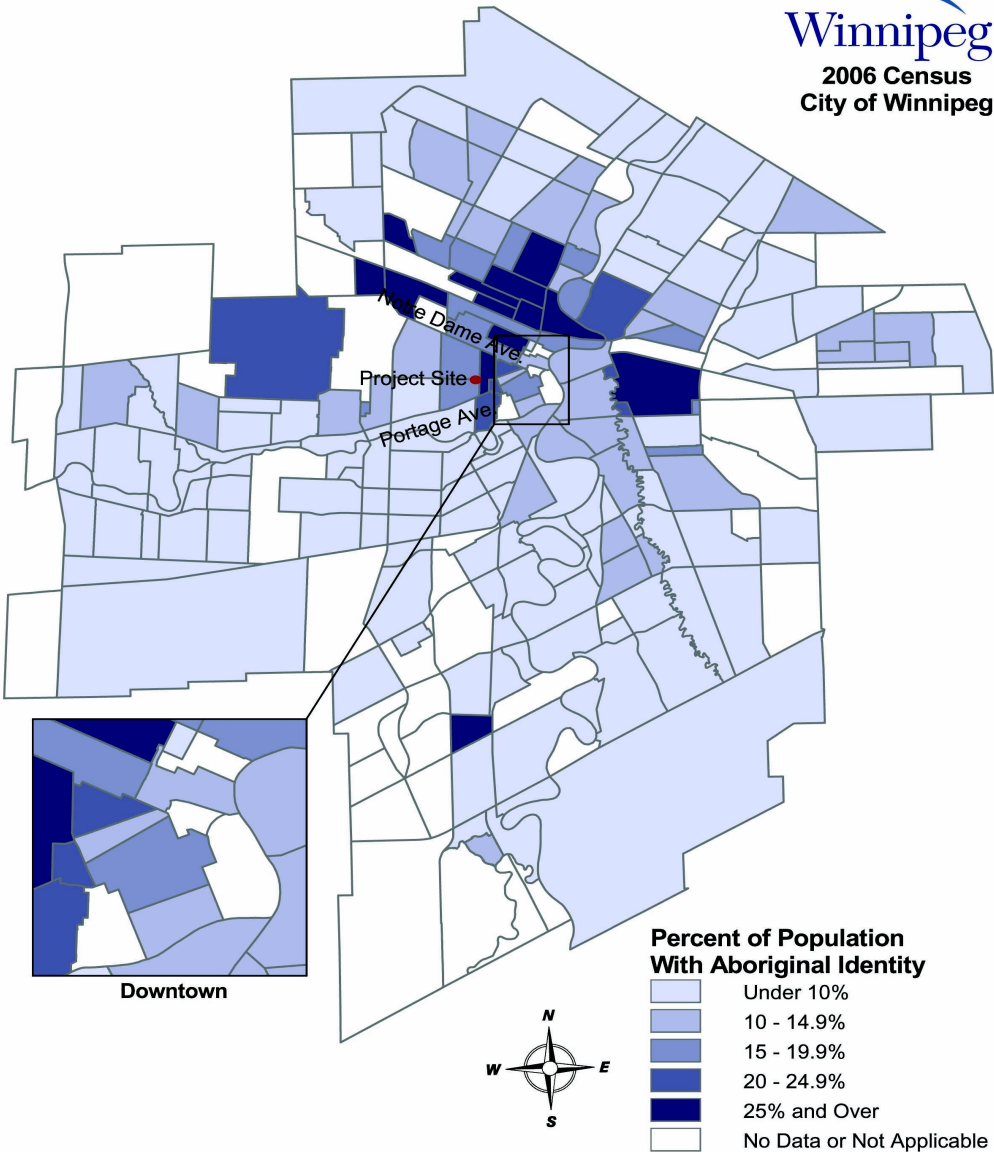
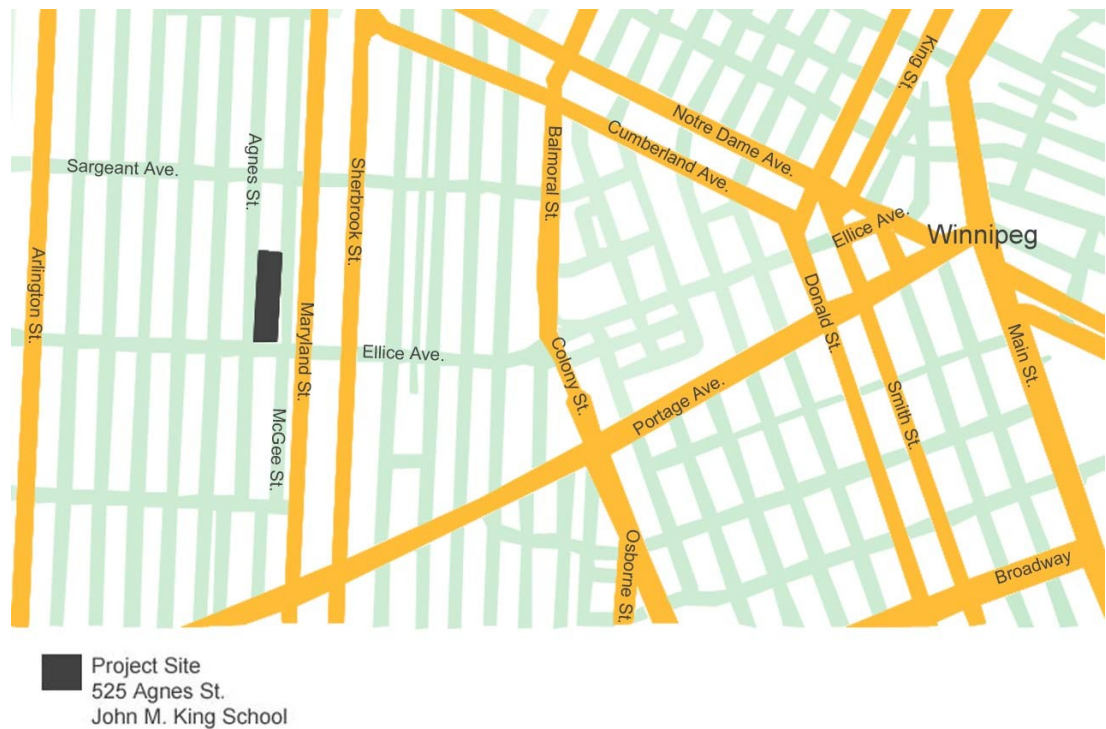


Figure 2. Aboriginal Identity. This figure illustrates that the highest percent of the population with aboriginal identity is clustered around the downtown core of Winnipeg. Permission to use image obtained on October 15, 2009. ©Statistics Canada

In terms of ethnic makeup, the highest percent of the population with aboriginal heritage is clustered around the inner city core (figure 2). In general, ethnic diversity in the downtown core is very high. According to the 2006 Census with regards to immigration, 12.6% of the downtown community's population holds a citizenship other than Canadian. This percentage is the highest in Winnipeg. The next highest percentage of citizenship other than Canadian occurs in Fort Garry, at 9.1%, and the lowest occurs in Transcona, at 2.5% ("City of Winnipeg", 2006).

The average number of children per family is low, but population density is high, much of the area at 5000 persons per square kilometre (City of Winnipeg, 2006, "Population density"). As such, the project will reach out to inner city children who are considered "at-risk". A plan recently drafted by Winnipeg city officials to "dramatically increase resources for core-area recreation programs", like sports leagues and community centres, aimed to reach out to the same children (Paraskevas, 2008). One community recreation director states: "We've got all these kids wandering around in these mini gangs because they've got nothing to do" (Paraskevas, 2008). Locating the school in the inner core of Winnipeg, and linking it with its surroundings and other facilities, such as community centres, will provide children with beneficial opportunities, including discovering new hobbies, learning, creating art, and playing sports.



*Figure 3.* Project Site. This figure illustrates the location of John M. King School at the corner of Agnes Street and Ellice Avenue in Winnipeg, Manitoba.

Locating the project school in a lower-income Winnipeg neighbourhood is an attempt to combat the digital divide (the uneven distribution of technology both socially and spatially), eliminate transportation problems, and enhance and provide service to the community (Warf, 2001, 3). The site of the proposed design is John M. King School, located at 525 Agnes Street, at the corner of Ellice and Agnes in Winnipeg, Manitoba (figure 3). John M. King School is an approximately 71 000 square feet two-storey building. The original school building was constructed in 1906, and was replaced with the current building in 1963. Three-hundred and fifty students are currently enrolled at the school, in nursery school through to grade six. According to

Vice Principal, Andrea Powell, an exceptional culture exists in the school, and it is often used as a pilot-school for the district, because they are viewed as embracing new ideas and technology. The staff is generally quite young, but there are still varying degrees of acceptance of technology and cutting-edge ideas (A. Powell, personal communication, June 10, 2009).

The existing school building will provide the site for the project with adaptations to support contemporary forms of learning. Digital infrastructure can be integrated successfully into the infrastructure of existing building forms. For example, infrastructure can be “over-layed or nested” into circulation paths of existing buildings to create engaging common spaces in corridors, stairways, social areas, and lobbies with multiple uses. The spaces are traditionally under-used (Kennedy, 2002). It is these under-used spaces that will be the focus of the design.

The use of an existing school in the inner city ensures the presence of large outdoor green space and play areas for the students. Current literature, by writers like Constance Beaumont, states small school sites that are successfully integrated into the community should not be considered “substandard” (Beaumont, 2002, 28). The literature supports the sharing of resources. An example would be where students become mobile at recess and make use of community parks, therefore not requiring large school grounds; but the climate of Winnipeg dictates otherwise. In winter, time required to bundle up to venture outdoors for recess means that direct

proximity is essential; the school grounds should accommodate play structures and opportunities for physical education.

The adaptation of an existing school avoids the demolition of housing, or the creation of a sprawl school outside of town. They may be difficult to access on foot, creating traffic problems, and spurring on urban sprawl (Beaumont, 2002). Suburban sites become isolated and the schools are engulfed by parking. The proposed school will provide an alternative to the above-mentioned situation, offering new and exciting opportunities with respect to technology and new forms of learning to children in a low-income area.

The presence of a school in a dense neighbourhood encourages students to experience the context of their surroundings. From this expansion outside of the walls of the traditional school many opportunities in terms of mobile technology and the digital linking of community arise. The adaptation of an existing school in a higher density area will allow for the preservation of a strong neighbourhood, providing support for the students and encouraging after-hours use of the school's facilities, so that its services can reach out to those who will benefit.

Kennedy states that the design of a school can take on the physical form of a city. Its utilization can be shaped by surrounding urban information and infrastructure, and allow children to engage with physical design opportunities provided by housing, community centers, parks, and roadways,

to create “public space for teaching and learning” (Kennedy, 2002, 45). Potential spatial collaborations, or local learning experiences, can be linked both physically and digitally in the areas surrounding a school, creating a network of sites which extend the digital and physical community of the traditional elementary school. Digital linking can redefine notions of public and private space in a school environment. Concepts of mobility and an expanded network of learning spaces are supported by the move in information infrastructure beyond the passive interaction of the screen to become characterized by “more portable computation devices children will use in conjunction with systems of display and interaction embedded into the material surfaces of the classroom”, and beyond (Kennedy, 2002, 49).

## **1.2 Purpose, Rationale, & Benefits**

The static nature of educational environments have hindered students’ progress as the realities of technology in their daily lives is becoming less and less reflected in their schooling. Yelland states: “schools and the curricula that exist today are more suited to the needs of the industrial age than those of the information age” (2007, 9). As a result, children are not properly prepared for their future, in a society where the emergence of the knowledge worker is becoming prevalent. Today, much of the repetitive work that used to occupy vast numbers of workers is done by computers. Knowledge work “is now the dominant mode of working in most of the world’s advanced

economies” (Myerson, 2006, 8). Knowledge work focuses on the application of considerable theoretical knowledge and learning. “It is based less on individuals following explicit instructions within a supervised hierarchy, and much more on the shared working practices of collaboration, initiative, and exploration, in which knowledge is often implicit” (Myerson, 2006, 8).

According to Yelland, “creative and innovative individuals will be able to adjust more readily to a world that is increasingly complex”, and therefore, schools need to prepare their students for the complexity they will encounter in the future (2007, 123).

Mitchell asserts that: “we are living our lives at the points where electronic information flows, mobile bodies, and physical places interact in particularly useful and engaging ways” (2002, 3/4). He believes that these points are becoming the “occasions for a characteristic new architecture of the twenty-first century” (2002, 4). The notion of interaction between physical space and digital space is key to the design of the technologically-inspired elementary school. Explorations in cyberspace which allow for manipulation and engagement with physical space ensures a more multi-sensory and interactive community-based experience.

The daily lives of children and their families are filled with objects such as cell phones, pagers, and digital toys and games. The materials of the physical world and information infrastructure are becoming increasingly interwoven (Kennedy, 2002). As such, in order to maintain children’s

attention and respect, schools need to reflect the realities they experience on a day-to-day basis. But, when does technology become a distraction? Conversely, children who lack exposure to technology need equal opportunities for such experiences. Locating the school in Winnipeg's inner city, where statistics suggest income levels are low, and school drop-out rates are high, will benefit children who may otherwise be excluded. One aim for locating a digital community in an inner-city location would be to break down hierarchies and combat the digital divide, allowing children to reach their full potential.

Despite fears that technology is causing rapid globalization and conformity, Mitchell believes that the power of place and local cultures are still important. He does not feel that the "death of distance" has destroyed these things (2002, 210). The "death of distance" refers to the placeless-ness experienced when one visits the World Wide Web. Sitting at a computer in Canada, one can experience or "visit" a country across the world from one's own home. All the while, some, like Canadian educator, philosopher, and scholar, Marshall McLuhan, fear we are ignoring the importance and uniqueness of our own real-life communities and contexts (McLaughlin & McMahan, 2002). In response, the project school's interior design will reflect context, history, and the realities of life in Winnipeg and the lives and experiences of the children who occupy the school and its linked exterior spaces. The digital community will provide shared public resources, and

function as a multipurpose learning platform, useable by community members and strengthening sense of place. The community's investment in a school is more rapidly repaid if schools are designed so that selected areas can be used on weekends and evenings for such activities as adult education, English as a second language courses, research, and vocational instruction. The expansion in use in the Digital Community project will also require versatility in the interior spaces. The definition of space will merge and cross over, and the school could become known as many things: a social center, a library, or a town hall.

The community-focus of the design discussed above reflects John M. King School's own desire to reach out to those who need help, and instill a respect of home and neighbourhood into its students. Many of their school programs and assignments are focused on a community inquiry which allows students to become familiar with their own contexts in order to create and develop a sense of pride towards their Winnipeg community, as well as an understanding and appreciation of what it means to be a global citizen (A. Powell, personal communication, June 10, 2009).

Although many schools, including those in Winnipeg, utilize technology at this point in time, the quality of relevant student experience and learning is poor (Yelland, 2007). Many school districts are slow to catch up with the times, due to a scarcity of resources. Any technology incorporated is limited to conversing with a flat screen, disconnected from any other activity

occurring in the classroom (Kennedy, 2002). But, as both Kennedy and Yelland believe, our culture is increasingly dominated by technology, and students need to be adequately prepared (2002, 2007). This project proposes an alternate approach, where infrastructure and interior design are integrated to transform the building, the classrooms, curricular opportunities, and to provide community resources (Kennedy, 2002).

The proposed design will benefit society and the interior design community by providing the realization that standardized and institutionalized facilities can change. There are many roadblocks in school design, a highly conventional field, where an “unchallenged and unnecessary adherence to school building typologies” is occurring (Kennedy, 2002, 44). Kennedy focuses on three arguments for change, supported by the integration of technology: ethical, entrepreneurial, and curricular (2002). In terms of ethics, change allows for the best creative use of resources in an era of decreased funding for public schools (Kennedy, 2002). Entrepreneurially, change increases the pragmatic value of design and creates new value in construction and renovation, as well as surrounding property values. Finally, with respect to curriculum, design challenges conventions and becomes a vehicle for educational reform and community oriented change, which is crucial in areas like Winnipeg’s inner city (Kennedy, 2002).

Important findings from this project will include how technology can be balanced with traditional and multi-sensory or multi-modal (linguistic, visual,

audio, gestural, and spatial representation) forms of learning; and integrated into school environments to create collaborative space, in addition to space for individual and group learning. Theorist, Lieven de Cauter, echoes the need to create multi-sensory space. He argues, due to a “constant increase of technological media”, hyper-individualism is occurring, and people are becoming passive and avoiding human interaction (2004). Insight into combating hyper-individualism and promoting a sense of place will be an attempt at alleviating some of the fear surrounding the realm of technology. The content of the project will enable the questioning of how the inactivity created by technology can be counteracted, and the sensory experience of space can be emphasized, through the use of design. Technology's interactive potential and connections that can be created with physical space will be explored. The proposed design will expose the ability of interior design to positively impact the environment beyond a single building, extending out into the community. This expansion beyond the traditional notion of a school environment, into the home, the community, virtual locations, and beyond, provides a multitude of exciting design implications.

### **1.3 Conceptual Framework**

In order to proceed with the Digital Learning Community project, a conceptual framework was utilized to focus the research and design process. The framework (figure 4) indicates the relationship between focal areas and knowledge required in order to reach the final goal of the production of a new

typology for learning environments. Re-cycling arrows indicate a revisiting of ideas and theoretical notions throughout the process in order to produce an appropriate and well-researched solution.

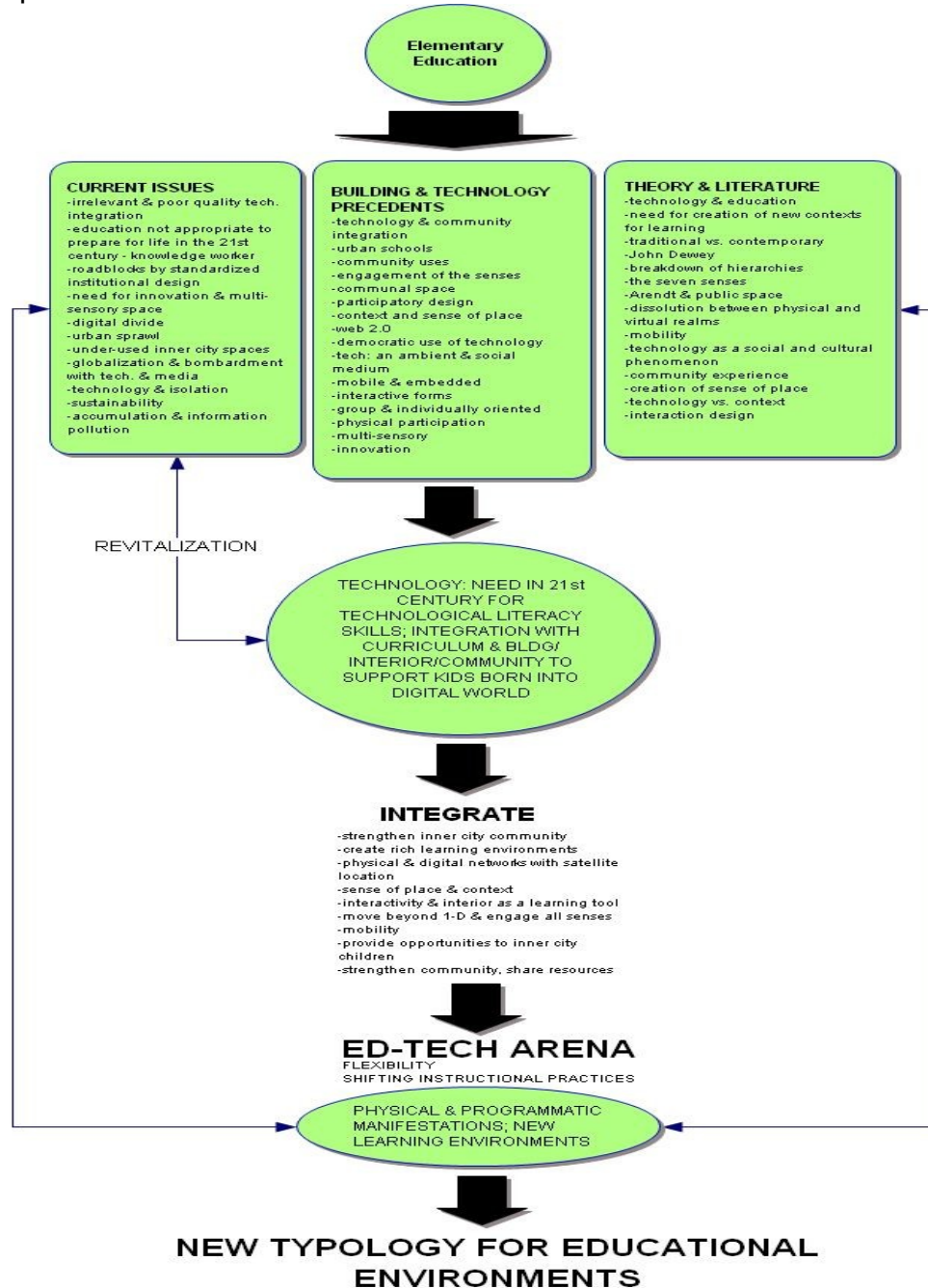


Figure 4. Conceptual Framework. This figure illustrates the process which was utilized during the Digital Community Project's process.

## **2.0 Literature Review**

### **2.1 Education**

#### **2.1.1 Education in the Twenty-First Century**

There is a growing need in early education for redeveloped curricula and the creation of new learning environments to support the needs of the child in the twenty-first century. Jackie Marsh, Senior Lecturer in Education at the University of Sheffield, discusses the notion of 'Shi Jinrui', a term coined by Japanese parents meaning 'new humankind' to depict the younger generation "which is forging ahead in terms of their technological practices", such as text-messaging, computer game-playing, and online magazines (2005, 5). Education and the incorporation of learning with new technologies, like cameras, and other peripherals, have the "potential to enhance young children's experiences and understandings about the world" (Yelland, 134). Despite the current shaping of 'Shi Jinrui' identities, academics like Nicola Yelland and Marsh believe that there is currently a definite lack of change in educational environments. As a result, children are not properly prepared for interactions. This is unfortunate, because, according to Marsh, "new media texts play a central role in the construction of young children's social identities" and the ritualised play and materiality of childhood (2005, 5).

Because the application of technology is such a controversial field, designers of schools have a lot of catching up to do in terms of the creation of appropriate learning environments. Many fears are associated with

technology, including the very real dangers that exist if technology is not used responsibly, and associated monetary costs. Due to these fears, it is currently more likely that initiatives will “develop as a result of innovation and experimentation in the diverse 'labs' of individual districts, schools, and classrooms” (Hobbs, 13). The traditional school structures of cellular classroom arrangements limit and stall teacher's use of technology: the “individualistic and isolated nature of teaching often prevents the spread of ideas from teacher to teacher, even within the same department” (Peck, Cuban, & Kirkpatrick, 2002). Design of educational environments has the potential to address this problem, with incorporation of more flexible classroom spaces, break out areas, and space for teamwork and collaboration amongst teachers and students of varying grade levels.

Schools are social environments and therefore it is important for children to learn to socialize and not just interact with machines. In addition, “students should be in control of the machine and not vice versa” (Yelland, 11). Computers and technology should be at the periphery of activities, where children can be exposed to them and learn from them, but not be bombarded. Yelland believes creating “vibrant social environments” which allow children to experience multimodal ways of knowledge will make schools more meaningful learning places (2007, 19). These multimodal ways of knowledge will incorporate both traditional and more modern forms of learning within a social setting, and create opportunities for identity

construction, creative production, and playful responses to text (Marsh, 7).

Traditional views of literacy mainly focus on print literacy, but the use of new media enables teachers to extend their “pedagogical repertoire to support children to become *multiliterate*” (Yelland, 38). Simply living in contemporary times demands an understanding of linguistic meanings in multiple forms: written text, music, logos, lighting and more (New London Group, 1996). Yelland echoes this sentiment, stating that something as everyday as a visit to a mall requires an understanding of these forms as well as “multimodal aspects of the design of language, that is, an understanding of the spatial architecture of the buildings” (2007, 38). As technology is becoming more widely used and supported, we can hope that elements of it will become faster, more robust, smaller, and cheaper to make it more accessible to the everyday classroom.

Current use of technology in schools has mainly focused around the the support of traditional curricula with electronic pizzazz rather than creating new contexts for learning. Computers and curricula surrounding them are mainly designed for individual use and minimal teacher intervention; many teachers find it difficult to “think of ways in which children might use them to share their findings and strategies to support further learning” (Yelland, 116). If this is the case, how can design be incorporated with technology to encourage interaction, group work, and problem solving?

In traditional practices, schooling has often focused on the teacher at

the front of the room and the children passively listening. According to Marsh, “children’s culture is often shaped by adults and taken up by children...[I]n various ways, children also create their own, child-centered cultural practices” (2005, 3). Marsh’s idea should be explored in both the design of school environments and the creation of new curricula. Active engagement in the learning process where children have a sense of control will encourage excitement in learning. The development of cultural practices can also be enhanced by the tools of technology, which many small children have already been fully exposed to through the ‘digitextual practices’ of their everyday lives (Marsh, 4). Marsh warns, however, that “although it is important to acknowledge the immense changes new media have generated, over-emphasis of the impact of these technologies should be avoided” (2005, 3). It is crucial that students have an active sense of their physical surroundings and local context.

It is important to avoid undervaluing basic, important skills, which some academics, such as Yelland, feel the presence of technology makes obsolete: “[computers] have enabled educators to think more about strategies for learning and discovery rather than about privileged 'stuff to know', so that it is more important to know *how to learn* than to know...[how] to instantly recall the product of 6 and 7” (2007, 133). There are drawbacks and weaknesses to technology, and the need to be able to complete basic tasks without full reliance on electronic or digital means is necessary. Theorist and cultural

critic, Neil Postman, notes that for the last one-hundred years, children have been able to access more information outside the school than in it (1995). If this is to change, and school curricula are to be radically altered to accommodate technology, Postman states we need to be concerned about “what kinds of learning will be neglected, and perhaps made impossible?” (1995). He argues against 'sleepwalking' attitudes towards technology use, and stresses we should not make a god of it. Postman also emphasizes that technology provides opportunities, but it also “has a powerful bias towards amplifying personal autonomy and individual problem-solving” (1995).

Postman's concerns are echoed by Canadian educator, philosopher, and scholar, Marshall McLuhan. McLuhan is often characterized as a technological determinist, and by the notion that “the machine makes the rules” (McLaughlin & McMahon, 2002). He believed that individuals use technology to protect themselves by numbing the body. Technology becomes an extension of self and the nervous system in the environment, separating the body from surroundings, and decreasing the ability to observe and enjoy the rich world we live in (McLaughlin & McMahon, 2002). McLuhan warned about the negative side to technological innovation and change. He felt that people were becoming controlled by technology and felt that the only way to overcome it was to understand it. He very much believed in the importance of being “wide awake” and that “nothing is inevitable provided we are able to pay attention” (McLaughlin & McMahon, 2002). Although many of McLuhan's

writings are forty to fifty years old, he discusses the educational system in a way that is very relevant to today. For example, at the time of his writings, he believed that there was no education present to cope with new media and new forms of technology, which he believed reach out with tentacles, affecting all the senses (McLaughlin & McMahon, 2002). He believed a strategy for evasion and survival was desperately needed. Although McLuhan's opposition to technology is difficult in this day and age, his warnings to pay attention are very important, and his concerns are extremely relevant.

If schools are to remain places where children learn to become social human beings, technology absolutely cannot undermine the goals of collaboration and socialization. Ways in which technology can be integrated to encourage interaction amongst students needs to be explored.

### **2.1.2 Inclusion**

Along with the positive impact technology can have on learning if used appropriately, it also has the potential to promote inclusion. Inclusion, however, will not occur unless individuals take action to encourage change. According to Yelland, "it is not the machines but what individuals or groups do with them that is relevant to social change and important for social inclusion" (2007, 14). The use of technology and computers in schooling comes along with a huge social, economic, and political importance. In terms of the digital divide, appropriate use of technology in a multitude of school environments provides children with opportunities they may not have otherwise had. It also

has the potential to empower everyone from the child who struggles to read and the beginning reader, to those who are much further along in their education. According to Yelland, “those who are excluded from this process for whatever reason are being denied the social capital that comes with being able to synthesize and transform this into knowledge that is socially, economically, or politically useful” (2007, 15). In promoting inclusion in school environments, students will come to value diversity and understand the importance of culture. As a result, this understanding will allow individuals to “work collaboratively and effectively in globalized economies and for the promotion of positive societal ideals” (Yelland, 26).

On the other hand, academics like Michael McKenna, Professor of Reading at the University of Virginia, feel that despite technology’s potential to support inclusion, literacy growth in the developing world is occurring in the context of a powerful American popular culture, whose influence could “ultimately threaten the multiplicity of cultural identities that have characterized the world” (1998, 379). In addition, the English language is known throughout the world as the dominant language of the Internet (1998, 379). If this is so, how can the needs of a diverse classroom be supported and differences be celebrated?

Another aspect of inclusion is widely discussed by philosopher, writer, and founder of the Waldorf School, Rudolf Steiner. His discussions of education as a way to promote social change introduce the ideas of bringing

community into the educational process, and making schools accountable to the communities they serve. Steiner's work surrounding the development of the Waldorf School in Stuttgart originated in Europe following World War I. The overwhelming hardships he experienced and witnessed others experiencing led him to hypothesize on the place of every child in the world, and a way in which children can create a bright light following the darkness of war. He spoke of the guidance adults give children, and how the “type of guidance adults provide becomes a living force within the child, which manifests later as adult capacities” (Steiner, xvii). As such, he felt exposure to positive role models and “worthy human beings” would encourage children to learn through imitation, and thus grow up to assist in creating a world where the evils of wars would not have a place (Steiner, xviii). Steiner states: “If we want the adults of the future to achieve the goals of freedom, equality, and community, while they are children, we must first have them imitate, follow, and revere” (1919, xviii).

Including parents, teachers, and positive role models from the community in the activities of a school exposes a child to various influences which collectively reach towards Steiner's goal. As well as providing positive role models within a small and holistic school environment, exposure to a variety of people will create a deeper understanding of context and create a stronger sense of place. A variety of role models will help to ensure that each individual child has an adult mentor to look up to and ask for help. Stronger

parent-child and teacher-parent relationships and more cross-age discussions are all beneficial to the development of a strong community.

### **2.1.3 John Dewey & Authentic Investigation**

Many theories regarding teaching currently reside around the notion that knowledge building should occur in all aspects of learner's lives and not be restricted solely to the classroom (Yelland, 3). Learning that occurs in school, home, and in the community needs to be both valued and expanded upon. The approach Yelland is discussing represents an idea of authentic investigation by bringing real life and cultural diversity into the classroom. The notion of recognizing the influence of community is important in schools that have a strong focus on technology. The acknowledgement of the impact of community provides a child with a strong sense of place and understanding of context.

This model of learning also promotes the ideas of active exploration in areas that children themselves define, problem solving team work, and sharing and documentation of ideas. This 'real' form of learning suggests that school could become more meaningful to children, and relevant to their lives. Rather than teaching subjects in isolation, it is possible that links and connections between areas of study would become apparent and could potentially be explored. Technology could also assist in creating links between “disparate elements of a broad curriculum” : “[s]ince mass media artifacts are relevant to science, social studies, the visual and performing arts

as well as reading...,teachers can easily make connections that stretch across subjects areas by teaching with media (Shepard, 1993). Yelland states that this form of curriculum and pedagogy allows “individuals to take charge of knowledge at the highest level by playing with ideas” (2007, 18). This learning form echoes a current focus that is occurring at John M. King School, the school that this practicum focuses upon. According to Vice Principal, Andrea Powell, John M. King is supporting the notion of inquiry-based learning, which is driven and defined by students (A. Powell, personal communication, June 10, 2009). Allowing children to be in control of aspects of their own learning encourages them to complete tasks that could potentially be “well in advance of those expected in traditional educational settings, and the technological setting enable[s] them to do this in a nonthreatening and playful manner” (Yelland, 37).

Play, an important part of childhood, and its inclusion in new curricula can empower children and encourage them to expand their knowledge base further than they traditionally would have. According to the theory of Swiss psychologist and teacher, Jean Piaget (1972), children learn through experiences with the objects that they encounter. Initially, Piaget states young children are only capable of learning through sensory-motor experiences with objects, but subsequently, children are able to abstract their initial understandings and formulate new ideas and concepts. Including aspects of play in early education is vital to learning, and it enables children

to enhance their self-esteem and engage in team work and collaborations (Yelland, 50). In this way, three-dimensional, and traditional aspects of childhood need to be incorporated into technological teachings to ensure that children are being exposed to the best of both worlds.

Many of the ideas discussed in the previous paragraphs, and many current writings on pedagogy and learning echo the theories of philosopher, psychologist, and educational reformer, John Dewey. Project-based curricula dominate, where the teacher takes the role of both facilitator and a partner in learning. Yelland's belief that "teacher interaction with children is...vital if learning is to occur" is one of Dewey's major criteria (2007, 50). Topics are selected by small groups of students based upon their interests, and collaboration among students, teachers, and parents is crucial (Abramson, Robinson, & Ankenman, 1995). The content of the project emerges as the project develops, rather than relying upon pre-packaged activities. Dewey saw the act of learning through experience as much more appealing and relevant to the student than "acquisition of isolated skills and techniques by drill" (1938, 7). The length of the project is determined as the project develops. Media and technology could be very beneficial to this process because they can incorporate a multitude of different styles of learning and modes of representation. Upon completion of project-work, documentation of work, and therefore space within the school environment for display, is valued.

John Dewey recognized that children have different strengths and the ability to represent ideas in a wide variety of symbolic and graphic modes (1938). Work can therefore be presented in multiple ways – through print, art, construction, drama, storytelling, music, puppetry, and shadow play. In many ways, the program gives prominence to visual languages. As such, linguistically diverse classrooms have the ability to reach out to all students and create a common ground between them. The recognition of the capacity of children to represent their ideas in a wide variety of ways also acknowledges and celebrates cultural differences that may exist within a classroom, like the classrooms at John M. King School. It has been found that such a curriculum “promotes language development...and increases creative and thinking skills. Visual arts, literary arts, video and theater, as well as...trips to art museums, have enormous potential for expanding the learning horizons of linguistically diverse children” (Abramson, Robinson, & Ankenman, 1995). The theories of Dewey will assist in eliminating the digital divide.

The aesthetics of the classroom environment are very important with regard to the theories of John Dewey and educational programs which have developed as a result of his work. Environment is seen as the 'third teacher' (Edwards, Gandini, & Forman, 1993). The classroom is seen as a location for learning to occur as well as a learning-tool itself. “Teachers pay careful attention to all aspects of the environment, looking for ways to increase

children's educational, aesthetic, and social opportunities" (Abramson, Robinson, & Ankenman, 1995). Space is organized to allow for small and large group projects, and small intimate spaces for one, two, or three children. Display areas at both a child's and adult's eye-level is utilized. Common space and informal gathering areas, such as dramatic play areas, and worktables, where children in varying age-groups and different classes can come together, are incorporated into the learning environment. Unusual, open-ended play structures and spaces that are related to projects are often incorporated in the schools, and interiors and grounds often become a source of pride for students, parents, teachers, and the community.

Dewey influenced the development of many educational theories, including the Reggio Emilia approach which was developed in Reggio Emilia, Italy, at the End of World War Two. The community of Reggio tended to be culturally homogenous, but the program developed has been adapted to successfully support culturally, economic, and linguistically diverse classrooms in the United States of America (Abramson, Robinson, & Ankenman, 1995). The Reggio Emilia approach integrates community commitment, supportive relationships between staff, parents, children, and the community, and a unique philosophy which sees "each child as an individual with rights and potential" and "reject[s] a portrayal of children as dependent or needy" (Edwards, Gandini, & Forman, 1993).

The methods above, suggested by many current academics and

theorists such as Nicola Yelland, as well as the work of John Dewey, provide a method of learning which is sensitive to cultures, learners, areas of knowledge, and multiple contexts in which the program can easily be altered for, due to its adaptability and 'work in progress' status.

## **2.2 Technology & Society**

### **2.2.1 Saturation**

Society has been heavily influenced through the presence of technology. Computers, according to theorist Malcolm McCullough, were the first truly interactive technology (2004). As a result, they have become an important social medium. Computers and the Internet have allowed for the development of shared experience, through organizations, activities, work practices, and communities of interest. Is this shared experience physical or digital? Currently, this sharing is more associated with digital than physical space. Is there a way to bring engagement created by computers and the Internet into the physical realm? Although people generally think of computers when they hear the word "technology", according to McCullough, "less than a quarter of the chips produced by Intel...are put into desktop or laptop computer motherboards...The rest are embedded into things that you carry about, drive, or wear; or they are embedded into physical locations" (2004, 5). As such, there is far more technology surrounding us and involved in network structure than we even realize, and therefore, far more opportunities beyond the computer screen available in the design of interior

environments. Within an educational environment, learning possibilities are endless, and a well-orchestrated combination of physical and digital elements supports a child's need for interaction. In terms of design, McCullough states: "the saturation of the world with sensors and microchips should become a major story, and an active concern for all designers, but so far it has not" (2004, 14). Developing awareness into the design field is crucial.

The bombardment of technology in our lives and notions of cyberspace produce negative connotations, and issues surrounding the notion of disembodiment. Through the Internet, we can 'visit' a multitude of spaces, but in reality, we are merely sitting at our computer. According to theorist Lieven de Cauter, the "constant increase of technological media... means that the human species...has to build in protections" (2004, 95). As a result, he argues that hyper-individualism is occurring, and people are becoming capsularised, and passively moving from one capsule to another, avoiding human interaction (2004). How do we, as designers, break through this shell to encourage the users of space to open themselves up to multi-sensory experiences? As De Cauter's capsule theory suggests, perhaps we are becoming so saturated with information and commodities that a state of passive stupefaction has resulted. We sit and do not react, and need to be shocked in order to pay attention.

The notion of technology as a fashion accessory also reveals that we are inseparable from technology, first experiencing it before we are even

born, with prenatal imaging, and from that point on, existing in “a state of continuous electronic engagement with [our] surroundings” (Mitchell, 2). This continual contact brings up the issue again of isolation from the physical world, and stresses the need for multi-sensory environments which engage learners and allow them to interact with their peers.

In terms of intentions and ethics, Mitchell explores the complex and inescapable interconnections that have been created across space and time. Vast space allows for both good and bad intentions in a world that is becoming less rigid and more fluid (2002). As a result, the effects of our actions are reaching far beyond traditional boundaries, even globally, creating a “widening moral circle” (Mitchell, 2002, 6). In terms of school environments, the issue of technology is quite controversial. Children are often seen as targets and an understanding of the implications of widening circles of interaction within the school’s curriculum and within the design of the school’s learning spaces should be developed.

An educational environment and the imaginative capabilities of children provide a scenario in which an interactive and careful balance can be created between the digital and the physical. Integrating interactive technologies reflecting both the local and global context (which can be shared with fellow classmates) will create an understanding of the importance of one’s immediate surroundings and interaction with peers. In addition, access to technology will provide children with an understanding of the larger context

of the world and their important place within it. Emphasizing the importance of balance at a young age will hopefully provide children with foundations which they can build upon to create a life rich in the understanding of one's own context, real space, and time, shared interactive potentials, and the effect they, as an individual, can have upon the rest of the world.

### **2.2.2 Technology vs. Context**

Australian architect and author, Chris Abel, discusses the problem of creating one's own identity through the anonymity of communication over the Internet: "How do you know who or what stands behind the aliases and masks that present themselves? Can you always tell whether you are dealing directly with real human beings or with their cleverly programmed agents?" (2004, 45). Some theorists, such as Michael Heim, fully embrace the idea of the mind-body split that occurs through cyberspace, consequently painting a dark and scary picture of the world. He speaks of the "cybernaut leav[ing] the prison of the body and emerg[ing] in a world of digital sensation" (1994, 89). He goes on to say "online, we break free...from bodily existence...Telecommunication offers an unrestricted freedom of expression and personal contact, with far less hierarchy and formality than is found in the primary social world" (1994, 89). This notion of the body as a prison and an escape from the social world, personal contact, and real people is frightening. In an educational context, school and the personal interactions that occur within are crucial with respect to a child's social development.

Connection with real space and time is crucial, and Heim is negating this need. McCullough also questions the aims of what he calls a universalizing, disembodied cyberspace (2004). He states: “humanity has had thousands of years to build languages, conventions, and architecture of physical places. Wave upon wave of technology has transformed those cultural elements, but seldom done away with them. Context appears to have unintended consequences for information technology” (McCullough, 2004, 11).

Although a connection with context is preferable and necessary, and extreme anti-social ideas such as those expressed by Heim are far from any reality most people would like to live in, the notion of remote connection is not entirely negative. In school contexts, connecting remote environments will allow students to better understand their global context in connection with their local context. For example, students could connect with students in a school on the other side of the world. This activity would provide direct real-world interaction and socialization amongst the students of each individual classroom, and would provide a virtual-social interaction with those abroad.

### **2.2.3 Interaction Design**

Malcolm McCullough states that a paradigm shift has occurred from “building virtual worlds towards embedding information technology into the ambient social complexities of the physical world” (2004, ix). Here, again, we see the connection between physical design, social space and virtual aspects of technology. Advantages of technology built into our surroundings include

more intuitive and embodied responses, whereas disadvantages include annoyances of maintenance, constant accumulation or information pollution, and notions of surveillance. In addition, an increasing dependence on technology produces fears of isolation and separation from the biological self. Is there a way that technology could be used to reverse these fears and avoid completely remote interactions, where individuals never meet face to face? The field of interaction design, as described by McCullough, studies how people deal with technology and how people deal with each other through technology (2004). Interaction design demands rich cultural foundations, “unless this new field is to belong solely to technocrats, or tyrants” (McCullough, 2004). Interaction design turns attention to how “technology accumulates locally to become an ambient and social medium” and thus “brings this work more closely into alignment with the concerns of architecture” rather than an “overemphasis on technical features and interface mechanics” (McCullough, 19). The emerging presence of this field is key to ensuring that technology is used as a tool to encourage interaction, a sense of community, and real-world awareness. The field of interaction design will inform interior designers so that they can play a key role in ensuring technology is designed appropriately into physical environments.

An element of technology which has created a huge revolution in educational environments in terms of social collaboration and interaction, is the development of Web 2.0 (Tapscott, 18). The term, Web 2.0, first

originated in 1999, but didn't become popular until 2004. Prior to Web 2.0, sophisticated web languages were needed to manipulate online content and post information. Today, the Internet is based on XML, a language which is a standard for programmability, creating a 'programmable web' (Tapscott, 18). Every time an individual uses the Internet, the Internet is changed. The development of sites such as Facebook, blogs, wikis, flickr, and other programmable elements, have increased collaboration and the growth of online and off-line communities. These communities can exist within the school environment, within the community, or internationally, ensuring students understand their position as global citizens. In educational environments, Web 2.0 has hugely impacted what students are now able to learn about and how they can present and interact with the information they learn, and the people they learn with. In the past, the web existed primarily as a source for content. Now, students and teachers are able to be the creators of the content they were once searching for. Web 2.0 is not specifically an example of interaction design, but its principles can be compared to what interaction design strives for.

Although there is much apprehension in regards to the field of technology entering our daily lives, McCullough states: "to turn our backs on computing would be foolish...To neglect further prospects will not make them go away. We would be wiser to accept them as a design challenge, to emphasize their more wholesome prospects...and to connect them with what

we value about the built world” (2004, xiii). In terms of education, value regarding technology can be placed upon the surrounding community and neighbourhoods, locally and globally. Technology has the potential to encourage learning, creativity, and excitement in a school environment. McCullough’s statement above is key to the field of interior design. Designers have a direct influence over that which is built-into environments, and as such, can ensure that technology is in harmony with context and physical social environments. Often, when design occurs in relation to technology, it has not considered cultural need and presence (McCullough, 2004). Instead, an emphasis has been placed upon accumulation rather than integration, and first time usability rather than long term practices. Accumulation refers to a state of distraction, rather than a seamless integration with regards to technology embedded into the environment, echoing Marshall McLuhan's discussions of technological determinism, as mentioned previously. McCullough describes accumulation as information pollution. He feels growing collections of the newest 'smart devices', are misguided: “do smart machines generally force humans into stupid activities?” (2004, xiii). McCullough believes that as information becomes more and more abundant, clear views through it become less and less possible, and all quiet time and space is viewed as something that needs filling (2004). This view suggests a simplified and context-focused design with respect to school environments.

Embodiment of technology into the architectural form or skin, in which

digital networks are no longer separated from space, is one way in which pervasive computing can be inscribed into the social and environmental complexity of the existing physical environment (McCullough, 2004).

Whereas previous notions, according to McCullough, threaten to dematerialize architecture and design, pervasive computing is a defence of architecture (2004). Despite this notion, there is still, however, a potential for misuse and un-needed accumulation, but if designed appropriately, pervasive computing can assist in the creation of valued places.

In the field of education design, typologies of mobile and embedded technologies can be utilized in order to create learning experiences and encourage interaction with surroundings and other people. Mobility may encourage familiarity with the neighbourhood, and having ready access to interactive technology in school can encourage socialization that may not have otherwise occurred. Incorporating typologies into interior design responsibly encourages the definition of a sense of place and participation. In the process of engagement, “new meanings of personal as well as group significance” can be constructed (Bullivant, 17). Although some argue that technology is bringing an end to face-to-face interaction, theorists like Manuel Castells suggest that whatever benefits the Internet provides, the creative energy created by groups of people living and working close together cannot be substituted (1996).

#### **2.2.4 Making Sense of it all**

It is interesting to note, as discussed by Chris Abel, that the Internet is part of the public domain, and “efforts have been made to make more tangible and comprehensible one of the most important but ephemeral creations in the history of science and technology” (2004, 33). Abel goes on to discuss how architects, urbanists, and writers commonly “resort to metaphors deeply rooted in the physical and spatial world of cities and urban communities, as well as to other analogies with familiar cultural and social concepts” (2004, 33). Western spatial concepts and systems of order, such as streets and transport systems, structures and places, connections, and the evolving city are continually referred to (Abel, 37). Abel explains that with any radically new idea, human-kind has to make connections with existing ideas and ways of thinking in order to visualize and make the idea meaningful (2004, 33). Metaphors connect with notions of the mind-body split. From Abel’s discussion arises the question of whether or not humans need to equate the seemingly infinite Internet to something more permanent and concrete? Can we equate the virtual non-spatial city to the importance of discovering one’s own physical surroundings?

McCullough states: “as digital technologies surpass their predecessors at expressing the culture of the moment, particularly in its visual aspects, physical architecture is relieved from its struggle to be at the fashionable centre of attention and returns to what it does better in any case, namely the

enduring formation of periphery” (2004, 63). The previous quote emphasizes the importance of quiet and calming physical spaces that work in collaboration with new and exciting technologies. Such spaces could provide the enduring environment to which all human beings unknowingly cling. With respect to the design of educational spaces, students should not be constantly bombarded and overwhelmed with the latest technology. The importance of context, permanence, and calm in a school environment suggests a simplified design approach with focused learning spaces, and more extensive and attention-grabbing devices at the periphery, which substantiates the design focus of this practicum: including corridors, common areas, and other underused spaces. Collectively, these concepts reveal that despite virtual representations of technology, immediate surroundings and an understanding of context are fundamental human needs.

## **2.3 Place, Space, Time**

### **2.3.1 Permanence: Local Context**

Technology and the temporality of digital space offer the world to an individual with the click of a button; however, this often occurs at the expense of context: “modernity’s mechanistic beliefs ha[ve] rejected most appeals to nature” (McCullough, 24). Scientist and philosopher Michael Polanyi states: “Our body is the ultimate instrument of all our external knowledge, whether intellectual or practical...In all our waking moments we are relying on our awareness of contacts of our body with things outside for attending to these

things” (1967, 15). Polanyi speaks of the importance of a symbiotic relationship between bodily and mental processes. The waking moments he speaks of include moments when we are engaged with cyberspace. Therefore, in relation to technology, immediate and local context is significant, and design should reflect a sense of place. Speaking of Polanyi, Abel states: “The clear and important implication of Polanyi’s theory is that intelligence itself, at least as far as we know it, requires a physical centre and spatial integrity – an integrating focus – if it is to function effectively in the world” (2004, 54). Intelligence, and learning, as would occur in a school setting, therefore rely upon physical design. McCullough correlates the importance of place-making processes: “persistent structures remain essential to how people understand and use the world” (McCullough, 2004). As such, enduring forms, such as the book and physical space mediated through design and architecture, are crucial for social development and connection with context. Geographer Yi-Fu Tuan writes about space, place, and the child: “Places stay put. Their image is one of stability and permanence. The mother is mobile, but to the child she nonetheless stands for stability and permanence” (Tuan, 29). A sense of security is therefore seen to be crucial in a child’s development, and Tuan’s words should be carefully considered in a school’s design and its corresponding place in the community.

In terms of education, context creates a sense of place for a child and a backdrop into which temporal elements can insert themselves. McCullough

states that information technology must be moved from the centre of our focus to the periphery in order to ensure we maintain an understanding of the importance of place. As much as technology proposes constant change, the permanence of history and development of culture and civic life prove the human need for consistency. Technology must fit into this scenario. Interaction design, as discussed by McCullough, supports this idea and turns to “patterns of the living world as something...to be understood, not overcome” (2004, 12).

### **2.3.2 Arendt & Public Space**

Political theorist, Hannah Arendt, believed in the need for public space in any community (1958). Public space provides a medium in which individuals can come together, discuss, create, and promote positive action. She believed that the fundamental human condition is plurality and identity is consolidated by the public world we share (Minnich, 127). According to Arendt, major problems can occur with public life. These problems, like the Holocaust, are due to the dissolution of public life. Arendt was concerned with the destruction of stable, shareable realities but was also concerned with “unthinking submission” to these shared realities (Minnich, 128). In a world heavily influenced by technology, a need for public space which encourages human interaction is becoming increasingly critical, especially in educational settings, where children are developing a sense of the world and need to be encouraged to think. The incorporation of Arendt’s

ideas into spaces for learning invites a breaking through of the everyday and normalized activities, into a world of “imagination and creativity” (Schutz, 1999, p. 78). The notion of capturing the learning child’s attention in a technology-drenched society is crucial. Public spaces which allow for children to interact with each other and community members will encourage a greater depth of learning.

Arendt recognized a need for both the public and the private. There is a need to share with and learn from others, but there is also a need for solitude which allows for contemplation and reflective disengagement from the chaos of the world (1958). Thus, educational settings should provide space for both group and individual work to satisfy both these needs. Without the means to share the world with a plurality of others, “the thinking subject’s common sense is eroded, and the result is a dangerous distortion of its ability to perceive reality” (Allen, 139). Again, Arendt’s fear can today be linked with the isolating aspects of technology, and the promotion of the notion of self over plurality.

Arendt argues that it is important to avoid “uncontrolled uniqueness”, which she believes will threaten public space and destroy the common points between perspectives. This view supports the idea of design with a purpose. Designers must create spaces which fit the context, reality, and the user group. Arendt’s fear of uncontrolled uniqueness echoes De Cauter’s discussion of hyperindividualism, where, as discussed previously, society

disappears in favour of complete individuals, resulting in a loss of public space (2004). A common connection should be provided in educational environments. In terms of public action, we can see the design of educational environments transforming to extend beyond the traditional notion of the school, acting as centres of the community, inviting participation and forming a web of relationships, much as discussed previously with the proposed school's expanded network.

Arendt believed the world is increasingly defined by normalized society and a grid of social rules (1958). She believed that these rules provide deficient personalities, and as such, in relation to education, the individual teacher or student is not aware of their own standpoint. The design of a school should support a curriculum which encourages the student to look at the world critically and be active in the community.

Arendt also discusses public space as a project – an element which is never quite achieved, but always coming into being. Public space as a project re-introduces John Dewey's approach to education, as discussed in a previous section, and promotes the idea that children should learn through authentic investigation, and emerging discoveries. The element of public space as a project can also be seen in conjunction with an ever-changing society. If a public space is never quite complete, maybe the design that defines it should provide flexible, changing, and reactive learning environments to respond to concurrent unpredictable human needs. As

Arendt states, teaching is not static, it operates in an ever-changing environment (1958). Although some would say Arendt, who had a definite aversion to isolating aspects of modernization, was anti-technology, we can see her notions of society in flux in direct connection to educational components which utilize technology in interactive and collaborative ways.

### **2.3.3 Experience: The Body**

In correlation with ideas of space and place, McCullough discusses the idea that technologies and virtual realities leave out some important details, “such as the fact that we orient spatially not just with our eyes, but also with our body” (2004, 10). This relates to the idea that design and architecture should serve not only the eyes, but also the experience of the body. Through our bodies and physical activity, we come to understand the world and develop a human sense of our environments. Lucy Bullivant echoes McCullough’s idea in her discussion of humanist technologists, or designers who strive to ensure technology is easy to use and more closely intertwined with the human body and senses (2006, 7). In *An Architecture of the Seven Senses*, Juhani Pallasmaa explores the need to engage the seven senses (sight, sound, smell, taste, touch, muscle and bone, and bodily identification) in the built environment. He states that architecture is almost becoming one-dimensional, serving only the eye (2006). This concern correlates with the idea of the incorporation of technology. How can a balance be created, and technology work with interior design to engage all of the senses? Society, as

a result of many elements, including technology, is becoming desensitized; it is extremely important that the notion of multi-sensory environments is kept in mind at all times to properly engage the learning child. An understanding that technology does not fulfil all our human needs is crucial.

#### **2.3.4 Proximity: Global Context**

As well as immediate and local context, technology is making the world much smaller, and therefore making global context more relevant. In the field of education and school design, an understanding of one's place in the world is a valid and essential field of learning. Geographer Doreen Massey speaks of the global city and a global sense of place. She states: "Maybe places do not lend themselves to having lines drawn around them...[t]here is a vast geography of dependencies, relations, and effects that spread out...around the globe" (2007, 13). We are much closer together now, and technology provides the opportunity for children to experience other aspects of cultures and places around the globe. The notion of global responsibility is becoming more prevalent in society. As Massey suggests, "[a]ctions in one place effect other places...[This] raises the question of responsibility, and specifically responsibility beyond place" (2007, 15). Our contexts are growing, and even the space of a small local school should provide its students with some idea of what extends beyond.

Marshall McLuhan's theories of the 'global village' also speak of the stretching of the metropolitan membrane so much so that there is now only

one city on the planet – the planet itself (McLaughlin & McMahon, 2002). He states that space has become reshaped and human affairs and relationships have been altered, creating a disconnect from human instinct. News travels faster than ever and we are now able to know everything about everybody. McLuhan believed the presence of the global village means we no longer have to be anywhere to do anything; the same information is available anywhere in the world at anytime (McLaughlin & McMahon, 2002). As such, connections, stasis, and continuity are deteriorating. McLuhan saw the loss of a sense of time and place, and feared that people were becoming less connected with their place in the world. Technology has the ability to bring people together, but also has the darker ability of pushing people and authentic experience further apart. How do we connect and communicate with the global environment while still honouring and appreciating our own personal contexts and surroundings?

## **2.4 Summary: Spatial Implications**

Collectively, the theories discussed in this section present a solid argument of the place of technology in education and the issues and discussions that surround it. From examining current educational theories, it appears as if the classroom of yesterday is no longer relevant to today. Spaces need to be more interactive and engaging for the student. Placement and use of technology in educational settings needs to change. Instead of an isolated computer room, how can technology be better distributed throughout

a school and its individual learning environments? Technology also needs to be utilized in more interactive ways, so that students can work in groups as well as individually. Technology needs to be peripheral to the school experience, so that students and teachers are interacting with space and place and developing a firm understanding of their local, national, and international context. School, as a place where important social learning occurs, needs to provide spaces to optimize socialization and learning through exploration. Technology should become a tool which assists in socialization, authentic investigation, and inquiry-based learning.

Strategically locating a technologically and socially-rich school in a diverse low-income neighbourhood could assist in bringing aspects of technology to those who may not have otherwise experienced it. Designing spaces in ways which invite the outside community in and make the school accountable to the community will also assist in developing a sense of local pride; increasing student's understanding of their surroundings and exposure to the community, and revitalizing the neighbourhood.

## **3.0 Precedents & Case Studies**

### **3.1 Precedent Review**

#### **3.1.1 Project 1: High-Tech High**

**High-Tech High · Los Angeles, California · Berliner & Associates · 33,000 square ft.**

An example of technology inspired educational design is a high-tech community-based high school in Los Angeles. Currently, very few examples of high-tech elementary schools exist, so this precedent proves to be an interesting and useful example. High-Tech High was designed to be a prototype for a technology-based community school educating low-income and minority students, thus combating the digital divide. To ensure interaction between students and teachers, offices are located directly adjacent to classroom space, and each classroom has a connected room which provides space for ongoing projects. Although elementary school teachers do generally have their own individual offices as they might in high-schools, notions of student-teacher interaction in High-Tech High are beneficial. The building itself in this project becomes a learning-tool. Building systems reinforce science and math curricula; “smart building technology systems are labelled and colour coded to illustrate function” (Macht, 2005, 40). Wireless systems and technology are balanced with the integration of breakout spaces, adjoining labs, and outdoor classrooms, which allow for both collaborative and independent endeavours (figure 5). The flexible spaces

allows for participation in group projects which simulate real-life experiences (Macht, 2005, 40). Each classroom has views to the outdoors, and spaces flow together with minimal boundaries, allowing for maximum interaction. This balance between technology and public space provides an example of positive change in curricula and school design.



*Figure 5.* Interior Collaborative Space. This figure shows central space in High Tech High that can be used for group work, gathering, or ongoing projects.

Permission to use image obtained on October 1, 2009. ©Berliner and Associates.

### **3.1.2 Project 2: J. Lyndal Hughes Elementary**

**J. Lyndal Hughes Elementary · Roanoke, Texas · SHW Group · 79,040 square ft.**

J. Lyndal Hughes Elementary, located in Roanoke, Texas, is designed to house six-hundred and fifty students from kindergarten through grade 6. The school, completed in 2005 by SHW Group, acts as a prototype in flexible school design in the district, and has since been copied multiple times due to its success. One question, however, the necessity of repeatedly copying a design. Copying successful underlying principles is understandable, and the

limit of resources in educational systems is most likely a factor, but when it comes to the entire design of a school, is the individual school's context not important? Or is it acceptable to drop the same school over and over onto random places on a map? Nevertheless, J. Lyndal Hughes is described as efficient, innovative, inviting, and functional (DesignShare, 2009).

The school is based around the idea of adaptable design and flex-space. Garage door-like overhead panels separate classroom spaces from shared space which connect adjoining classrooms (figure 6 & 7). The doors can be opened to encourage collaboration between classes.



*Figure 6.* Classroom Interior. This figure shows a typical closed classroom.

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Designer: SHW Group



*Figure 7. Open Classroom Interior.* This figure shows a typical classroom with garage-like door panel opened for cross-class collaboration.

Permission to use image obtained on October 1, 2009. ©Design Share, 2009

Designer: SHW Group

Also, in order to meet all aspects of the school's program within a limited footprint, the cafeteria space was designed to open up to become a performance stage, which allows the room to efficiently double as an auditorium. This feature allows the school to reach out beyond the needs of students and teachers to the community at large. A main feature of the school is transparency – natural light and an open, welcoming feeling are definitive of the school environment.

The architects responsible for the building engineered the facility to save operations and maintenance costs. Cost efficient aspects of the building include the use of vestibules at every entry and exit, canopies for persons

waiting outside that double as sun shades for offices, and earth berms to keep excavated soil on site. In addition, the use of a small building footprint on the site saves land costs while accommodating potential future expansion - “future suites of classrooms can be added at all three classroom wings” (DesignShare, 2009).

According to an educator at J. Lyndal Hughes Elementary, “the school has opened a lot of new doors for both teachers and students. The flexible classroom configuration has allowed them to team together and truly implement individualized and project-based learning” (DesignShare, 2009). In addition, teachers have incorporated use of outdoor space into the classroom environment in order to experience hands-on learning and encourage student's imagination. The section of the school containing the cafeteria and auditorium has its own separate entrance, which means the rest of the school can be secured during after-hours use by the community. Although this particular design does not focus on technology, its underlying principles of community, interaction, and flexibility are admirable and echo many important ideas regarding a pedagogy facilitating John Dewey's educational approach, which can be successfully and responsibly integrated with the use of technology.

### **3.1.3 Project 3: South Bronx Charter School for the Arts**

**South Bronx Charter School for the Arts · Hunts Point, New York · Weisz & Yoes Studio  
· 23,700 square ft. ·**

South Bronx Charter School for the Arts, completed in 2004, is seen as unique due to the local and inclusive nature of its design process and the fact that it is a “true community building in that it accurately reflects the needs and aspirations of local people” and is “oriented towards the needs of people who are not necessarily in education themselves” (Dudek, 158). The design of the school, which caters to students in kindergarten through grade six, was initiated by community activists from the local art board, and was developed through a series of workshops that included board members, school staff, and parents. Community inclusion was a key aspect to the design's development. As a result, the suggestion that the school might include a gallery which both local artists and students could use arose. New spaces were added to the design which would accommodate this “seamless” cross-over between school and community (Dudek, 159).

The designers and clients decided on the adaptive re-use of an existing building to accommodate the design, and an old sausage factory in South Bronx was selected. Widely spaced columns in the factory allowed for large and flexible spaces. In these spaces, the client wished to explore ways in which educational ideas about openness and communication can be encouraged by the built environment. Designers decided to group similar

grade classrooms together around shared break out, or multi-use, spaces:  
“[t]he floor plan of the school combines a traditional school layout with an open design. Through the utilization of multi-use shared spaces called 'pods' the school is able to expand learning spaces outside of classrooms into zones that promote interaction between teachers, students and faculty”  
(DesignShare, 2009).

Community and school-shared elements of arts-related spaces, including music, art, and dance rooms, were placed at the centre and main facade of the building, allowing accessibility, emphasizing their importance, and connecting the arts to the neighbourhood. Moveable partitions separating the arts spaces from the surrounding halls and shared spaces create a semi-permeable condition which ensures easy access to the general public entering from the street (Dudek, 159) (figure 8).



*Figure 8.* Connection to Street. This figure shows the colourful front entrance of the school, which is closely connected with community and school-shared elements of the building.

Permission to use image obtained on October 9, 2009. ©Design Share, 2009

Designer: Weisz & Yoes Studio

Interior principles focus on the use of “colour theory and spatial clarity as a connection between physical space and art” (DesignShare, 2009). Interiors are bright, fun, and lively, appealing to a child's imagination and sense of play. The chromatic colour palette utilized is echoed throughout the school in glazed brick tiles, floor tiles, door and window frames, carpets and furnishings (figure 9). Overall, the colour scheme creates an identity for the school, and emphasizes an idea of vibrancy and unity (DesignShare, 2009).



*Figure 9.* Main Hallway. This figure shows the use of colour and clear spatial connections in the interior of South Bronx Charter School for the Arts.

Permission to use image obtained on October 9, 2009. ©Design Share, 2009

Designer: Weisz & Yoes Studio

Limitations with regards to the design included few opportunities for

conventional windows, which meant the architects instead integrated a skylight system to bring light inside. In terms of sustainability, solar electricity, recycled building products, and certified wood products were utilized. The minimum standards for air changes and natural light were exceeded and filtered fresh air and north facing skylights “supply the building with an ethereal aesthetic and healthy environment for children” (DesignShare, 2009). Also, the designers incorporated polycarbonate clerestory windows, which let more light in without any heat gain. Thus, the school's heating and cooling costs are reduced.

Overall, the school has proven to be a success, acting as both a traditional school and a “new community learning center” (Dudek, 159). This precedent, much like the last, does not have a technology-based focus. In fact, examples of technology-based elementary schools are currently few and far between. The school does, however, exhibit innovative interior design practices and the infusion of community, collaboration, and learning into its spaces.

### **3.1.4 Project 4: Heinavaara Elementary School**

**Heinavaara Elementary School · Heinavaara, Finland · Cunningham Group Architecture ·  
26,000 square ft. ·**

Heinavaara, a small city with a population of one-thousand, is located in a heavily forested region in Finland, on the Russian border. The elementary school (pre-kindergarten to grade six), completed in 1999, is nevertheless referred to as “the wooden school of tomorrow” (Architectural

Record, 2009). The school facility combines technology with a unique design which reflects the rich culture and heritage of Heinavarra. The school incorporates twenty-first century technology with the North American building technique of wood platform framing, which allowed Heinavarra to make use of a locally available material and boost their wood products industry.

Educational pods or modules make up the interior of the school. These pods open to a central gathering space with a media centre, performance area, and cafeteria (which is available to the community in the evening) (figure 10). Computers are not dedicated to a computer lab, and are instead found on mobile carts which can move to the teaching modules, or be “clustered for use by students or community groups” (Architectural Record, 2009).



*Figure 10.* Communal Space. This figure shows the shared space between the classrooms. Permission to use image obtained on October 9, 2009. ©Design Share, 2009  
Designer: Cuningham Group Architecture

A stage opens up to both the gym and to the cafeteria, which provides flexible space which can change in size depending on the size of the gathering. Although the idea of grouping classrooms around a central multi-purpose space to encourage interaction amongst students and teachers from different classes is beneficial, the classrooms in Heinavaara Elementary School are based upon an open-plan concept (figure 11). Although some do find open-plan schools to be positive learning experiences, there are resultant acoustic issues and distractions for students and teachers. A similar model of space with more adaptable classrooms which can open or close depending on the activity may be a solution to acoustic problems.



*Figure 11.* Typical Classroom. This figure shows the use of open classrooms which have access to the central gathering space.

Permission to use image obtained on October 9, 2009. ©Design Share, 2009

Designer: Cunningham Group Architecture

In terms of reflecting local context in combination with integrating technology, the focal point of the main gathering area is a 10-foot high

soapstone fireplace. The fireplace is used by students for such activities as storytelling and baking traditional pies. Also, the front entry incorporates a wooden canopy, which is a classic design feature of the region. Despite potential issues with an open-plan, Heinavaara Elementary School has successfully integrated simple technological elements with a culturally rich building which reflects the needs of students, teachers, parents, and the community.

### **3.1.5 Project 5: San Felice Nursery and Preschool**

**San Felice Nursery and Preschool · Reggio Emilia, Italy · ZPZ Partners  
· 24,756 square ft. ·**

San Felice Nursery and Preschool is an Italian nursery school for forty-two toddlers between the ages of one to two and eighty children between three and six years of age. Although San Felice is not specifically an elementary school, it still exhibits design elements which would be beneficial in many learning environments. This school, completed in 2000, synthesizes an “educational/care vision with a strong and coherent environmental strategy” (Dudek, 65). The program integrated at the school is the Reggio Emilia Approach, which was discussed previously as an off-shoot from John Dewey’s educational theories. The space of the school is considered to be a public meeting space, where parents, teachers, and children make contact. In the Reggio Emilia Approach, there is a “particular emphasis on [the] idea of relations, and how they shape the future citizen. It is a concept which is central to the educational philosophy and is based on the development of a

long standing child centered philosophy” (Dudek, 66).

The interior of the San Felice School is rich and vibrant, which supports and encourages open-ended activities (figure 12). The school is an experiment in creating space for children and supporting ideals of the Reggio Emilia Approach. Designers created clear interior form which would act as a background to the children and their explorations. The interior space is simple, elegant, and spacious, and allows for an uninterrupted whirlwind of excitement and art work to occur within. Social and private spaces are balanced in an interesting way, and an “illusion of privacy within an open environment” is created (Dudek, 67). Different areas are subtly defined by slightly dropped or raised ceiling planes. Ceiling planes are made as interesting as floor planes, with geometric cutouts and interesting lighting features. Colours are simple and cheerful, once again allowing for the activities of the children to be the main focal point.

Homebase areas for groups of children of similar ages are clearly defined. The school, and the Reggio Emilia Approach, respect the differences of the ages, and each base contains its own range of activity corners, including things such as a climbing area, a soft corner, an art/wet area and a general play and activity zone (Dudek, 66). The double-height spaces on the interior also incorporate mezzanine levels with sleeping areas (figure 13). As



*Figure 12.* Circulatory Space. This figure shows the vibrant interior space in the San Felice Nursery and Preschool. Vibrant colour, simple geometric forms, and multiple visible spatial connections provide an energetic environment for the children of the school. Permission to use image obtained on October 9, 2009. ©ZPZ Partners.



*Figure 13.* Homebase Area. This figure shows the vibrant use of colour and clear interior form in the San Felice Nursery and Preschool. Upper mezzanine levels are designated as sleeping areas. Permission to use image obtained on October 9, 2009. ©ZPZ Partners.

a result, “it has the feel of a self-contained family apartment, social but small enough to feel cozy and safe for the youngest children” (Dudek, 66).

Although individual age groupings are defined, a central communal area allows all age groups to mix and interact. The dining area and kitchen are visible to the children from the central communal area: “the important social role eating has within Italian society is continually underlined, with children joining their older and younger friends around the dining table” (Dudek, 67). Here, like several of the precedents discussed previously, we see the integration of context and understanding of culture into the design. As well as the dining room being visible from the central area, music and art rooms become visible and central to school life. Outside play space is also very accessible to the children. The idea of public space, interaction, sharing, and learning are central.

### **3.1.6 Summary: Spatial Implications**

Examples in space planning and room typologies in the design precedents above offer successful new ways of designing positive school environments. The designs incorporate project space and spaces which encourage student-teacher interaction, and present the building as a learning tool. More interactive layouts mean that corridors are more than passages linking spaces. Adaptable space encourages the linking of classrooms and cross-class collaboration. In some examples, learning spaces, both social and individual, expand into pods or nodes outside of the traditional classroom

space. Flex-space allows for both collaborative and independent endeavours and on-going projects. Space has the ability to grow or shrink depending on the size of the gathering. In addition, potential for expanding school populations was considered through the identification of possible ways to accommodate future classroom space.

In general, the school environments are bright, fun, and lively, accomplished through the use of colours and finishes in the interior. Colour schemes assist in the creation of school identity. Simple and calm interiors act as backgrounds to the activity of the children and the display of their work, and could also act as background to innovative forms of technology.

Public space in many of the designs connect the schools with their local context. Community needs and usage of the school buildings were integrated into the programming, and community identity was key to many of the school's designs. Public meeting spaces and central gathering areas allow for students, teachers, and parents to make contact and interact.

Although the design precedents discussed offer a variety of useful elements which could be applied in engaging learning environments, none of the examples provide extremely innovative or edgy solutions with respect to the integration of technology. Forms of technology include wireless Internet, mobile computer pods, and media centres. Technological integration, although minimal, is of course a step in the right direction and more than many elementary schools are currently accomplishing. The field of interactive

technological design within school environments is one that needs further development.

## **3.2 Technology Precedents & Case Studies**

### **3.2.1 Introduction**

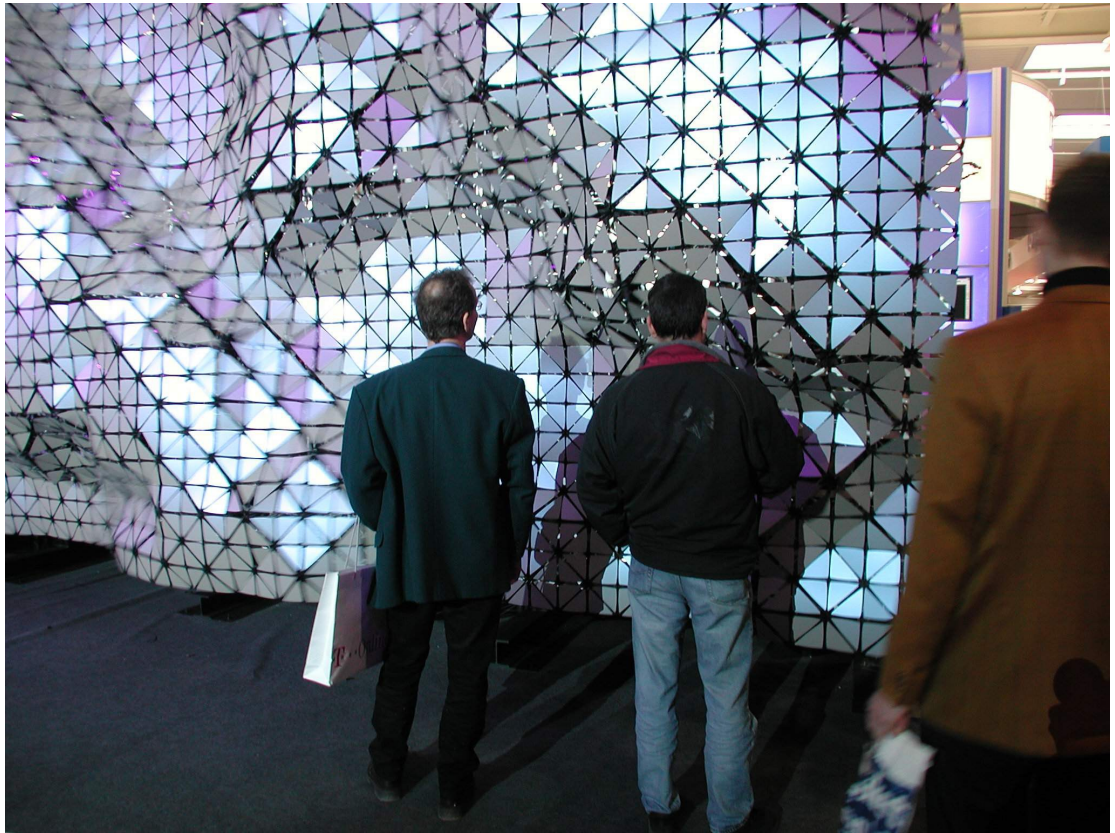
Design of a school-based environment should focus upon inclusive theories, accessibility to all, and a democratic use of technology. An avoidance of accumulation and information pollution in school design is crucial; a simple and complementary integration is best. According to McCullough, “as information becomes more and more abundant, clear views through it become less and less possible” (2004, 15). In learning spaces, technology should be an ambient and social medium, and not hinder the educational process. A careful and simple view and context focused design is required – all space and time does not need to be filled with information. Common themes can be extended inside as well as outside, and complete visual distraction should be avoided. Although in today's world, the era of the ipod and Blackberry, it is becoming apparent that an ability to concentrate on multiple tasks at one time is prevalent. However, young children may not have readily developed this skill, and being at the initial stages of their education and beginnings of their exposure to technology, a high degree of distraction may hinder their learning of the basics. As such, technology needs to provide an element of learning, and any technologically-based installations should be carefully placed to avoid irrelevant distraction during the learning

process.

Different learning areas require different technologies, although simplicity is still key; every subject of study should not have a different technology. An over-emphasis of screen-based technologies currently exists (Marsh, 2005). Some elements should be mobile, and some embedded, and not all technologies should be solely visual. Possible technological integrations could include aspects of digital graffiti, or other changeable installations which the students interact with as a group or individually. Display panels, or walls in spaces like the lunch-room could enable the downloading of student's work, for example the mediums of photography and videos, supervised by teachers. In addition, human well-being requires more than just sitting at a keyboard and interacting with screens. Young minds require physical activity and physical space in which they can socialize and play. Technology should not be a part of all of these experiences – physical participation is otherwise at stake.

### **3.2.2 Typologies**

An example of real-time technology manipulated by the passer by is the Aegis-Hyposurface, by architect Mark Goulthorpe (Figure 14). The wall reacts in real time to voice and movement picked up electronically. Passers-by play with the surface, as the wall reconfigures with their presence and bodily movements. Bullivant states, it effectively “actualized the virtual of a new medium”, while fully connecting with the physical context (2006, 20).



*Figure 14. Aegis-Hyposurface. This figure shows the wall interacting with passers-by. Permission to use image obtained on February 3, 2010. ©Blaine Brownell, Princeton Architectural Press, Mark Burry (photographer).*

Design elements do not have to be confined to a school's interior. Information, student work, and community initiatives can extend outside into the surroundings. For example, artist Ben Rubin created the 'Story Pipeline' at the BP Energy Center in Anchorage, Alaska, to tell the stories of local Alaskans. Stories appear on a plasma video screen and simultaneously emerge as real-time text transcriptions on a 150-foot long LED display (Figure 15). Bullivant states: "the text zigzags indoors down a glass corridor, then veers out through the plate glass façade, dancing between the trees until it

disappears out of sight” (2006, 29) (Figures 16, 17, 18). Although this technology is primarily visually based, it could be expanded and linked with online documentation of art and narratives, allowing students to display their work and promote their school in a less static way.



*Figure 15.* Story Pipeline. This figure shows the LED Display with real-time transcriptions. Permission to use image obtained on February 2, 2010. ©EAR Studio, Kevin Smith (photographer).



*Figure 16/17.* Story Pipeline. This figure shows the LED Display travelling from the interior of the building to the exterior.

Permission to use image obtained on February 2, 2010. ©EAR Studio, Kevin Smith (photographer).



*Figure 18.* Story Pipeline. This figure shows the LED Display zig-zagging away from the building and amongst the trees.

Permission to use image obtained on February 2, 2010. ©EAR Studio, Kevin Smith (photographer).

Another technology which promotes learning is exemplified by Lifeline, designed by Casson Mann in 2004 for the Churchill Museum in the United Kingdom. This installation is the largest interactive object within a museum to date, and its table-like surface can be used by up to twenty-six visitors at any one time who “readily release new data, and dynamic imagery that sails across its surface” through touch and exploration (Bullivant, 101). Although expense may make it impractical and the installation in no way defeats the importance of reading the physical book, the interactive table allows for group engagement and could have a potential place in a school library-like setting.



*Figure 19.* Lifeline. This figure shows the placement of the interactive table in the context of the museum.

Permission to use image obtained on February 16, 2010. ©Casson Mann.



*Figure 20.* Lifeline. This figure shows the visitors to the museum interacting with the table.

Permission to use image obtained on February 16, 2010. ©Casson Mann.

Microsoft has recently developed a technology which replicates some of the key features of Casson Mann's Lifeline. The company has developed Microsoft Surface to provide users with a tabletop computer surface which offers direct interaction, and multi-user experience (Figure 21). In a school setting, the ability of multiple students to comfortably use the same interface offers great potential. The product operates using a multi-touch platform, which allows several users to participate at once, and also recognizes natural hand gestures and 'real-world' objects, such as cellphones, music players, and programmed tags (Microsoft, 2010). Tags have the potential to be programmed by teachers for use in various projects to save and link to previously submitted material. Linking computer use with the experience of the body in a social atmosphere brings forth an element of technology which could be very successful in assisting to create a sense of place and develop social frameworks. Although there is currently only one format available (tabletop), Microsoft Surface has the potential to be developed in multiple sizes, into soft furnishings, and for wall, floor, and ceiling use.

Mobile technology has the potential to be used in learning environments for a variety of inquiry-based school projects. A social project in Toronto which utilized mobile technology to promote the creation of local histories and the celebration of one's surroundings provides an example of a



*Figure 21.* Microsoft Surface. This figure shows the current Microsoft Surface format that has been developed.

Permission to use image obtained on February 3, 2010. ©Microsoft.

positive learning experience which could be extended to the school environment. The project by CFC Media Lab, named [Murmur], encouraged individuals in the city of Toronto to phone in and record oral histories of their experiences around the city. In 2003, signs with phone numbers were then posted in locations around the city so that mobile phone users could call in and experience the story in the location it occurred. Since then, the project has also sprouted up in other cities, including Montreal, San Jose, Calgary, and Edinburgh. According to the [Murmur] website: [murmur] is a

documentary oral history project that records stories and memories told about specific geographic locations. We collect and make accessible people's personal histories and anecdotes about the places in the neighbourhoods that are important to them" (2010). By phoning in, anyone can "listen to [a] story while standing in [the] exact spot, and engaging in the physical experience of being right where the story takes place" ([Murmur], 2010). Some of the stories told will even suggest that the listener walk around and follow a path through the place where the story takes place.

The use of mobile technology by [Murmur] brings local history to life, and is a great vehicle for learning. Similar projects could be undertaken in school-based authentic investigations and inquiry-based projects as a celebration of the everyday, a discussion of local landmarks, and experimentation with oral-storytelling traditions. The ability for children to discuss their personal points of view and to in turn, be heard, learning that their footprint does make a mark on the planet, would be a very empowering experience.

### **3.2.3 Summary: Spatial Implications**

According to Lucy Bullivant, technology has "literally seeped into the skins of buildings in new ways. However, this is not true with regards to school-buildings. Artists are responding to the electro-physical flux of urban environments" and creating installations in response (2006, 7). The technological precedents discussed paint a picture in which interaction and

socialization is maximized, and place and context are acknowledged.

Perhaps the students could become the artists, creating a sense of pride and ownership, and thus creating a connection with school community, and local surroundings. A phenomenological impact, “meaning that the body is able to directly experience its environment in a very direct and personal way” would be beneficial to the students (Bullivant, 7). Using elements of technology discussed in environments which invite the community in and encourage socialization amongst varying age groups would be a positive change in school design.

Design elements within the school environment will focus on physical space, but technology will assist in the creation of a multi-sensory environment. Simple design decisions, like placing computers on desks with wheels, will allow students to join together in social groupings, rather than being isolated, interacting solely with the screen. In addition, break-out spaces and social activity nodes where students can physically interact and collaborate and perhaps take part in cross age activities would be beneficial. Although technological design elements should be kept simple and straightforward, opportunities for artistic installations could occur in spaces which students pass through in order to stimulate their imaginations. In order to avoid an over-accumulation, a common theme or thread should be kept amongst any chosen technological installation schemes.

Another potential design element is the integration of architecture with

real-time technological mediums controlled or created by the students.

According to Bullivant, this would be one way to “compensate for the marginalization of architecture as a cultural activity” (2006, 8). On the other hand, some would argue that architecture is the center of cultural activity, and does not need to be enhanced with technology.

## **4.0 School-Based Research: Interviews & Workshops**

### **4.1 Methodology**

#### **4.1.1 Purpose of Research**

The purpose of the research project was to collect information which informs and supports the design decisions and elements of this project, and ultimately helps determine the final outcome of the practicum. The information gathered was used to inform the conceptual design of an elementary school in Winnipeg, John M. King School, focusing on technology-influenced aspects. The research undertaken is important to the project, as it allowed for first hand surveying of the impact that technology is currently having on elementary schools in Winnipeg in general. The research assisted in gauging the effect that technology is having on the lives of both students and teachers, and revealed elements of what is currently working in the school's curriculum, and what can be improved or changed.

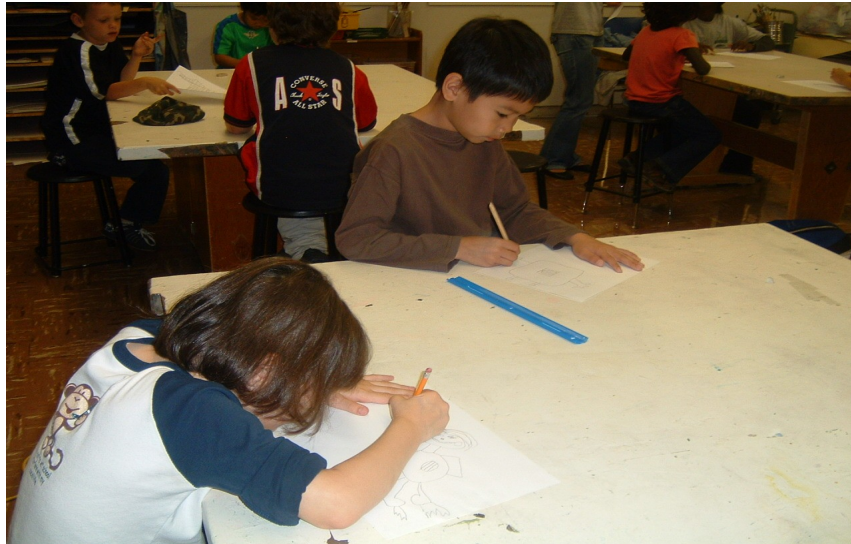
Once the research activities were complete, the information was utilized along with supplemental research in order to conceptually incorporate new design elements into the spaces of the participating school. A copy of the final work will be provided to the students and teachers of John M. King School.

#### **4.1.2 Research Design & Data Collection**

In order to gather information, several elementary school teachers from John M. King School were interviewed for fifteen to twenty minutes each. Interviews with teachers took place in person at the school. The principal, vice principal, and four teachers were interviewed. Questions involved their background, present teaching experience with respect to design and technology in schools, and what they expect or would like to see in schools the future (see appendix C).

In addition, a workshop with elementary students took place where students were able to visually explain their understanding of technology. Three sessions took place over two days in July, 2009 during the school's Community School Investigators (CSI) program. CSI is a summer enrichment program for inner city students. "The goal [of CSI] is to level the playing field for inner-city children who don't have the same summer-time opportunities as kids from more affluent areas" (Sanders, 2009). The students in the first group were in grades one and two, two and three in the second group, and four, five, and six in the third group. Two different presentations were created geared towards the varying age groups. For the first and second group, grades one through three, a simplified presentation focusing on robots was conducted. The robots exhibited interesting and new ideas about technology. For example, robots were shown which were able to fight fires, check patients' vitals with a video screen connection to a real doctor, or stop by

homes to pick up garbage and recycling in order to then distribute it to the correct facility. Following the presentation, students were asked to design their very own robot which could help them at school.



*Figures 22/23. Grade 1/2 & 2/3 Workshops. This figure shows students in the first and second groups working away on their robot designs.*

For the third and oldest group of students, grades four through six, more complex examples of new and innovative applications of technology

were presented. Technology discussed included Microsoft Surface (a tabletop computer which has no mouse, and only responds to touch and interaction with other electronic devices), interactive windows, walls and floors, plant pots which monitor the health of a plant, digital graffiti, and chairs which electronically learn the most appropriate shape to conform to for each individual chair-user's comfort. Following this presentation, students were asked to design and draw a technology that would help them with a specific activity or subject at school. Examples for all groups were provided, and suggestions for possible activities were posted to initiate the development of ideas.



*Figure 24. Grade 4-6 workshop. This figure shows students in the third group coming up with ideas for their technology design.*

The information collected through both interviews and workshops was intended to assist in showing the impact technology is currently having on

schools in Winnipeg, as well as on the lives of both students and teachers. The research was also meant to reveal positives and negatives of current curricula and learning spaces with respect to technology. Through the project undertaken with students, it was hoped that their current level of exposure to and understanding of technology would be revealed. The main intent of the collective research methods was to provide a realistic understanding of the current needs of elementary schools with respect to technology, and how interior design can be used to positively respond to these needs.

#### **4.1.3 Participants**

The school selected for this research study and as the site for the design project is John M. King School at 525 Agnes Street in Winnipeg, Manitoba. In interviews conducted, four teachers, the principal and the vice principal were interviewed from John M. King School. Each interview was approximately 20 minutes each.

Workshops with students were conducted with a total of thirty-five students divided into three groups based upon grade level. The students came from a diverse mix of backgrounds – no single cultural group or heritage stood out as dominant. In addition, there were three students who were learning English as a second language amongst the three groups. The first group consisted of nine students in grades one to two (approximately ages six through eight), the second group consisted of twelve students in grades two to three, (ages seven to nine) and the third group consisted of

fourteen students in grades four through six (ages nine through 12). Each group had one to three teachers and high school helpers assisting and joining in on the project.



*Figure 25/26. Sharing ideas. These figure shows students from all groups discussing their work and learning from others. Many of the students were very proud of their work.*

Each session took approximately sixty minutes, and the youngest group continued on with the drawing project following the session. On the last day, following the three sessions, a group session took place where students from all age groups were able to look at each others' ideas and talk about their own. The children were in general very proud of the work they produced.

## **4.2 Findings**

### **4.2.1 Teachers: Interviews**

Interviews with teachers took place over one morning in the school's conference room. The principal, vice principal, and four teachers were interviewed. The interviews revealed the many strengths that the vibrant school possesses, and the strong community initiatives they value. The discussions indicated the school's mandate to integrate technology and infuse it into everything. Technology is valued as a tool which is used everyday, not just as a separate class. The school is ahead in its district in terms of technological integration, but despite this, many of the teachers interviewed did not believe that technology exposure was adequate. Other interesting findings revolved around the strong sense of place the school is currently creating, positive school programs, a focus on inquiry-based learning, and challenges that the school's design is currently posing. The following chart summarizes the interview findings (figure 27).

Figure 27. Interview Findings.

		INFO OBTAINED/QUOTES	CONCLUSIONS/NOTES
PEOPLE	Employees	Principal, Vice Principal, 12 teachers, 2 Learning Assisted Centers, 18 Educational Assistants, 3 support teachers (resource), 2 office staff, 4 custodial workers, and a community worker, part-time computer technician	1. large teaching and work group also needs to be supported by the school design 2. Inclusion of community worker indicates that school values its students and their needs as well as the school's place in the community. 3. Computer technician - values a seamless integration of technology 4. wide range of experiences and wide range of activities happening in the school - flexibility
	Duties	vast day to day responsibilities teaching, supervising recess, community and family relations, staff development, empowering teachers & students, leading learning paperwork administrative roles "impossible to list all the duties"	
	Experience Range	2 years to 21+ years	
BACKGROUNDS	Goals in Teaching	1. creating life-long independent learners Support students to become independent learners 2. empowering students to lead their own learning and provide them with skills and strategies to do so 3. "Teachers need to be learning to give their students the best" 4. Helping the kids to become more aware of their goals and to set them. 5. "Creating engaged independent learners. Students need to learn how to learn". 6. getting kids involved and excited to learn and pursue personal interests	1. Goals echo many of the ideals discussed by John Dewey. 2. Creating spaces which support inquiry-based learning (therefore flexibility) is key. 3. Display space, technology integration, and place for creative play is important. 4. Empowering students is important, and relationship between students and teachers is instrumental to learning. 5. engaging and interactive learning environments
	Challenges	1. Time constraints, interruptions, keeping up with the add-on stuff 2. Dealing with a wide range of abilities and differentiating lessons for them. 3. Dealing with behaviour, attendance, and paperwork 4. behaviour no. 1 issue; bringing new kids into the class and getting them up to speed - 4 new kids in the last month 5. other commitments - meetings, programming	
ENVIRONMENT	School Neighbourhood	1. Inner city community with families below the poverty line struggling to provide their children with housing, proper nutrition, and safe nurturing homes 2. immigrant families, ESL families 3. despite challenges, a strong community 4. "It's very friendly, and lots more parents are now involved with our new structure." 5. Vibrant 6. Very eclectic: new immigrants, refugees, long term people. "The mix of cultures brings different experiences to the school". 7. An inner-city like community. "People say things about safety and aggression, but I don't feel unsafe. Really all the same issues happen in all neighbourhoods". 8. Constant change, multi-cultural, different ethnic presence.	1. New school design needs to support the school's love of community. 2. Need for school to reach out to community. 3. Strengths of community will be strengthened by making the school even more of a focal point than it already is. 3. New school design can assist in celebrating the community and promoting the student's local context. 4. The community currently provides the students with a strong sense of place. 5. Continued provision of space, and increased provision of space for community programs will be beneficial to the school and to the community it supports. 6. The school currently has a strong and positive identity. It is a forward-thinking and innovative school. 7. Socialization is key to the school's success and space to encourage student's collaboration should be developed, as well as space where students can interact with teachers, parents, and community members (Arendt). 8. Long list of school programs demonstrates the lengths the school goes to to ensure the students are surrounded by positive role models and grow up in a supportive environment (Steiner's theories). 9. Philosophy not to separate out students with challenges unless it is an extreme case is very positive - does not single out individuals as different-atmosphere of equality and understanding. 10. Inquiry-based learning process (again, much like theories discussed by John Dewey), seem to create engaging and positive learning experiences for the children - higher degree of relevance. 11. Technology linked to inquiry-based learning is key.
	School Identity	1. "We have demonstrated unbelievable leadership in an inner city community. The superintendent demanded excellence, and we have achieved a high level of teaching" 2. celebrating a diverse community 3. Helping to create independent learners 4. a "learning buzz" 5. "We have a strong sense of community in the school - everyone says hi. The kids greet each other." 6. a community atmosphere, a positive place in the community	
	School Programs	1. translators - interaction with ESL families; try to build community relationships. 2. strong advocates for children - sometimes take over parental roles if necessary. 3. Connections with child and family services. 4. Breakfast & snack program & after school programs like the pow-wow club and lunch-hour craft club. 5. Programming in every classroom by a "professional group of teachers" re: behaviour, languages; teachers are case workers and meet needs in the classroom. Unless individual issues are extreme, "our philosophy is every child should work in a 'normal' classroom" 6. resource teachers are on hand to work with teachers 7. Inquiry-based learning: "children learn better when they are engaged". "Inquiry based learning is a divisional focus. It involves letting go control and turning the learning process over to the children. They are naturally curious and will ask questions which drive the learning". "After Christmas, a community inquiry will take place school wide. Every class will take it to a different level, and every class will be different. They may focus on international communities, research a culture, or physical landmarks. The project is broad in order to meet the needs of each class". 8. Integrating technology and infusing it into everything; feeds into inquiry-based learning	
	Community Programs	1. Community support workers are available after hours and during the day. 2. Cooking club, sewing club, workshops that families are taken to, evening crafts, dealing with housing issues 3. Parent council meetings - bring parents in building 4. working with the new Macs to create hardcover books for 20 families in the school. Parents work with their children through the Family Room to create a book about their family's history. 5. Parks & Rec. out of building 6. Winter coat program 7. Lots of information through the family room - book lending library, cooking clubs, parenting courses	

		INFO OBTAINED/QUOTES	CONCLUSIONS/NOTES
ENVIRONMENT	School Components	wireless internet Mac mobile units with laptops travel to classes smart boards - not wall mounted - set up and take down projectors - not ceiling mounted - portable some digital cameras and video cameras computer lab some classes have desktop computers teachers have laptops in some classes printers, scanners, photocopiers etc...	School technological components indicate that the school values a technological integration and is following the curricular mandate to do so. School is much like a pilot-school for their district, and is willing and ready to learn, making it a perfect school to work with on this project.
	Neighbourhood Contacts	1. Spence Neighbourhood Association 2. West End Community Center 3. Community Gardens 4. New Life Ministries - instrumental in creation of sensory garden - provided free labour. 5. University of Winnipeg - tutoring 6. In regular contact with daycares, and one is being placed in 3 empty classrooms in the school. 7. Communities for Families 8. Welcome Place - New arrivals, translators	1. Schools many linkages with community programs outside of the school (eg. West End Cultural Centre), provides a stronger sense of connection and sense of place to the community and to the students. The school is assisting in revitalizing the neighbourhood, and design will assist in doing what they are already successfully engaged in. 2. The school is creating positive networks and connections throughout the city of Winnipeg. It is very much a focal point of the community.
	Classroom Setup	1. average 23-24 students per class 2. students usually work individually, pairs, or small groups. 3. share as a group	Classroom setup is a nice size in terms of number of students. School values collaboration, and ways that the design of the school could enhance collaboration would be beneficial.
TECHNOLOGY	Personal Experience/Changes	Varied depending on amount of teaching experience - some have seen drastic changes, while others say it has stayed quite constant. 1. drastic - no computer in first classroom, then eventually received an old classroom computer, and eventually a computer lab. Teachers either embraced technology or did not - usually a push from above for or against it. Now, there are laptops in class, computerized report cards, and class attendance is tracked online. Teachers check their email daily, and we are as paperless as possible. 2. "I have been teaching for 2 years, and technology has not drastically changed, but I'm learning more as I go, and I'm learning how to support the students and myself" 3. "Technology is exciting and can be intimidating for those trying to catch up. We are far behind. There is so much out there and so much in development. We can use it for so many things - math, telling stories..." 4. "Technology is finding its way into the classroom. We need the kids to keep up. They will be the ones developing new things in the future. It can be exciting, overwhelming, and frustrating". 5. "Technology can have negative effects. Maybe video games, but at the same time, a non-reading student learned to read through video games. His reading level had a huge jump". 6. "Technology plays a large part in my work. It's embedded in the way we do business. We use it from questioning to researching to production of final projects." 7. "Technology is both a positive and negative thing. It allows for research into medicine, etc. ... and helps with communication. But there is the aspect of fear. Texting, facebook, emailing - they have created a lack of social skills and limited student's abilities to communicate orally. But, the students love technology. They love seeing gadgets. It's engaging to them". 8. "I use technology as much as possible. Sometimes it's difficult to access the latest information, or it's not readily available. The speed of fixing things is also a challenge. We have some broken computers or incorrect software. It's better when the computer tech. is around, but it's a part-time position. 9. "Technology is letting us do more and more. We communicate more. It's generally positive, but it can also increase work load expectations-it's easier now, so it's easy to expect more. It's a great tool for communication. Video games can be negative, but technology's generally a positive thing". 10. "I like the computer lab, because it's already set up and the programs are loaded. Mobile would require more preparation and memory sticks". 11. I've had a computer for 30 years. I couldn't do it without a computer. I think technology has created more paper - not reduced. I use a blackberry for my calendar, memos to staff, documentation of my responses to programs, and applications to grants. I've also done my reports for a long time this way. Technology access for teachers is increasing and for children is increasing." 12. "Technology can devalue our language structure - it makes us sloppy. It also depersonalizes and creates anonymity. But, it is wonderful for the purpose of information gathering, as long as you have the right skills and ability to figure out which information is correct and which isn't". 13. "Technology is not adequate yet all across the board. But, technology is also not the be-all and end-all. We need to cope with learning and change more importantly. Students need skills for technology, but not a specific technology, as they will change". 14. "The transition to the computer lab is not conducive to the flow of learning. The computer should be in class and always be a part of it. It should be like the pencil and paper rather than isolated in a lab".	1. Generally, attitude towards technology is positive. Many believe the school, although ahead of many schools in the district, is not providing an adequate level of exposure to technology. 2. Technology changes quickly, and many of the teachers experiences of change indicate that technology needs to be integrated in a flexible way to allow for change. 3. Technology is valued in this school. 4. Elimination of a dedicated computer lab would be a positive thing in many of the interviewed teachers opinions, although mobile technology has its own set of challenges. 5. Technology at the periphery and the creation of a holistic learning environment is crucial in school design. 6. Negatives of technology - devaluing language structure, eliminating face-to-face communication, etc... need to be combated with development of a strong sense of place (which this school is successfully doing), and not forgetting or eliminating the basics of learning. Young children need a holistic learning environment, and a design which allows for socialization, collaboration, and authentic experience.
	Current Usage	1. Currently one part-time computer tech. 2. The amount of technology-based learning in the schools is not adequate for this day and age. "The budget is not there, and some teachers are unwilling to use it and unwilling to let their students use it. Some practices in the school feel archaic. We currently use technology to support learning. We use smartboards, do instant googling in-class, use digital cameras, create movies, and use camcorders to make video reflections of our learning. We use the smartboards to play interactive math games, build stories, and manipulate sentences. We also were able to participate in the ignite camp, sponsored by IBM. Students built circuits and circuit boards in order to build robots".	1. Current technological integration could be increased and improved. 2. The design should provide a more seamless and flexible integration of technological elements to ease teaching methods and to support multiple forms of technology, and increase collaboration and socialization. 3. Current technological components, although positive additions to the school environment, are bulky, distracting, and take up valuable space in the school. 4. Despite issues, the school, again, is very

		INFO OBTAINED/QUOTES	CONCLUSIONS/NOTES
TECHNOLOGY	Current Usage	<p>3. "A dedicated computer lab is not necessary - why can't we bring the lab to the classroom? It would be great to have more direct access with a projector ceiling mounted rather than on a table. It can be frustrating if you're resetting the smartboard all the time. It would be nice if it was permanently mounted and always ready and practical, rather than having to set it up and take down".</p> <p>4. "Our school is ahead of most schools divisionally. We are pushing for technology, but not necessarily providing an adequate amount of exposure. It really involves the adults, or teachers, taking the risk of taking it on. Some teachers push it and some don't see it as positive".</p>	forward-thinking and quite far ahead in terms of integration of technology.
	Student Usage	<p>1. Exposure varies class to class - "some students are not as exposed or not given the opportunity to play and to develop skills".</p> <p>2. editing videos, laptops, smart boards, interactive websites, Google information in-class to see immediately or answer questions</p> <p>3. At home - video games are the main form of tech. experienced, although also TV, DVDs, ipods, mp3s, cell phones (not allowed in school)</p> <p>4. "Technology is what students need to become learners in the community. They need oral skills, but they also need to work on the computer and learn to design and create".</p> <p>5. scanning artwork, creating learning folios on the computer, setting goals, reflections, scanning important work and recording why particular pieces helped them grow. Recording goals, strengths, next steps - provides proof students reached their goals</p> <p>6. outside of school, usage is increasing. Most students have some level of computer skills - "they are pretty aware, especially with what we offer in class - smartboards, Microsoft word..."</p> <p>7. "Some students will type a story, but won't pick up a pencil to write".</p> <p>8. "The student's current level of exposure is more than most of their teachers. Sometimes we underestimate the "underprivileged" population. We underestimate their access to facebook and email. Some don't have access, but they depend on their teacher in class more now than ever. So technology use has become mandated in our curriculum. We want technology to be utilized not just for the sake of using technology, as it was originally used, but use it to enhance learning".</p> <p>9. "Most students here do not have a computer at home"</p>	<p>1. Although the opinion varies slightly, it seems as if many of the students main exposure to technology occurs at school. Therefore, technology becomes a crucial aspect of design in the creation of learning environments for students of the twenty-first century.</p> <p>2. Location of a technologically-focused school in a lower-income neighbourhood is a very positive addition to a community. JMK is providing its community with a valuable service. It is evident they value their student's learning.</p>
	Teacher Usage	<p>1. Classes spend time in computer labs, but teachers often find this time as their free time to get paperwork etc... done while students work individually on the computers. "Teachers take students to labs so the teacher gets free time. What we really want in that the teachers will learn to teach technology in a collaborative way."</p> <p>2. "some teachers embrace the technology, and some are still reluctant but the onus is on them to learn."</p> <p>3. generally a "young, dynamic staff" who want to learn.</p> <p>4. Teachers use smartboards and prepare the evening before so they are ready to teach in the morning.</p>	<p>1. Technology integrated in a more flexible manner may encourage teachers to increase their learning</p> <p>2. It seems that the teachers willing to be interviewed were all the ones who support technology. It would have been interesting to interview a teacher who was against it.</p> <p>3. Interactive spaces where teachers can collaborate with their students would be beneficial.</p>
SPATIAL	Positive	<p>1. "The moveable furniture we have in the classes allows us to design our own layouts for what works for us."</p> <p>2. "The school grounds are a massive positive step. It's a positive for everyone in the community".</p> <p>3. The front entry - student's mosaic work, open-ness, gathering: "this is critical. We need display space for work and information for families".</p>	<p>1. Flexibility is valued.</p> <p>2. Design which enhances the community-life is important.</p> <p>3. Celebration of the students work and socialization is key. Including family in school-life and keeping everyone informed should be considered in the interior design.</p>
	Negative	<p>1. "I don't like the current design. It's dated and ugly."</p> <p>2. "There are no windows in the middle classrooms".</p> <p>3. "The fluorescent lights are too harsh - it would be nice to use something softer"</p> <p>4. portable aspects of classroom technology (smart board, projector, etc.) take up prime seating space.</p> <p>5. improper window sizes - can't see outside</p> <p>6. environmental - heating, plumbing, environmental controls - too hot, too cold. Need fresh air and a more comfortable environment.</p> <p>7. physical size of rooms is too small - need room for resources and room to move around - creates social issues - people bumping into each other</p>	<p>1. Bring light into the interior.</p> <p>2. Finishes need to be updated.</p> <p>3. Technological components need to be more flexible, and integrated more seamlessly.</p> <p>4. Larger windows.</p> <p>5. Environmental systems need re-work.</p> <p>6. Open up school to the community.</p> <p>7. More carefully designed classroom spaces to maximize storage and circulation space.</p>
	Changes	<p>1. In the class, I'd love a reading loft, a stage for creative play, plenty of storage with doors so it's not messy and distracting. A larger classroom would be great with a proper cloak closet. Two rooms together with a doorway between would also be great for the classroom setup. Outside of the classroom, I'd like a large meeting place where the students and I can use laptops - I don't want to have to book the space like we do with the current computer lab. It would be great if it was already there and already setup.</p> <p>2. A few laptops in the room would be great so we can work everywhere. Smartboards should be permanently mounted. It's a pain right now, and we don't use them as much as we should.</p> <p>3. plants and big windows</p> <p>4. drop box spots, plugs, electrical, ability for flexibility - more engaging</p> <p>5. central server, printers, copiers, hard wired CAT5 - everything connected</p>	<p>1. Re-work classroom</p> <p>2. Large central gathering</p> <p>3. seamless technological integration</p> <p>4. more light, views, and windows</p> <p>5. wireless capabilities increased, central server</p> <p>6. even more connectivity</p> <p>7. Flexibility</p>

## **4.2.2 Students: Workshops**

### **Day One: Grades 1,2,3**

The first day of workshops consisted of two sessions which included students from grades one through three. The discussions that resulted from the presentation as well as the robot design project revealed that kids in this age group had a more simple understanding of technology and a need for the basics. Although the discussion revolved around technology, many of the children wanted to discuss non-digital toys, like dolls and books. Books were also represented in many of the drawings, rather than being replaced with a digital version. This suggests that there is need in the early years to build a strong framework of basic skills as well as introducing simple technologies to the young children. However, children were very interested in technologies like video games, as well as the robots presented and were excited to design their helper robot.

The robots designed by the youngest of the students shows that simple and fun ideas work best for this age group. Technology utilized by this age group should be simple and well thought out. Development of basic fundamentals and the presence of play is important. Technology should not be excessive or overwhelming.

### **Day Two: Grades 4,5,6**

Day two consisted of one workshop for students in grades four, five,

and six. The workshop took place in the same art room as the previous day. Flexible space where the students could interact with one another and move around was important. Group discussion and brainstorming at the tables was prevalent. Socialization, sharing, and helping amongst the students was very natural. Despite technology being deemed isolative by various members of society, excited and collaborative discussions were sparked amongst students and teachers. Children in the older group seemed slightly more self-conscious and less willing to discuss their ideas than the younger children the previous day, but still demonstrated a great deal of excitement and imagination. Many of the students were constantly interacting and sharing ideas with the teachers: “look what I drew!”

Although the students in the grade four through six group had not personally experienced technologies like those they created, their designs, for the most part, were quite realistic. Many of the technologies or parts of the technologies they presented could be matched with real-life examples, indicating that children in this age group have a relatively up to date understanding of what is available today. Their interest indicates that technology in the school environment could be beneficial to increasing both their learning and level of excitement at school. The following charts (Figures 28/29) summarize the workshop experience and findings over the two days.

Figure 28. Workshop Findings: People, Spatial, Behavioural.

Category/Activity		Observations		Conclusions
		Day 1 (grades 1,2,3)	Day 2 (Grades 4,5,6)	
PROJECT	Subject matter	Robots	Technology Creation	
	Participants	21 students 1-3 teachers, high school helpers Younger group less self-conscious in expressing ideas - more willing to talk and ask questions, but all groups were enthusiastic	14 students 2 teachers, high school helper Children were slightly self-conscious but still demonstrated a great deal of excitement and imagination.	
	Classroom Usage	art room utilized wide use of classroom	art room utilized Flexible space where the students could interact with one another and move around was very important.	The flexible setup of the classroom allowed for a more interactive project. Group setup of tables very appropriate for art based activity - maximized socialization and interaction.
	Furnishings	1. 5-6 square tables (seating four to eight children) 2. circulation space between tables allowed for both students and teachers to wander through the classroom 3. Following the presentation, it became quite evident the children liked to explore and play		
SPATIAL/ENVIRONMENT	Reaction to Technology	1. high level of interest, particularly in video games 2. robots created a great deal of interest 3. The students were very interested in the technological material which allowed the presentation to take place - keen to play with the data projector and laptop (unfortunately off limits) 4. Imaginations were easily sparked	1. Excited and collaborative discussions were sparked amongst students and teachers. 2. The presentation of new and innovative forms of technology was of great interest to the students. They were very excited to see videos and to learn. The teachers were also enthusiastic about the presentation, and decided to take part in the art activity which followed, creating their own new technology which would help them at school (see figure 30).	Hands on technology would have great appeal to these children, as well as tactile materials, and interactivity in the interior environment.  The teacher's interest in technology suggests a higher level of its incorporation into learning environments would benefit those of all age levels.
	Interaction	1. Although the activity was individual, group interaction was important and very prevalent throughout the classroom - students valued classmate input. 2. Group discussion and brainstorming at the tables was prevalent. 3. Socialization, sharing, and helping amongst the students was very natural.		Formal and informal space for interaction is crucial in design of educational environments. Creation of interactive classroom spaces and break-out spaces which support varying group sizes would be beneficial.
	Teacher-Student Relationship	1. Students loved to discuss their drawings and ideas with the teachers present in the classroom, and myself, the guest teacher. 2. Face-to-face interaction encouraged the students and seemed to make them feel they were on the right track. 3. Many of the students were constantly interacting and sharing ideas with the teachers: "look what I drew!"		Spaces in the classroom and outside of the classroom (eg. Break-out spaces which support varying group sizes) would be beneficial, allowing for face-to-face interaction.
	Issues	1. ESL students had some difficulty understanding content of the project, but were still enthusiastic to interact with both students and teachers and create a piece of art.	1. Some self-consciousness existed in the older age group 2. Similar problems experience by the ESL students.	
BEHAVIOURAL				

Figure 29. Workshop Findings: Designs Produced.

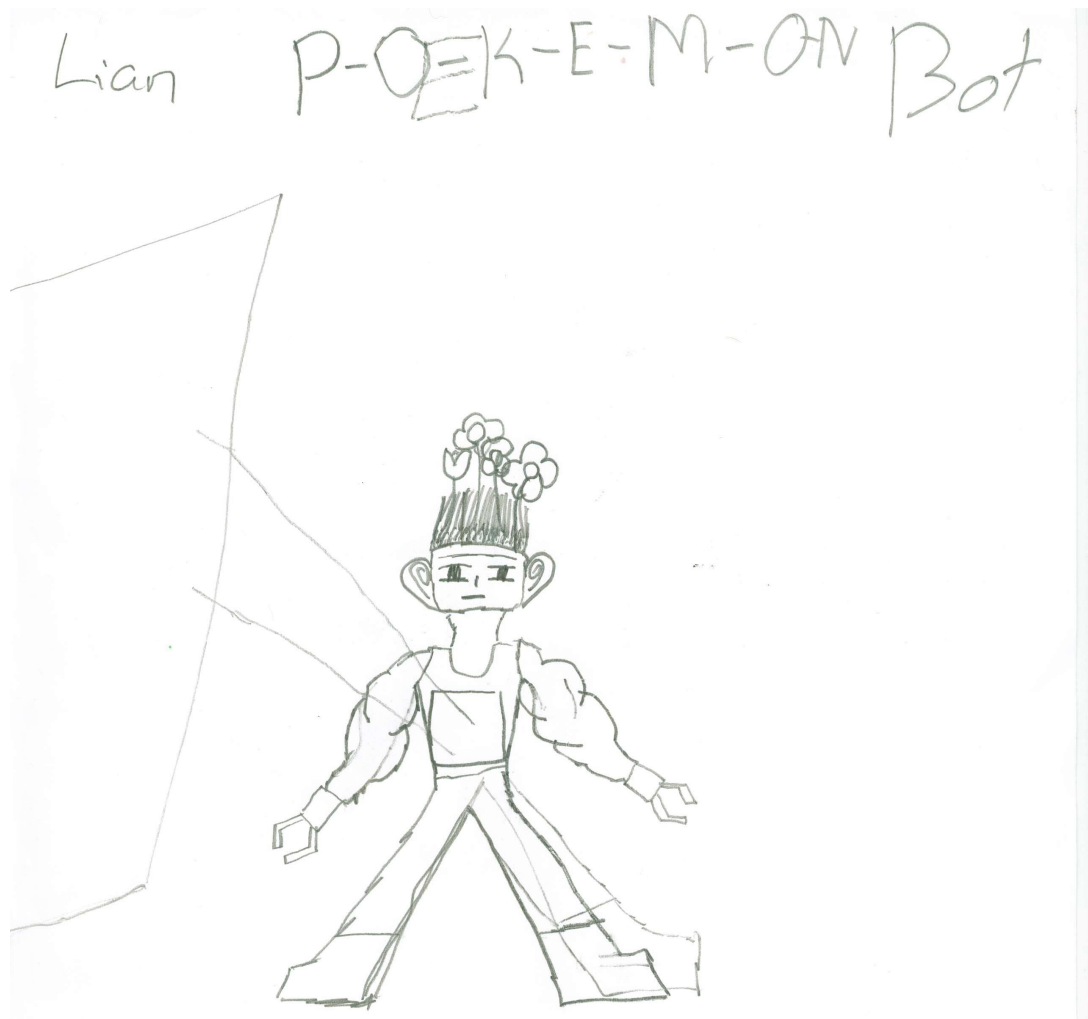
Category/Activity	Observations	Conclusions
<p>References/themes</p>	<p><b>Day 1 (Grades 1,2,3)</b></p> <ol style="list-style-type: none"> <li>1. Robot as companion - social aspects and high levels of interactivity were key to many of the robots designed.</li> <li>2. Robot as assistant - eg. Carrying student to school, helper robots, clean-up robot.</li> <li>3. Sports playing robots</li> </ol>	<p><b>Day 2 (Grades 4,5,6)</b></p> <ol style="list-style-type: none"> <li>1. References to learning as a class and learning individually (see example 2 below - figure 33). Several other drawings had similar themes of individual and group learning.</li> <li>2. assistance in finding objects (eg. library books)</li> <li>3. providing and presenting information</li> <li>4. environmental consciousness</li> <li>5. assisting teachers</li> <li>6. making learning easier</li> <li>7. Fun and play - eg. Go-carts with interactive displays to take students from class-to-class, holograms to play baseball with at recess</li> <li>8. Creativity and expression (see example 3 below)</li> </ol>
<p>Technology Use</p>	<ol style="list-style-type: none"> <li>1. minimal - most robots designed had very little technological information attached, although two students made references to technology (see example 2 &amp; 3 below).</li> </ol>	<p>Visually based technologies predominated because they are most likely the technology form that students have had exposure to.</p> <p>Students are drawn to interactive technologies</p>
<p>Representation of Non-Tech. Objects</p>	<p>books were represented in many drawings</p>	<p>Need and desire in early years to build a strong framework of basic skills as well as utilizing simple technologies</p> <p>importance of the book in a child's life</p>
<p>DESIGNS PRODUCED</p>	<p><b>Examples</b></p> <ol style="list-style-type: none"> <li>1. <b>Figure 30: Robot Companion (grade 1/2)</b> One girl in the group designed a robot which would play with her. The student's main concern was to create a robot to be her friend.</li> <li>2. <b>Figure 31: Spike the Do-anything Robot (grade 1/2)</b> Slightly more complex than many of the other student's robots. The robot features elements which are interactive for the student, including a speaker that the robot communicates through, ease of mobility, display screens, and buttons to help a student acquire information. The robot helps you to find books that you are looking for. A row of books sits on the robot's chest. The screens and buttons help you locate the correct book, which the robot then delivers to you. Once again, references to physical books were made.</li> <li>3. <b>Figure 32: Pokemon Bot (grade 2/3 group)</b> A boy in the group designed this robot which exhibits elements of projection and display. The robot has a display screen on his chest which projects information a student needs when working on a project, much like a portable encyclopaedia system. He can also assist in projecting larger format information, like a movie or television show, on to a screen for entertainment purposes. In addition, the robot is environmentally conscious, growing plants upon his head, and programmed to pick up litter and recycling with his clamp hands.</li> </ol>	<p><b>Day 1 (Grade 1-3)</b> Simple and fun ideas work best for youngsters. Technology used by this age group should be simple and well thought out. Development of basic fundamentals and the presence of play is important. Technology should not be excessive or overwhelming.</p> <p><b>Day 2 (Grade 4-6)</b> The teacher's interest shows that incorporating interactive technologies into school environments would also benefit them, as important users of the space. Technology can be fun and inventive for all age levels. The level of understanding of technology in the older age group was more developed than amongst the younger students. Drawings of invented technologies were imaginative and presented more complex ideas of technology than the previous day's robots. Although the students in the grade four through six group had not personally experienced technologies like those they created, their designs, for the most part, were quite realistic. Many of the technologies or parts of the technologies they presented can be matched with real life examples, indicating that children in this age group have a relatively up to date understanding of what is available today. Their interest indicates that technology in the school environment could be beneficial to increasing both their learning and level of excitement at school.</p>
<p>Examples</p>	<ol style="list-style-type: none"> <li>1. <b>Figure 34: Teacher's Contribution</b> Interactive blackboard/desktop connection.</li> <li>2. <b>Figure 35: Desktop/Whiteboard Computer System</b> The figure demonstrates a desktop computer system whose screen duplicates information the teacher presents to the class. The three desks on the right hand side of the room display different forms of information, indicating work or research that would occur individually whilst in a group setting.</li> <li>3. <b>Figure 36: Bus Display Windows</b> Ideas of digital graffiti, art, personalization, and expression were presented in one student's work. She drew a picture of both the inside and outside of a bus where students could personalize windows, which also act as interactive computer display screens.</li> <li>4. <b>Figure 37: Choose a Book</b> Choose a book is an example of a representation of a mobile technology. The book appears to be a traditional book. However, it is actually a display which helps you find a book at any library you visit, indicating notions of portable technologies and wireless networks.</li> </ol>	<p>Need and desire in early years to build a strong framework of basic skills as well as utilizing simple technologies</p> <p>importance of the book in a child's life</p>



Figure 30. Robot Companion. This figure shows a robot designed by a student in the grade one and two group. The text is meant to say: "This robot plays with me".



Figure 31. Do-Anything Robot. This figure shows a more complex example of a robot produced by a student in the grade one/two group.



*Figure 32. Pokemon Bot. This figure shows a robot designed by a student in the grade 2/3 group. Its features include projection and display capabilities, as well as environmental awareness.*



Figure 33. Robots. This figure shows many of the robots drawn by the students on Day 1: grades one through three.

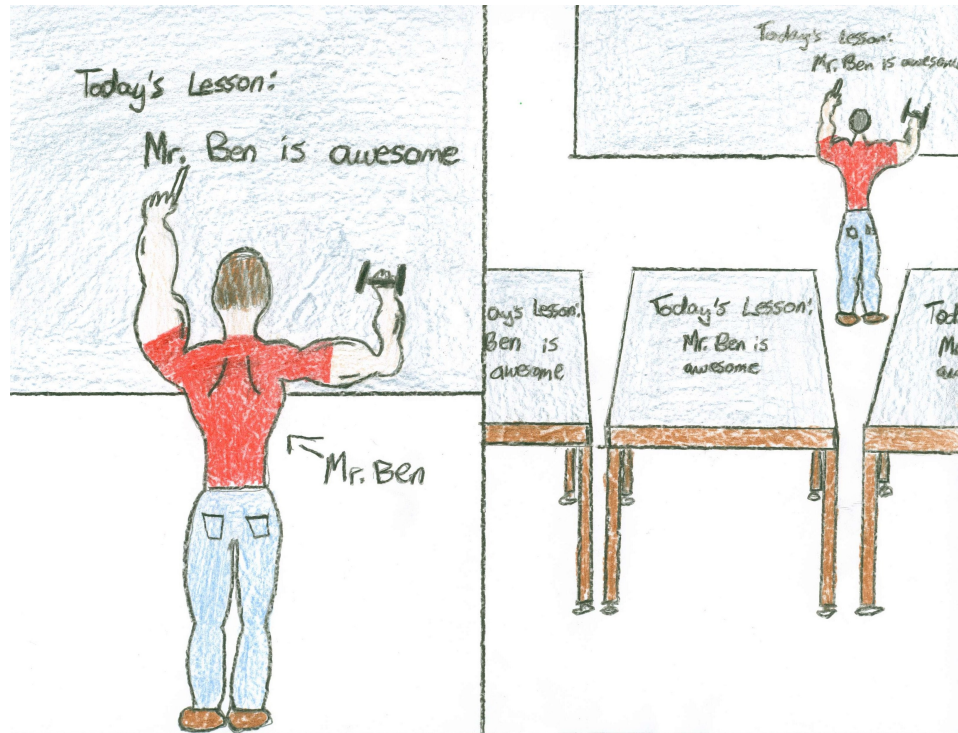


Figure 34. Teacher's Contribution to the Project. This figure illustrates a technology designed by a teacher following the presentation. The teacher's interest in technology suggests a higher level of its incorporation into learning environments would benefit those of all age levels.

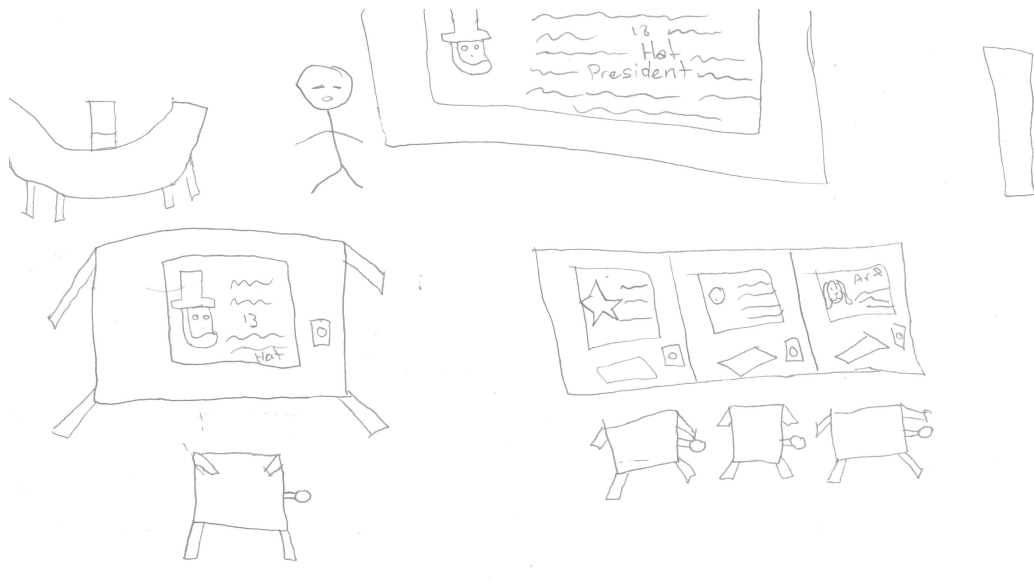


Figure 35. Desktop/Whiteboard computer system. This figure shows a form of technology drawn by a student in the grade four through six group. The image represents both individual and group learning. Classroom depiction reflects traditional teacher at the front of the room setup.



Figure 36. Bus Display Windows. This figure illustrates a student's technology which allows passengers to personalize bus windows during their ride.

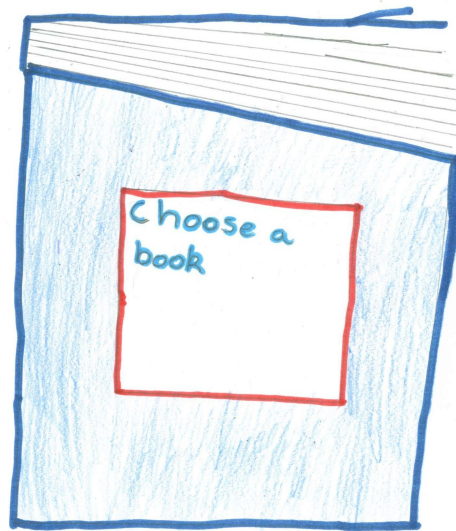


Figure 37. Choose a Book. This figure illustrates a portable technology which assists in locating a chosen book.

### **4.3 Themes: Design Considerations**

Interviews with teachers and administration presented a number of considerations to take in the redesign of John M. King School. Many of the teaching goals discussed echoed the ideals of John Dewey. The school's focus on independent learners and inquiry-based learning suggests a need for creating spaces which support on-going project development. A large central gathering space would assist in the inquiry-based project process. Flexibility, therefore is key. In addition, display space, integration of technology, and place for creative play is important. Engaging and interactive learning environments will support the student's learning. Young children need a holistic learning environment, and a design which allows for socialization, collaboration, and authentic experience.

In addition, continued and increased provision of space for community programs will be beneficial to the school and to the community it supports. A multipurpose central gathering space which accommodates various group sizes would also be useful in creating a location where students can interact with their peers, teachers, parents, and community members. The Family Room, a space in the school out of which many of the community and parent-programs run, should be made a focus of the school. The creation of a holistic school environment is crucial to a positive sense of place.

In terms of technology, many teachers agreed that there was no longer a need for a dedicated computer lab. In order to infuse technology into

learning, more flexible and mobile infusion of technology becomes instrumental. Mobile formats will also assist in increasing collaboration and socialization. Current technological integration should be increased and improved. The design should provide a more seamless and flexible infusion of technological elements to ease teaching methods and to support multiple and changing forms of technology. Current technological components, although positive additions to the school environment in terms of content provision, are bulky and take up valuable space in the school. Smartboards need to be wall mounted and projectors need to be ceiling mounted. High-levels of connectivity need to be created. Wireless capability needs to be increased, a central server integrated, and data and electrical connections need to be easily accessed throughout the school.

In terms of aesthetics, finishes need to be updated and light needs to be brought into the interior. Larger windows and the creation of more views and viewpoints would be positive additions, opening the school up more to the community. Also, classrooms need to be more carefully designed to maximize storage and circulation space.

After workshops with the three groups of students, potential design considerations arose through observing their work habits in the classroom and through analyzing their drawings. Watching the children collaborate with other students and with teachers indicates the need for flexibility in a classroom space. The shared tables in the classroom allowed for group

discussion and brainstorming, and the circulation space around the tables allowed the students to visit their peers and discuss their ideas collectively. The ability for the children to move about their classroom and interact with others, as well as have a spot to sit and work is very important. The ability for the teacher to move around the class easily to interact with students was also facilitated well by the flexible and moveable classroom space that the art room provided.

Through observing the project taking place, it became apparent that a teacher's feedback is very important to students. Some students seemed to need feedback more than others, and a student who misbehaved would have benefited from space where he and the teacher could talk one on one. Inclusion of space where this one-on-one interaction is able to occur could be a positive addition to a learning environment.

The students' high level of interest and excitement with regards to the realm of technology and their apparent interest to experience technology in a hands on way indicates that technologies which have the ability to engage multiple senses would be successful in an interior learning environment. Playful interiors with tactile finishes and materials would also be appropriate. Students were easily distracted. As stated previously, multiple types of technology in one space may be too overwhelming; classrooms should focus on a simple integration of technology. More diverse and interactive forms could occur in the periphery. A high level of energy was prevalent amongst all

three groups. As such, the importance of physical education and avoidance of solely integrating technologies which do not support physical activity are key. Students need more than just stationary desks. They need the ability to walk and move around and socialize. School is a very social environment, and this needs to be promoted.

Following the presentations, the final task which took place was the group sharing of ideas. The group met in a gym where they placed their drawings on tables and circulated throughout the room to view each others work and discuss their own. The children took ownership of their drawings and all felt the need to locate their piece of art: “where's mine?” They very much enjoyed explaining their ideas to other students and teachers, and happily asked each other questions. The positive atmosphere and interactions in the room indicated a great potential for creating more appropriate space for display and discussion of work, which could easily be incorporated with elements of technology. Also, break out space which promotes cross age interaction could help to improve the overall community-spirit in the school.

## **5.0 Design Concept & Programme**

### **5.1 Site & Building Analysis**

#### **5.1.1 Site Analysis**

The area surrounding the John M. King School is a vibrant and interesting community. The school is located in northern Winnipeg, Manitoba, at 525 Agnes Street at the corner of Agnes and Ellice in the inner city district of Winnipeg School Division Number One. As discussed in the introduction, the inner city area includes the lowest-incomes and the highest level of unemployment in Winnipeg. One teacher interviewed at John M. King School described the neighbourhood as an inner city community with families below the poverty line struggling to provide their children with housing, proper nutrition, and safe nurturing homes (see figure 38). Many outsiders have a negative perception of the area (see figure 39).



*Figure 38.* Inner City Neighbourhood. This photograph illustrates housing in a lower-income segment of the community.

Despite the challenges, the teacher stated that it is a very strong community (JMK teacher, interview, November 19, 2009). Fears associated

with safety and aggression also arose during the interviews. Most of the teachers, however, believe that the area is safe: “I don't feel unsafe. Really all the same issues happen in all neighbourhoods” (JMK teacher, interview, November 19, 2009).



*Figure 39. Graffiti & Debris.* These photographs represent visually a perception of the area that many outsiders incorrectly hold. As stated by one JMK teacher: “all the same issues happen in all neighbourhoods” (Interview, November 19, 2009).

The highest percentage of the population with aboriginal heritage is clustered around the inner city core. The ethnic diversity of the area is very high with the presence of many immigrant and refugee families. The population density of the area is 5000 persons per square kilometre for much of the area (City of Winnipeg, 2006). Because of the high population density, the school serves as an important location for services that can reach out to 'at-risk' inner city children in response to the digital divide. The school can

provide children with opportunities, including new hobbies, learning, the creation of art, and playing sports.

The majority of the children who attend John M. King walk to school, and there is very little need for transportation by bus or car. Revitalizing a school in an inner city neighbourhood like John M. King's is beneficial in terms of reducing transportation problems and urban sprawl that would occur with the creation of a new school in a suburban location. The school currently reaches out to its community members, and encourages after-hours use of its facilities. Its central location means that it can be a focal point of the neighbourhood.

The school's surroundings are eclectic and diverse. As well as the presence of many houses and apartment buildings in the area (figure 40), there are a multitude of religious (figures 41 & 42), commercial (figures 43 & 44), and cultural institutions. The Spence Neighbourhood Association (figure 45 & 46), the West End Community Centre (figure 47 & 48), and the Ellice Cafe and Theatre (figure 49) liaise with John M. King School, increase the cultural presence of the community and bring visitors to the inner city area of Winnipeg. A number of community gardens are present in the area and assist in building relationships, connections, and a sense of pride amongst residents (figure 50 & 51). Institutions like the Welcome Place assist new arrivals to Canada and provide translators to ease their transition to their new home. The neighbourhood has a strong sense of community and celebrates

its diversity. The presence of murals and sidewalk art paints a picture of the eclectic group of people who live in this area (figure 52). According to one of the teachers interviewed, it is exciting to be a part of the neighbourhood (figure 53): “the community events and institutions and the mix of cultures brings different experiences to the school” (JMK teacher, interview, November 19, 2009).



*Figure 40.* Residential Neighbourhood. This photograph illustrates a row of homes in the area.



*Figure 41/42.* Religious Institutions. These photographs illustrate diversity of belief in the community, with Winnipeg Central Mosque, and City Church.



Figure 43/44. Commercial business. These photographs present a wide variety of businesses in the area, also reflecting the cultural diversity of the neighbourhood.



Figure 45/46. Spence Neighbourhood Association. The association plays a large part in revitalizing the area, and liaises with John M. King School, developing positive community relationships.



Figure 47/48. The West End Cultural Centre. The centre hosts a number of musical guests and cultural events.



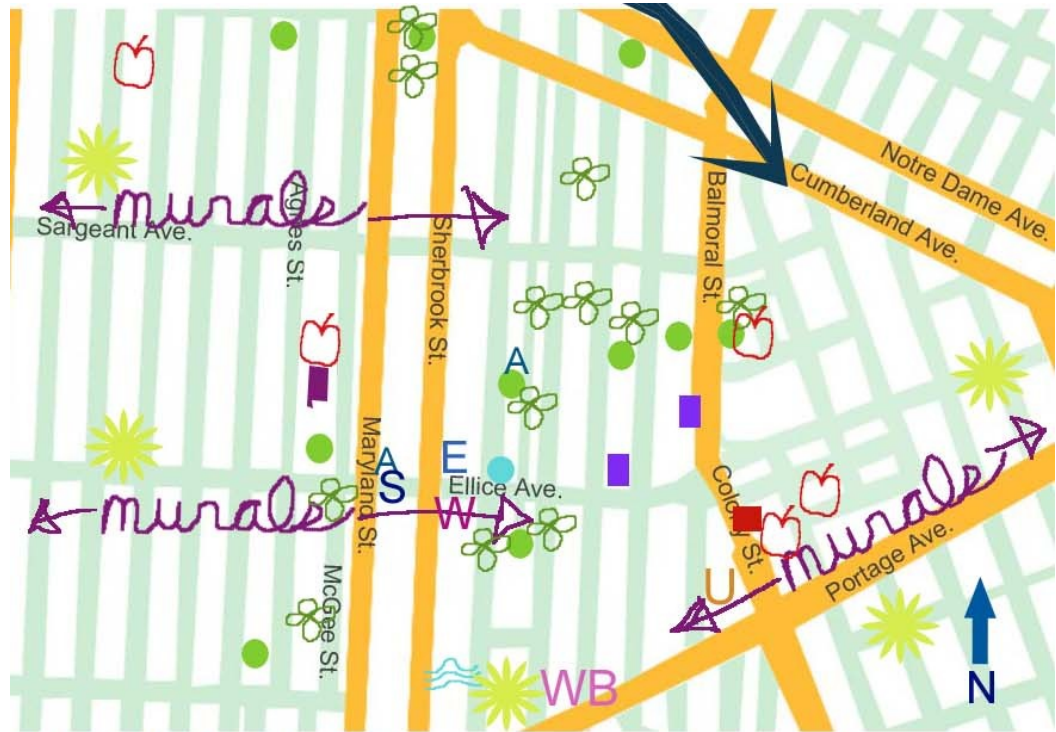
Figure 49. Ellice Cafe and Theatre. Another location for cultural events in the neighbourhood.



Figure 50/51. Community Gardens. Gardens in the area assist in building positive relationships amongst residents.



Figure 52. Murals. Colourful murals celebrating community and diversity are found on corners, buildings, and other locations around the neighbourhood



John M. King School's Neighbourhood

Legend:

-  John M. King School
-  Park/Playground/Rec. Centre
-  Cultural Heritage Centre
-  Theatre/Film
-  Women's Centre
-  Pool
-  Community Art
-  Community Gardens
-  Schools
-  University of Winnipeg
-  West-End BIZ
-  Ellice Cafe & Theatre
-  West End Cultural Centre
-  Spence Neighbourhood Association
-  Sun Pattern
-  Wind Pattern

Figure 53. JMK's Neighbourhood. This figure illustrates the area surrounding John M. King School and its community resources.

### **5.1.2 Building Analysis**

John M. King School is an approximately 71 000 square foot two-storey building (see Appendix B for existing plans). The original school building was constructed in 1906, and replaced with the current building in 1963 (figure 54). The main office and foyer are quite welcoming. A soft seating area and art mosaics completed by the children make the space inviting (figure 55). However, it seems as if the seating area is not used extensively, possibly due to proximity to the gym entrance-way. The main floor consists of two gymnasiums, office and staff functions, an art room, and classrooms for nursery school, kindergarten, and grades one through three. There are also several empty classrooms, three of which are currently being developed into a daycare space. The main floor also accommodates several community functions. A kitchen runs a breakfast and snack program for the students, and the 'family room' provides resources and workshops for parents and children. A Winnipeg parks and recreation office is run out of the main floor of the school.

The second floor consists of the library, music room, computer room, resource rooms, and an office for a child psychologist. Classrooms for students in grades three through six are included on this floor. Most classes in the school are set up to be multi-age. Many of the classrooms are empty on the third floor.



*Figure 54.* John M. King School. The main entrance to the building.



*Figure 55.* JMK's Front Foyer. The front entry of the school incorporates soft seating and mosaics created by the students.

The hallways in the building lack visual connections, and are long and uninteresting (figure 56). There are, however, several locations throughout where student's work and school information is displayed (figures 57 & 58). Classrooms, which are located along the North side of the building, are physically disconnected. Interaction between students of different home rooms occurs when working on projects in hallways, at recess, or when travelling throughout the school. Break-out or communal spaces are currently not extensive, although the second gymnasium space and its stage, located in the centre of the main floor, is used for gathering (figure 59). Natural light and window locations are limited. Several classrooms at the core of the building have no access to natural light. A more open facade would benefit the inner spaces of the school.



*Figure 56.* Hallways. The school's hallways have not been a focus in the current design.



Figure 57/58. Display. The hallways act as a location for display of school information and identity and student art work.



Figure 59. Gathering. The central gymnasium on the main floor is frequently used as a gathering space.

In interviews conducted, teachers at John M. King School had several comments regarding the school's current design. Teachers appreciated the mobile furniture used in the classrooms: “the moveable furniture...allows us to design our own layouts for what works for us” (interview, November 19, 2009) (figure 60). The school's grounds were also seen as a positive design element the school currently possesses: they are a “massive positive step. It is a positive step for everyone in the community” (interview, November 19, 2009). And the foyer was also noted as a positive part of the school due to its openness and use as a gathering space: “this is critical. We need display space for work and information for families” (interview, November 19, 2009).



*Figure 60.* Moveable Furniture. The flexibility of the current classrooms is valued by the school's teachers and students.

Aspects of the design which were seen as negative included the lack of windows in the middle classrooms, small windows in general, harsh fluorescent lighting, and bulky technological elements which take up prime

classroom space. The physical size of rooms was noted as too small. There is a need for space for resources and space to move around. One teacher noted social issues are caused due to people bumping into each other (interview, November 19, 2009). In terms of finishes, and general aesthetics, the design was not popular: “I don’t like the current design. It’s dated and ugly” (interview, November 19, 2009). Concern was expressed during the interviews regarding environmental controls. The school, according to interviewees, is either too hot, or too cold. Teachers wish there was more fresh air moving through the building and that the environment was, in general, more comfortable.

North of the building is a small parking lot for the school, and the adjacent streets of Agnes and McGee are primarily residential, allowing most students to walk to school. Beyond that there is a diverse mix of building typologies and institutions as discussed in the site analysis. The building's exterior landscape and school grounds have recently been redesigned, creating a wonderful place for the students to run and play (figure 61). The development of the grounds has in turn benefited the community as a whole. As well, a sensory garden, which celebrates community and culture, was constructed at the east side of the building in the summer of 2009 (figure 62 & 63). Due to the school's strong presence in the neighbourhood, all the labour for the sensory garden project was donated. The addition of student art work at the west main entrance and south side of the building indicate the vibrant atmosphere that the school possesses (figures 64, 65 & 66).



*Figure 61.* Exterior Landscaping. John M. King School's grounds have been recently re-landscaped, adding valuable green space to the community.



*Figure 62/63.* Sensory Garden. The garden is a new addition to the school's grounds.



Figure 64/65. Main Entry Artwork. Artwork at the school's entrance is very colourful and welcoming.



Figure 66. South Wall Artwork. Student created artwork can be seen from the play structure on John M. King School's grounds.

## **5.2 Human Factors Analysis: Client & User Profiles**

Three-hundred and fifty students are currently enrolled at John M. King School, in nursery school through to grade six. The student population represents the neighbourhood it is located in. It is culturally diverse, and includes new immigrant students and those whose first language is not English. Other users of the building include the principal, vice principal, twelve teachers, two Learning Assisted Centre teachers, eighteen educational assistants, three support teachers, two office staff, four custodial workers, a community worker, and a part-time computer technician. Parents of students and community members also spend time in the school. A strong and positive culture exists in the building. One teacher said: “we have a strong sense of community in the school – everyone says hi. The kids greet each other” (interview, November 19, 2009).

The teachers of John M. King are generally quite young and embrace new ideas and technology. As such, the location is often used as a pilot-school for the district. Although the majority of teachers value the integration of technology into the school curriculum, there are still varying degrees of acceptance. Day-to-day teacher and administration responsibilities are vast and unpredictable due to the challenges of the neighbourhood that the school is located in. They include teaching, supervising, working on community and family relations, leading learning, and processing paperwork. The teachers of the school have connections with child and family services and are strong

advocates for the children they teach. If necessary, they have sometimes taken over parental roles (JMK teacher, interview, November 19, 2009). Students with special needs are not separated from other students, unless individual issues are extreme. The teachers believe “every child should work in a 'normal' classroom” (interview, November 19, 2009). Resource teachers and educational assistants are on hand, and programming is created for each class, depending on things like behaviour and languages. The main focus of the teachers is a goal to empower the students to lead their own learning and provide them with the skills and strategies to do so, much like the theories of John Dewey (JMK teacher, interview, November 19, 2009).

The identity of the school is very positive in the neighbourhood and is known for celebrating a diverse community. A “learning buzz” exists in the school amongst an enthusiastic and energetic bunch of students (JMK teacher, interview, November 19, 2009). A number of programs exist in the school which strengthen its community atmosphere. Teachers work with translators to improve relationships with non-English speaking families and students. A breakfast and snack program and a winter coat program are in place, as well as multiple after school activities, including an after school pow-wow club and a lunch-hour craft club. Community support workers are available after hours and during the day. The Family Room in the school is used for activities for parents, including cooking clubs, sewing clubs, and family workshops. A book lending library also runs out of the Family Room.

Parent council meetings regularly take place at the school to encourage parents to visit.

In terms of community liaisons, parks and recreation Winnipeg runs an office in the school. The school is in regular contact with Spence Neighbourhood Association, the West End Community Centre, Ellice Cafe and Theatre, and New Life Ministries. These connections assist in enhancing the community atmosphere in the area, increasing the number of cultural events, and revitalizing the neighbourhood. Tutors from the education program at the University of Winnipeg visit the students, and the school is in regular contact with a number of day care centres, including one which will soon be run directly out of the school. A number of additional community connections can be added to this list.

In terms of technology, the majority of students depend on the school for exposure and do not have computers at home. Despite this, many of the students, according to one teacher, have a higher understanding of 'the ins and outs of technology' than many of their instructors (interview, November 19, 2009). As discussed previously, the school is ahead in terms of level of technological integration, but according to many of the teachers, still has 'a way to go'.

Manitoba Education, Citizenship and Youth (MECY) released a continuum model for infusing literacy with Information and Communication Technology (ICT) across the curriculum in 2006. John M. King School is a

strong supporter of this model. ICT refers to technologies including computers, laptops, digital cameras, video cameras, digital microscopes, scanners, cellphones, electronic games, digital audio devices, global positioning systems, electronic whiteboards, the Internet, and more. “ICTs in the classroom will continue to evolve as new technologies emerge over time” (MECY, 2006).

Technology is valued in the Manitoba Educational system as a “foundation skill” in order to prepare students to become “citizens of the global community” (MECY, 2006). The model recognizes digital citizenship and states that “21st-century students must develop multiple literacies that will allow them to respond to changing ideas, attitudes, and technologies as their communities and their world evolve” (MECY, 2006). ICT is explored as a tool that can be used to enhance and extend student's learning, and the model presents three-year phases which are customized for implementation in Manitoba school divisions, online professional learning communities, and professional learning for teachers (MECY, 2006).

According to the learning model, literacy with ICT means “choosing and using ICT, responsibly and ethically, to support critical and creative thinking about information and about communication” (MECY, 2006). The continuum was developed to acknowledge that ICT is not a separate curriculum in elementary school, but is “congruent with and infused with existing concepts across the curriculum”, as discussed by various teachers during the interview

process (MECY, 2006). The continuum recognizes learners of all levels, and provides tools so students can self-assess and set their own goals. In addition, inquiry-based and authentic learning, as discussed previously as being instrumental at John M. King School, is described as a supporting principle of literacy with ICT. Inquiry is described as a “powerful methodology that engages students in pursuing personal, active, and authentic learning in depth” (MECY, 2006). As students engage in this form of learning, they develop questions which guide the process, research information sources, synthesize new ideas, and present and share their findings (MECY, 2006). Reflection is a key aspect of the inquiry, and “processes enable students to learn how to learn, and to become self-directed learners” (MECY, 2006).

Literacy with ICT and inquiry-based learning are extremely relevant principles when relating to the generation of students being taught. University of Toronto professor of management, Don Tapscott, states that over the last twenty years, “clearly the most significant change affecting youth is the rise of the computer” (2009, 17). As such, he refers to the current generation, which includes students currently at John M. King School, as the Net Generation or Net Gen (children born from 1977 to December 1997) and Generation Next (children born January 1998 to present) (2009). With the presence of Web 2.0, iPods, mobile phones connected to the Internet, digital cameras, text messaging devices and Facebook, students and young people today are more connected to the rest of the world and more technologically savvy than

ever before. Net Gen and Generation Next children “assimilated technology because they grew up with it” whereas adults have had to accommodate it, which Tapscott describes as a much more difficult type of learning process (2009, 18). Assimilation means that children today view technology as a natural part of their environment, “as natural as breathing”, and as such, children at John M. King School will greatly benefit from an increased exposure to technology (2009, 18).

Net Geners are described by Tapscott as “initiators, collaborators, organizers, readers, writers, authenticators, and even strategists, as in the case of video games. They do not just observe; they participate. They inquire, discuss, argue, play, shop, critique, investigate, ridicule, fantasize, seek, and inform” (2009, 21). Growing up with the Internet and new media gives control to users. Children have to search for information rather than simply looking at it, and as such, have been forced to develop “thinking and investigative skills” to determine which websites contain the information they are seeking (2009, 21). As such, Tapscott states that children of current generations and the “shift from one-way broadcast media to interactive media”, are the antithesis of previous generations whose main source of information was television (2009, 21). In effect, the “knowledge hierarchy [has been] effectively flipped on its head” (2009, 28).

As well, Net Gen and Generation Next children have a global reach. They are living in a “flattening” world, and “distinct localized characteristics

specific to young people are somehow fading” (2009, 27). Tapscott believes that young people around the world are becoming more and more alike, in terms of “generational attitudes, norms, and behaviors” (2009, 27). However, a global generation is only just beginning. Tapscott continues by stating that technologies are still not distributed equitably across the world, and pronounced digital divides are very real (2009).

The definition that Tapscott has created of children of the generation which includes those that inhabit John M. King School creates a strong defense for the use of both literacy with ICT and a curriculum based on inquiry. The investigative and creative characteristics that young people possess, and their attraction to technology, is key in the design of learning environments. Spaces need to be interesting and engaging, and incorporate new and changing technologies. Aspects of flexibility, and project and event spaces will support their learning.

As discussed previously, socialization and interaction between students, and between students and adults, in early education environments is extremely important. Technologies which allow for teamwork and engage multiple senses will benefit students of this generation. To combat issues of lack of identity due to increased globalization, spaces which connect the students with their community and assist in creating a sense of place and sense of pride are crucial. The generation of students present at John M. King School present an exciting, innovative, and complex set of

characteristics and challenges which require a new design typology in elementary educational environments. The goal of the proposed re-design for John M. King School is to meet these diverse generational needs.

### **5.3 Design Concept, Issues & Objectives**

The concept behind the re-design of John M. King Elementary school focuses on community and connection. The design will examine peripheral spaces like hallways, corridors, and lobbies. The front foyer will be a major element of the design. The foyer is often the heart of the school; it speaks to parents, students, teachers, and visitors. It displays what is special about the school and what is happening in its community. Potential for creation of communal gathering areas and community spaces within the school will be explored. For example, the Family Room of the school will become a focus of the design. Located adjacent to the foyer, its location becomes a celebration of family and community. The family room acts as a family and community resource, providing such services as workshops for parents and community members, cooking lessons, a book lending library, and sewing clubs.

In addition, the project will include a typical classroom design. The periphery will be the focus of the design in regards to the placement of interactive technological interventions. These peripheral spaces will act as learning spaces in connection with classroom space. Technological elements will also occur in classrooms, but large scale interventions will occur in under-used peripheral spaces. The non-technological interior design elements will

be calming and simple, ensuring that a feeling of permanence and a grounding sense of context is created. As well, simplified interiors will act as a back drop to the activity of the students, the incorporation of technology and the display of work. The incorporation of technology means that the design of the school requires flexibility in its spaces in order to support changing elements and future needs.

Technology utilized in the school's spaces will encourage both interaction and activity. Technology will encourage social interaction and teamwork. Using the concept of connection, technological elements will be dispersed throughout John M. King School. Elements of technology will include display, interactive learning stations, and mobile forms.

Technologies like the group-work appropriate Microsoft surface, projection screens, and digital graffiti will allow the students to experience and customize the environment. Work will be displayed digitally and physically. Information about the school will also be displayed for visitors and parents. The school's technological focus and project-based learning could accommodate projects similar to the [Murmurs] project which took place in Toronto, Ontario (as discussed in the Technological Precedents section). Active learning, as encouraged by theorists like John Dewey, could be facilitated with ease of access to information and ease of creating a network between locations.

The inclusion of technologically-driven spaces of display and

information-sharing have the potential to celebrate the everyday and accommodate mapping and learning about one's community. For example, students could collectively work on a project similar to Murmurs, learning about the history and stories of Winnipeg. Mobile technology could become a vehicle for learning, and students could learn about historical figures like Louis Riel, Winnipeg landmarks, and the city. History could be brought to life through storytelling, and student's and community member's personal points of view. The mapping of the students' own surroundings and subsequent display and processing of information collected within the school's peripheral spaces would have a neighbourhood and community impact. The information displayed could be ever-changing when a new project is selected by the students.

In the case of a history project, similar to [Murmurs], students could collaborate with other classes in the school, and other classes across Canada and internationally in the creation of a community database based on student's own experiences of their local contexts. Learning could take place facilitated by mobile technology, visual, auditory, and direct experience. John M. King School would be connected to multiple points in the city and beyond. Such a project is an example of an inquiry-based learning process, supported by elements included in the school's interior. The project could be explored by students and teachers in a collaborative way. Students would be empowered through their direct ability to control and develop the project

alongside their teachers. Students would be encouraged to determine their personal definition of what a community is – within the school, locally, nationally, and internationally. Projects could be displayed physically, visually (images and video) and aurally, and provide an example of how integrated technologies could be used to interact with the physical world. Work, which could be changed and updated, would be displayed in hallways and communal spaces to encourage individual or group interaction and uploading or downloading of information. If the project was to become collaborative with schools across Canada or internationally, students could be taken to these locations through the use of web conferences, real-time cameras, and research. As such, a project like this when supported by technological means embedded into the interior can branch off into many other projects. Learning about and exploring one's own community and working with classmates encourages physical activity, socialization, and interaction. Thus, technology is seen as a tool which can be used in a very positive way.

The school's re-design will encourage more active learning with mobile pod units, which will allow learning to occur in various locations throughout the school. Mobile pods include two differing versions. An enclosed gathering pod, and a partition-like working or project pod are presented as two distinct designs in order to establish their different purposes in the learning process. Brainstorming activities take place in the gathering pods. Project work and display occurs at working pods. Direct proximity allows for a

continual movement between brainstorming and production as projects progress.

A digital learning lab incorporated into the art room will include equipment such as digital cameras to encourage students to get up and move around their community with their classmates and teachers. Classroom spaces will be fairly simple and flexible. Smart boards will be utilized and groupings of moveable furniture will allow children to collaborate and move around the classroom easily. Simple interior spaces with rich and tactile material choices, which are eco-friendly and sustainable, will work with technological aspects. The interior itself could become a teaching tool with regards to environmental responsibility. Overhead doors, by Skyfold (more appropriate for acoustics than sliding doors) will connect adjacent classrooms, in order to enlarge individual spaces or accommodate cross-class group work. Classes will also have the ability to open up and extend into adjacent communal space. Classrooms will be grouped around communal areas, which will encourage gathering, group technology work, support class space, and meetings between teachers or teachers and students. Gathering spaces can also accommodate John M. King's existing breakfast and snack programs. Mobile elements will encourage opportunities for gathering. Design opportunities which allow for group or individual work will also be included. Spaces will allow for varying gathering sizes, which accommodate everything from a student and a teacher to cross-age and

cross-class groups.

## **5.4 Design Vocabulary**

### 1. Connection

- Community Interaction
- varying scales of community
- Connections within school, with the surrounding neighbourhood, and beyond
- Visual and physical interactions between spaces
- Encourage users to cross paths
- Student-student, cross-age, student-teacher, teacher-teacher, parent-teacher, school-community relationship formation
- student→school→community→global
- Open the exterior so the school is connected with and accountable to the community
- Partners in the community – a display place for local artists
- Opportunities for constant learning by students and the community through exposure to various opportunities – for example, exposing students to art installations that take place within the school
- encourage a stronger sense of pride in community
- connect with the community socially, psychologically, and physically
- Technology: a tool for collaboration

## 2. Flexibility

- ease of change, broad element of technological flexibility (schools will most likely not change their forms of technology frequently, but should have the ability to do so without huge upheaval)
- varying scales of technology: mobile to embedded
- move away from conventional 'appliance approach' to the computer and the segregated approach of the computer room
- capacity of plasticity in space
- infinite possibilities to display, change, and rearrange both traditional and digital materials
- customizable elements for student's work, technology, and digital installations
- accommodations for a variety of group sizes and multiple functions
- mobile elements, moveable furniture – a sense of control over space
- project space/event space
- Modularity and components
- expansion of the definition of a learning environment

## 3. Periphery

- simplicity
- avoid over-design and distraction – what is critical?
- Technology integrated to be unobtrusive and flexible
- holistic learning environments

- focus on under-used spaces: lobbies, hallways, social areas

#### 4. Imagination, Exploration, Independence

- Inquiry-based learning
- Project space, event space
- interactive potential of technology
- multiple display opportunities for work in progress
- areas where larger groups can participate in the same project and talk about their ideas together
- rich and tactile material choice
- environmentally-friendly materials: surroundings as a tool to teach students about environmental stewardship
- playful elements
- balance of technology with traditional and multi-sensory (linguistic, visual, audio, gestural, spatial representations)

## 5.5 Design Strategies

### 5.5.1 Design Programme

The design programme for John M. King School indicates the areas of focus in the design proposal (figure 67). In addition, each of these focal spaces in the school are described in terms of activity and use and how they respond to the needs of a contemporary generation of students. A functional programme which outlines floor area, functional requirements, material quality, and lighting of the spaces which make up the school as a whole is included in Appendix A.

**Figure 67. Design Programme.**

Spatial Type	Activities & Uses	Description
Foyer	<ul style="list-style-type: none"> <li>-main point of entry to the school</li> <li>-welcoming place and information display</li> <li>-orientation &amp; wayfinding: visual connections</li> <li>-checkpoint: connection to main office</li> <li>-point of ticket sale for community events</li> <li>-gathering</li> </ul>	<p>The foyer of the school provides the initial presentation of the school's identity. A vestibule has been incorporated onto the main entry way in order to decrease environmental discomfort in the foyer. The foyer is a welcoming space which incorporates seating and digital displays. The space is visually connected to its exterior surroundings, and to locations within the school. The main office opens up to the space, and there are sitelines to the Family Room and the offices of the principal and vice principal, who play a large part in the strong community spirit present in the school. Their visibility increases their approachability. As well, the second floor looks down onto a segment of the foyer space, creating a</p>

Spatial Type	Activities & Uses	Description
Foyer (cont.)		<p>linkage between the two floors.</p> <p>A bench seating area which includes bar-type seating is integrated as an informal work surface, or a location where visitors can wait after checking in at the office. A wireless display system is incorporated throughout the school, and is useable in this location. Vertical digital learning displays, in the form of LCD touch screens, are also integrated into the bench system. Information displayed will include information for parents, students, and community members. Graffiti visitor walls are accessible in the area for passers-by to leave a message or a doodle.</p> <p>The eastern wall of the foyer incorporates modular panels which form a power grid. Technological elements, like display screens, lighting, and other interactive technologies, can be plugged into the wall. These elements can be rearranged and changed when new technologies replace the old. Although most schools will not be constantly updating technological elements, they will have the ability to do so with ease in the future. In addition, traditional forms of display can be mounted and arranged as desired on the power grid panels. Traditional and digital forms of work displayed can include student art work, photographs, school information, text, sound, or many other forms. Plants are also found in the foyer along with colourful accents, sustainable materials, and tactile finishes.</p>
Family Room	<p>-parents' programs, resources for parents</p> <p>-family &amp; community</p>	<p>The Family Room has been relocated to a location which is accessible from the main entry point, and becomes a focal point upon entering the school. Its location is a celebration of John M. King's strong community and family values. A</p>

Spatial Type	Activities & Uses	Description
Family Room (cont.)	<ul style="list-style-type: none"> <li>workshops</li> <li>-brochure display</li> <li>-small kitchen area for cooking classes</li> <li>-sewing/sewing classes</li> <li>-small book lending library</li> <li>-information display</li> </ul>	<p>demountable wall facing into the foyer allows for visual connections which strengthen the community atmosphere. Graffiti display walls are integrated into the demountable panels, making them useable from inside or outside (the foyer) the family room. Inside the room, an informal soft seating area which is used for visitors and for small workshops, creates an inviting atmosphere. Brochure racks and shelving for a small book lending library provide resources for parents and community members. Several horizontal work surfaces and a small sewing area are also included in the space. A small kitchen acts as a location for refreshments, and also becomes an area for cooking lessons or nutrition discussions for small groups. A Smart Board, and a mobile laptop cart are also included in the space, allowing parents and community members to have hands-on experience with technology.</p>
Main Floor Central Gathering Space	<ul style="list-style-type: none"> <li>-flexible multi-purpose space</li> <li>-assemblies</li> <li>-displays/ installations</li> <li>-access to technology</li> <li>-plays/creative play</li> <li>-community events (conferences, presentations,</li> </ul>	<p>The central gathering space on the main floor is a major area of socialization and interaction in the school. The space is divided into three zones, which includes a work or project area, a display or presentation area, and a kitchen area for community functions and the school's breakfast and snack programs. The project area and event area are based off of John Dewey's theories and the notions of inquiry-based learning. The spaces are fully flexible, and allow students, teachers, and community members to have control</p>

Spatial Type	Activities & Uses	Description
Main Floor Central Gathering Space (cont.)	parent council meetings, performances, adult education – mobile laptop carts & moveable furnishings) -Inquiry-based learning site (project space & display/event space) -small and large group gatherings -informal classes -physical extension of classroom spaces -visual connections -access to kitchen for distribution or purchase of food -separation of spaces with skyfold partitions -seating and gathering	over the space. The project area is set up so that it is fully connected to the event area, which contains a stage for presentations, community events, and creative play. Acoustic wall and ceiling treatments are incorporated so that activity in one area will not interrupt one in another. In the event that the spaces need to be disconnected, a skyfold partition, with elements of glazing and acoustic fabric panels, can be used to physically separate the spaces. Mobile working pod units, which incorporate seating, a work surface, and traditional and digital display capabilities, are utilized in the project space for class, cross-class, or small group projects. Teachers can have control over the space by arranging the pods as necessary. As well, the pods can be pulled into the adjacent event space. Panels incorporated in the pods have marker-board finishes, so that students or teachers can easily jot down ideas as they arise. Aspects of display can remain in the area for long-term projects. In addition to the working pods, several small gathering pods are present. These pods accommodate 4-6 people and are used for brainstorming and discussions, and display. A pod can be claimed as a teacher pod, through a change in finishes, to define a location where the teacher can be found and where he or she can supervise and have control over the activity in the area. Mobile digital displays mean that the teacher can easily set up an area for a presentation or a informal class. As well, the project space is adjacent to grade one, two, and three classrooms, which can connect to the space through

Spatial Type	Activities & Uses	Description
Main Floor Central Gathering Space (cont.)		<p>skyfold partitions.</p> <p>The project space connects to the event space, which is double height with views up to the second floor central gathering, library space, and circulation. The event space can hold large scale projects which emerge as a result of activities in the project space. As well, community-based artists can use the flexible space for gallery displays or installations. The focal point of the area is a stage with a large projection screen that can be used for school assemblies, community events, conferences, or parent council meetings. Plays and creative play can also occur in this location. Access to a behind the scenes preparation area is found connected to the stage.</p> <p>Stack-able seating and modular grid display walls (as found in the foyer) are used in the area as elements of flexibility. Innovative materials, colourful accents, sustainability, durability, and transparency are key to finish choice in this space.</p>
Second Floor Central Gathering Space	<ul style="list-style-type: none"> <li>-seating and gathering</li> <li>-physical extension of classroom spaces</li> <li>-modifiable displays</li> <li>-access to Internet technology</li> <li>-viewing of gathering space below</li> <li>-potential community gallery/art installation space connected to</li> </ul>	<p>The Second Floor Central Gathering Space provides similar functions to the main floor gathering space, although less complex. The area looks down onto the main floor event space below, and is connected to adjacent classrooms just as the project space on the main floor is. The space also uses mobile display systems for both traditional and digital forms of work. The mobile displays allow the space to become a community gallery or student gallery space in conjunction with authentic investigation and inquiry-based projects. Write-able surfaces are used to encourage personalization and informal class lessons.</p> <p>Again, connection to wireless and a central server is possible in the space.</p>

Spatial Type	Activities & Uses	Description
<p>Second Floor Central Gathering Space (cont.)</p>	<p>Student's inquiry work</p>	<p>Mobile soft seating allows students to comfortably work in the area. Acoustic wall and ceiling treatments are incorporated with mold-able fabric, which create another element of play and interactivity in the area. The final technological component which is used in the space is a Microsoft Surface soft seating area to encourage socialization, teamwork, and experience with interactive touch-based technologies.</p>
<p>Typical Classroom</p>	<ul style="list-style-type: none"> <li>-teaching</li> <li>-group &amp; individual work</li> <li>-customizable aspects to the millwork</li> <li>-location for mobile furnishings so class can determine the layout</li> <li>-display and storage</li> <li>-ability to connect to adjacent classrooms and gathering spaces</li> <li>-storage and workspace for teacher</li> <li>-reading corner and nook</li> <li>-connectivity to power and wireless data</li> </ul>	<p>Classroom spaces are intended to be flexible and customizable, so that both students and teachers have control over the space and set up the room as they see fit. Mobile furnishings allow students to combine their desks in multiple configurations, accommodating individual or group work. Mobility encourages interaction and creates stronger relationships between teachers and students. Demountable walls connect the room to the adjacent corridor, and incorporate a skyfold partition, so the room can completely open to nearby classrooms and gathering spaces, encouraging cross-class collaboration. Storage is found on all available perimeter walls, for class storage and teacher storage, along with customizable cubbyholes for the students. A reading corner with book shelving encourages informal class activities. A small reading nook is incorporated into the book shelving as a location for one individual to read a book or get away from the rest of the class if necessary. Tack-able fabric display panels, and write-able surfaces are incorporated on the wall surfaces of the room. In terms of technology, the room is connected to wireless data, the central</p>

Spatial Type	Activities & Uses	Description
Typical Classroom (cont.)		server, and power and LAN access points. Along with a laptop for the teacher, a mobile cart of laptops is included in the room so students can work with technology in class, or move out into one of the gathering spaces in the school. A printer, scanner, and ceiling mounted data projector are also available for use with the laptops or with a wall mounted Smart Board. Standard white boards are also mounted to the wall.
Gathering Nooks & Circulation	<ul style="list-style-type: none"> <li>-transparency, information, display</li> <li>-circulation, wayfinding, vertical circulation</li> <li>-access and visual connections to exterior locations</li> <li>-art gallery and display abilities – student and local community: text, sound, image</li> <li>-identification of rooms/classrooms</li> <li>-peripheral corridor seating</li> <li>-dispersed areas with soft seating in gathering nooks</li> </ul>	<p>Corridors and hallways are traditionally ignored in terms of designs of educational institutions. The design attempts to look at how underused spaces can become a focal point of a design. As well as circulation and wayfinding, the corridors in John M. King School act as areas where small informal groups can meet, and information and artwork can be displayed. Playful seating forms are found at the perimeter of the circulation pathways to encourage interaction between occupants of the building. The Power Grid plug wall modular panels (as described in the Foyer section) are dispersed throughout the corridors to display both traditional and digital work and information. The displays can include elements of text, sound, image, and more. Playful lighting and dropped ceiling panels and fun floor patterns are also characteristic of the area.</p> <p>Rooms and classrooms are playfully identified using text and colour. Several nooks incorporating the hallway seating forms are found as break-off spaces from the corridor. Small group projects or one-on-one discussions between a teacher and a student can occur here. A high level of transparency is found throughout the corridor system,</p>

<b>Spatial Type</b>	<b>Activities &amp; Uses</b>	<b>Description</b>
Gathering Nooks & Circulation (cont.)		connecting students with other points in the school (for example, a section of the second floor is open to the foyer below, and another area offers glazed views into the lower central gathering space) and to exterior locations and the community beyond.

### **5.5.2 Atmosphere and Spatial Character**

The formal language used in the proposed design of John M. King School is simple and puristic and focuses on the use of angular form. The angles represent energy and dynamics and breaking out of the current grid that makes up the spaces of the school. The grid and angles in the new design reflect the streets that are found in the surrounding neighbourhood (see Figure 68). The majority of the streets create a grid around the school, but the dynamic angles of Portage Avenue and Notre Dame Avenue direct the eye towards the downtown core of Winnipeg, an extension of John M. King School's community.

In order to break away from the severity of the angle, and to provide more comfort and a sense of fun in the spaces, curvilinear elements are introduced. They are found in furniture pieces, and soft seating. The incorporation of moveable furniture and work pods also encourages playfulness and positive interpersonal relations (figures 69-73). Mobile design features also give students and teachers a feeling of ownership and control over the space.

A variety of tactile materials are used in the school's interior to support the dynamic atmosphere created by the angles, and bright colours are used to energize the spaces. Red and orange tones are used in spaces where movement occurs, and in spaces of concentration, a focus is placed upon the more calming tones of blue and green. Neutrals in charcoal gray, silver, and metal tones ground the colours and bring them together. Materials which support learning, such as surfaces which allow for the use of whiteboard makers, or tacks are used in spaces where project work occurs. Engaging and environmentally sound materials which include elements of varying levels of transparency, texture, versatility, and visual interest are focused upon.

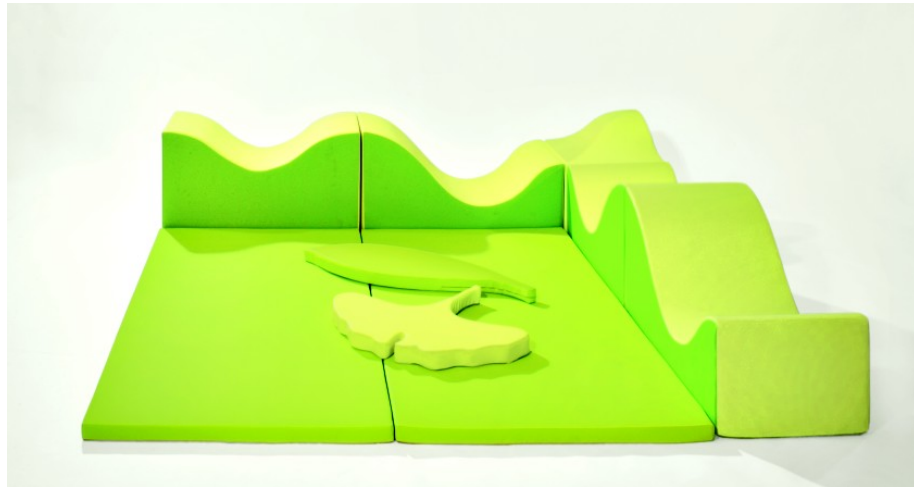


### Street Grid & Angles

*Figure 68.* Street Grid & Angles. This figure shows the angular dynamics which occur in John M. King School's surroundings, and from which the formal language of the interior was derived.



*Figure 69/70.* Dome Chair. Design by Sophie Langer. These figures show an example of curvilinear soft seating used in the school's interior to create a sense of fun and play. Permission to use images obtained on February 8, 2010. ©PLAY+srl.



*Figure 71/72.* Hills. Design by ZPZ Partners. These figures show curvilinear seating which will be incorporated into corridors and gathering nooks.

Permission to use images obtained on February 8, 2010. ©PLAY+srl.



*Figure 73.* Isola 8. Nienkamper's Isola 8 will be used in lounge spaces to break away from the predominantly angular forms of the school.

Permission to use images obtained on February 3, 2010. ©Nienkamper.

In terms of learning opportunities, the formal language of the grid and dynamic angular lines encourages studies in geometry and rhythm. Materials are joined together in a crisp and deliberate fashion, so that the students are able to 'read' the construction, which becomes a lesson in its own right. A wide use of environmentally friendly materials assist in teaching students the importance of their impact on the world. A diverse spatial variety allows for multiple opportunities in learning, and for the creation of more intimate and more playful spaces.

Lighting in the spaces of John M. King School is a combination of daylighting, display lighting, task lighting, and general ambient lighting to support the variety of activities taking place. The west facade of the building, which incorporates the main entry, is opened up with the use of glazing in order to bring more light into the school's interior. The transparency created also invites interaction between the school and the community. Glazing spans the two floors of the building vertically. A strip of coloured glass, which has the potential to incorporate digital elements of display, runs across the facade between the glazing on the main and second floors and conceals structural elements and beams needed to support the new penetrations. Views into the foyer, hallway space, and into the main floor gathering space are created. In addition, glazing is incorporated on the south facade, creating views into the gymnasium, and a connection to the playground. An area of glazing is also added to the east facade, creating views into the classroom corridor, and north-east stairwell. Automated shading devices are utilized in

these areas to control direct sunlight. The large size of the newly glazed areas improves the comfort of users of the school and enhances visual quality.

Continuous and linear point-source spotlights are utilized in conjunction with the various display surfaces found in the school. This lighting will assist in highlighting the activities of the school and the creative achievements and endeavours of students. The power grid walls found in the corridors of the schools have the capability themselves of incorporating lighting elements. These lighting elements will be more decorative, or even context related, for example, changing colour to indicate changing weather patterns. Also, a stage-lighting track system will be incorporated into the central gathering space on the main floor.

Task lighting systems are found in areas where students, teachers, or office staff are working. Much of the task lighting will be mobile, but in some cases, pendant lights will be suspended directly over key work surfaces or in gathering nooks. General ambient lighting will support other forms of lighting and is found in all spaces throughout the school. Ambient lighting assists in providing uniformity. Because of the flexible nature of the school, and the inclusion of mobile elements, it is key that the lighting is uniform, so that changing locations of horizontal work-surfaces and work areas are illuminated, so a variety of tasks and activities can occur. In learning spaces, general lighting fixtures are arranged in a organized and uniform manner to provide the best lighting. In corridors, a playful dropped ceiling, which

responds to the scale of the child, will utilize ambient lighting in a less grid-like way than the learning spaces. Linear strips of lighting which follow the pattern of the ceiling plane will energize the corridor spaces.

In conjunction with ambient lighting fixtures, low-brightness louvres which decrease glare are integrated. Energy efficient luminaires and fixtures are utilized. In addition, energy effectiveness is achieved with lighting controls which are found throughout the school. The presence of multipurpose spaces and incorporation of technology are supported by lighting which can be dimmed or brightened to suit the activity occurring.

Collectively, formal elements, furnishings, finishes, and lighting will assist in creating an interactive and productive atmosphere for learning.

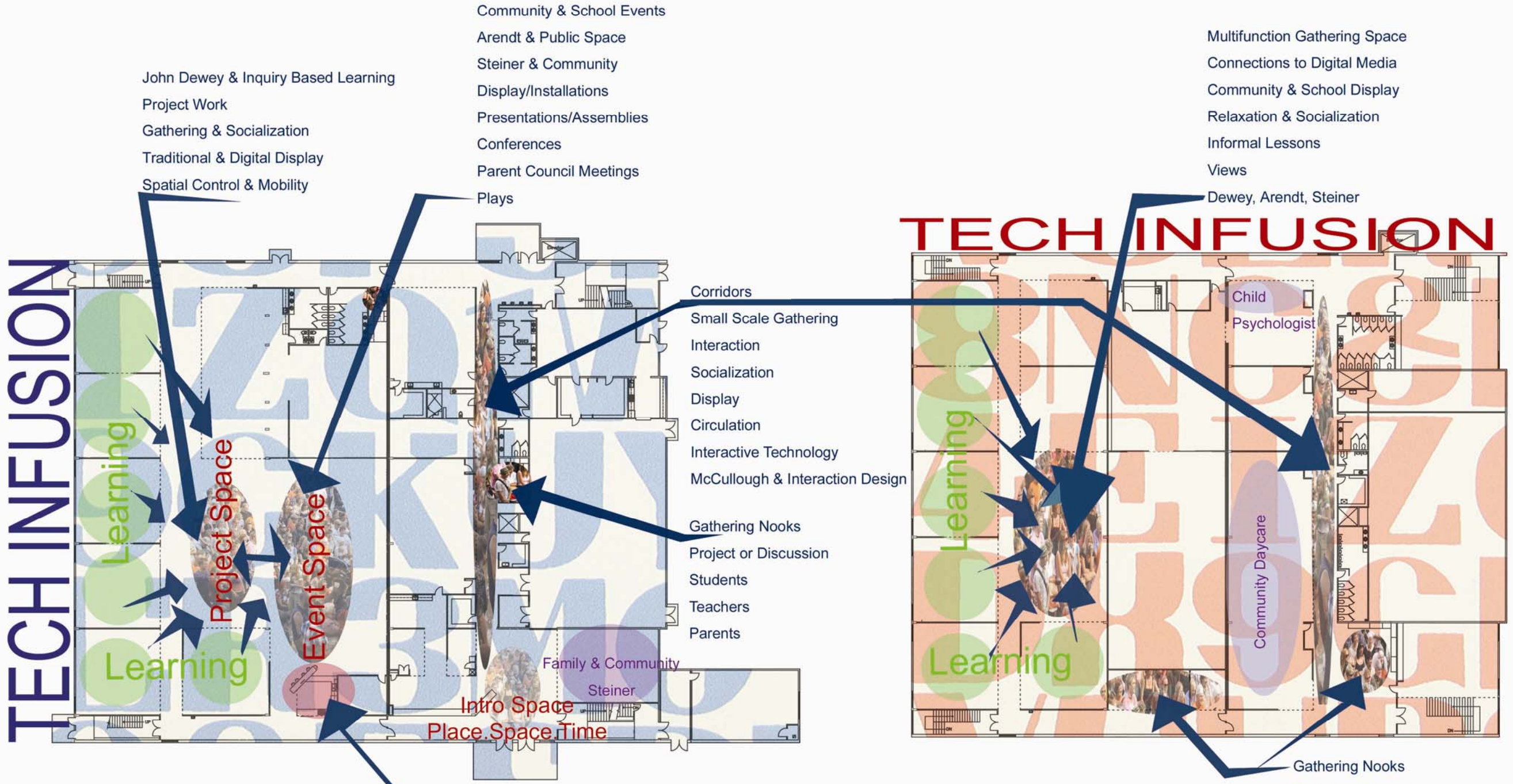
## **5.6 Spatial Analysis**

### **5.6.1 Zoning Analysis**

The following zoning plan (figure 74) formalizes the design programme and indicates the multiple uses and users of John M. King School. Spatial adjacency and connections are described in conjunction with supporting theories. The importance of flexible spaces which support student's learning and community life is acknowledged through the layering of information and activity.

### **5.6.2 Circulation Analysis**

Following the zoning plan, a circulation analysis image (figure 75) presents pathways which occur in the school, and their connection to activity and a variety of users.

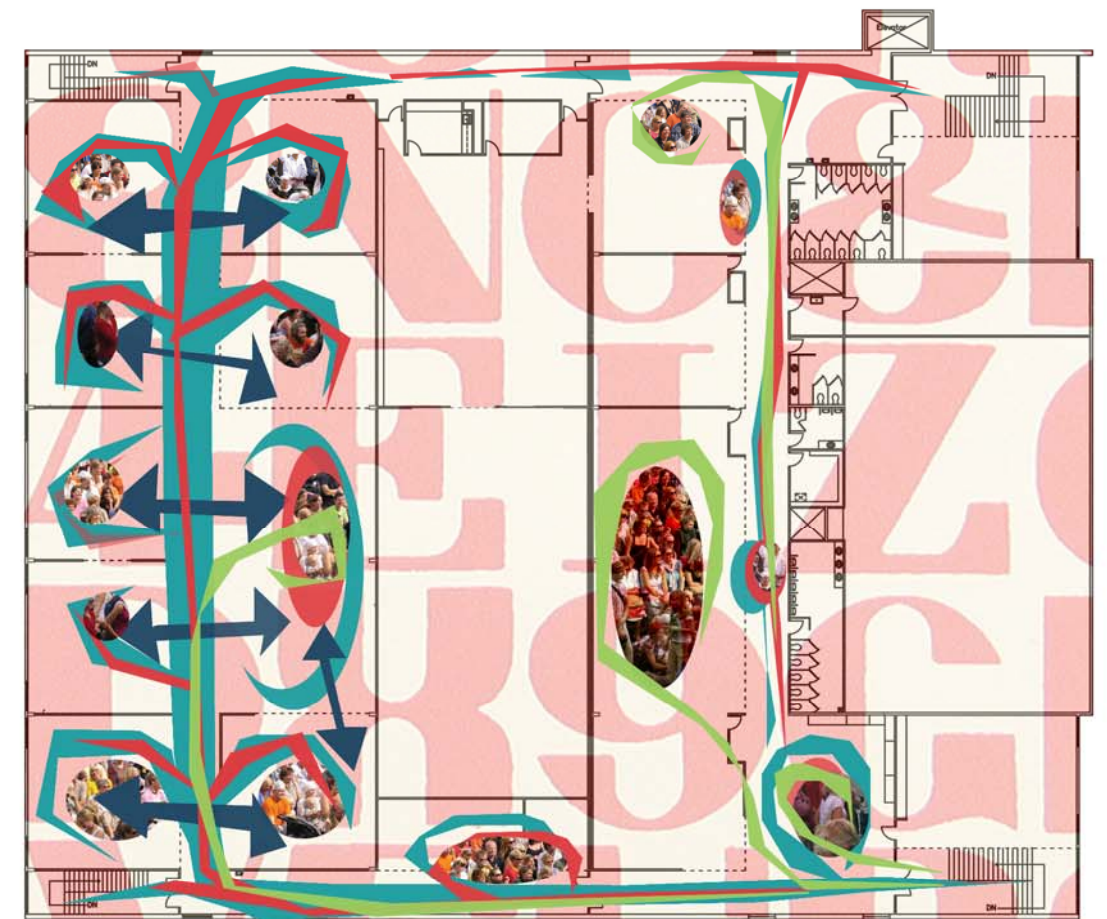
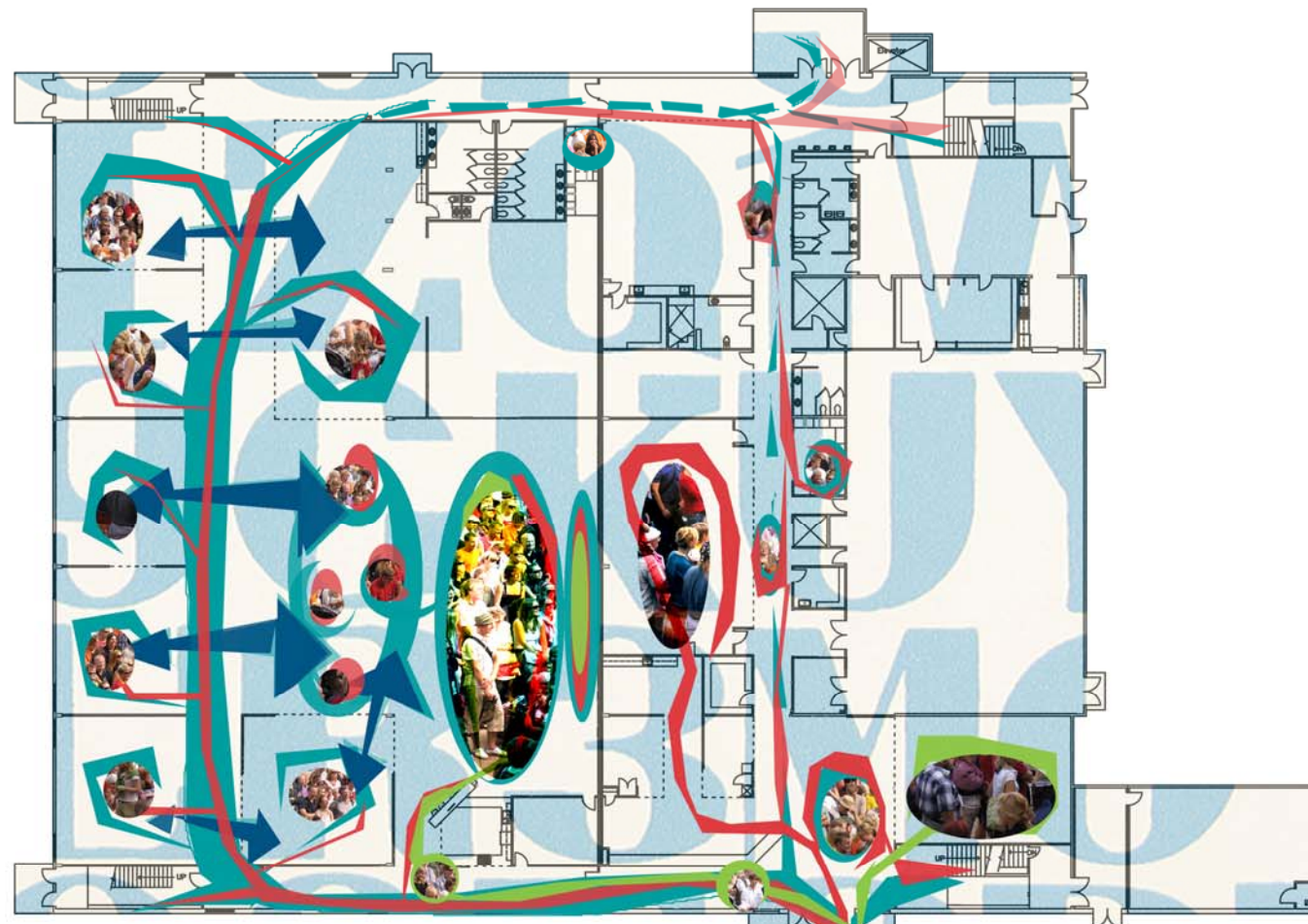


Main Floor

Second Floor

5.6.1 Zoning Analysis

Figure 74. Zoning Analysis.



Main Floor

Teachers

Students

Parents & Community

### 5.6.2 Circulation Analysis

Figure 75. Circulation Analysis.

Second Floor

## **6.0 Conclusion**

The vast and changing characteristics of today's generation of students require a new typology in the design of early educational environments. The rapid permeation of technology into the general public's daily lives has created a myriad of fluctuating community needs. One such need is derived from the notion that children today are unprepared for the realities of the 21<sup>st</sup> century, where the creativity of knowledge work is becoming the dominant mode of employment (Myerson, 2006). According to Nicola Yelland, "schools and the curricula that exist today are more suited to the [requirements] of the industrial age than those of the information age" (2007, 9). Consequently, there is a current necessity for redeveloped curricula and learning environments. Context centred design, multi-sensory spaces, and the use of technology as a tool to promote interaction and creativity is crucial.

Following an analysis of contemporary issues in education, technology and society, space and place, current design and technological precedents, and in school-research combined with site and client studies, this design proposal, the re-design of John M. King School, in Winnipeg, Manitoba, has included the presentation of an innovative solution. Issues of appropriately designed learning environments which integrate technology in an interactive and responsible way were key to this project. Community studies, and the effect of a shrinking world suggested the importance of establishing a strong

sense of place which would connect students and members of the neighbourhood with their place in the world. The positives and negatives of technology were discussed and analyzed, and formats which would allow for collaboration with others and connection with the movement of the body were brought to the fore-front. Flexibility was also revealed as a crucial element of environments which focus on technology, an ever-changing medium. The design vocabulary focused on ease of change and a broad element of technological flexibility. Varying scales of technology were discussed, from mobile forms, to embedded. In the design, the capacity of plasticity in the space became crucial.

By focusing on periphery, this design proposal presents the need to create a design programme for traditionally under-used spaces. Creating opportunities for gathering and the accommodation of small to large group sizes is key. By integrating technology into these under-used spaces, technology use is encouraged as an interactive and social activity. Because elementary schools are key locations for social development and understanding of self, opportunities which allow for the development of positive interpersonal relationships are very beneficial. Mobile furnishings and elements allow these interactions to occur in multiple locations.

Imagination, exploration, and independence was another key focus of the Digital Community project. Incorporating inquiry-based learning, project space and event space became a key area of the school. The creation of

areas where large groups can participate in the same project and talk about their ideas together was integrated. In addition, the interactive potential of technology was explored. Playful elements, and rich and tactile material choice were included to engage the learning child.

Creating a design programme which acknowledged the strong sense of community of John M. King School and the surrounding inner city neighbourhood, combats the notion of technology as isolating. Connection was also important with respect to the design vocabulary. A school which stands as a strong focal point in the community assists in revitalization and the development of a strong sense of pride amongst residents. Locating a technology-focused school in a low-income neighbourhood also assists in erasing the digital divide by exposing children, who may not otherwise have had the opportunity, to diverse forms of technology. Schools in high density neighbourhoods eliminate traffic problems, as many children are able to walk to school, and decrease urban sprawl.

By focusing on connection, the design explored varying scales of community and visual and physical interactions between spaces. Users of the school are encouraged to cross paths. The exterior of the school became transparent, inviting the community in, and creating accountability. In the design, technology becomes a tool for collaboration.

The formal language used in the design was derived from John M. King School's surrounding community. Energy was infused into the grid of

existing classrooms by introducing angular elements. The grid and newly created angles reflect the layout of the surrounding streets, which reach out to Winnipeg's downtown, an extension of the school's neighbourhood. In order to break away from the severity of the angle, curvilinear elements were sparingly introduced. They are found in furniture pieces and soft seating. The incorporation of moveable furniture and work pods also encourages playfulness and the development of positive interpersonal relations.

As Malcolm McCullough states, “information technology has become ambient social infrastructure. This allies it with architecture. No longer just made of objects, computing now consists of situations” (21). As such, an emphasis on people, rather than machinery, and the cultural richness of our surroundings, rather than virtual space, is key. This is incredibly important in the design of educational environments. Children are increasingly being exposed to new forms of media, and their schooling needs to reflect the realities of life in the twenty-first century, but at the same time, permanence, stability, and the development of a sense of place is crucial to their learning, social interactions, and well-being.

The design programme addressed revealed several limitations and opportunities with regards to this proposal. This proposal for a Digital Community opens the door for a multitude of studies which can build upon and address issues related to technologically-based learning environments. Working with a real client, John M. King School, and its teachers and students

was very rewarding and increased the quality of the product produced.

However, the design's conceptual nature and its unlimited budget will be difficult for most school divisions to implement. On the other hand, the final product may act as a starting point for John M. King by presenting them with what is possible. It may spur on some ideas or small scale projects in their vibrant school community which will improve their learning environments.

The large scale of the school building demanded a narrowed design focus which left many spatial elements of the school undefined. But, a narrowed design focus allowed for the selection of spaces which are traditionally under-used or left out of many school buildings. An exploration of integrating interactive learning and socialization elements into these spaces was a wonderful opportunity.

Another potential limitation revolves around the use of multiple flexible elements and increased ability of classroom mobility throughout the building. Although these versatile solutions and potential activities are presented as positive additions to new learning spaces, what is the likelihood that teachers and students would take the time to move and manipulate their environments? I am hopeful these interactive elements would be used and that students, families, teachers, and community members would be engaged by them. The question of use poses an entirely new area of study which could branch off from this proposal.

The flexibility of technology itself has been an extremely challenging

aspect of this proposal. Although elements were designed to assist ease of change, it is impossible to know what the future holds, and how long these flexible solutions will be appropriate. Perhaps the future will consist of learning which occurs virtually. In this case, perhaps the school building will one day become obsolete. This, however, is a frightening and hopefully far-fetched picture of the world. As Marshall McLuhan believed, it is important to be wide awake so that the machine does not end up making the rules (McLaughlin & McMahon, 2002). It is imperative that interior designers and educators recognize the importance of socialization, interaction, physical activity, and community. Spaces which allow for gathering and face-to-face intercommunication are vital to combating isolative forms of technology.

The Digital Community design proposal presents one of many possible solutions for the future of learning environments. No conclusive determinations of what is appropriate is suggested, and it invites discussion, and expansion on the ideas as well as new spatial definitions. By focusing on early education, this proposal also presents decisions that were made based upon a specific age group. Opportunities for design proposals for all levels of 21<sup>st</sup> century learning environments may be spurred on by theories and ideas discussed here. I hope that this proposal, which presents a new typology in learning environments, will assist in expanding the knowledge base of interior design and encourage and inform future research. I also hope that educators of contemporary learning environments will consider this study and examine

their current school spaces in response to the 21<sup>st</sup> century student's diverse needs. Technology can no longer be ignored, and in conjunction with an informed interior design, it has the potential to be a positive societal force.

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## APPENDIX A: FUNCTIONAL PROGRAMME

## **Functional Requirements**

\*Greyed areas indicate design focus

### **MAIN FLOOR**

approx. 40 000 sq. ft.

<b>FOYER</b>	
Floor Area	<ul style="list-style-type: none"> <li>●approx. 1500 sq. ft.</li> </ul>
Functional Requirements	<ul style="list-style-type: none"> <li>●welcoming place &amp; information display</li> <li>●orientation &amp; wayfinding; visual connections</li> <li>●checkpoint: connection to main office</li> <li>●point of ticket sale for community events</li> <li>●community identification: work display</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●digital LCD touch screens (learning touch displays)</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> <li>●custom bench seating system with bar stools</li> <li>●student's work display; digital version also extends outside</li> <li>●wifi access points, access to central exchange server</li> <li>●LED displays – wayfinding</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●Durability</li> <li>●Sustainability</li> <li>●Transparency</li> <li>●vibrant colour as a visual cue for wayfinding</li> <li>●Colourful accents</li> <li>●integration of graphics with technological, interactive, &amp; physical means</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>●access to daylight &amp; provisions for reduction of glare</li> <li>●ambient lighting</li> <li>●display lighting</li> <li>●task/pendant lighting at benching system</li> </ul>

<b>MAIN OFFICE</b>	
Floor Area	<ul style="list-style-type: none"> <li>●approx. 1500 sq. ft.</li> <li>●Principal's office (approx. 220 sq. ft.)</li> <li>●Vice Principal's office (approx. 190 sq. ft.)</li> <li>●Book Storage (approx. 140 sq. ft.)</li> <li>●Copy Room with coffee station (approx. 260 sq. ft.)</li> <li>●remaining circulation &amp; reception space</li> </ul>
Functional Requirements	<ul style="list-style-type: none"> <li>●ticket sales for community events</li> <li>●checkpoint: connection to main entrance</li> </ul>
Technological Equipment	<ul style="list-style-type: none"> <li>●wired network infrastructure &amp; LAN jacks for front desk &amp; offices, central exchange server location</li> <li>●lighting controls</li> <li>●computers &amp; display screens</li> </ul>

<b>FAMILY ROOM</b>	
Floor Area	●approx. 1000 sq. ft.
Functional Requirements	<ul style="list-style-type: none"> <li>●seating area (for teaching parents &amp; gathering comfortably)</li> <li>●brochure display &amp; shelving for book lending library</li> <li>●small kitchen area</li> <li>●display area (for presentations &amp; area for displaying events Etc.)</li> <li>●working area (exposure to technology, sewing &amp; ironing, computer work, etc.)</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●Vertical visual display surface</li> <li>●demountable wall system</li> <li>●Projection surface/Smart Board</li> <li>●soft seating</li> <li>●mobile laptop storage carts w/ laptops</li> <li>●mobile furnishings: seating &amp; horizontal worksurfaces</li> <li>●fridge, stove, microwave, sink</li> <li>●shelving and brochure racks</li> <li>●Connectivity to power and wireless data, access to central exchange server</li> <li>●lighting controls</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●sustainability, functionality, durability</li> <li>●neutrals with colourful accents</li> <li>●Comfort</li> </ul>
Lighting	●ambient & task, lighting controls, control of daylight

<b>STORAGE</b>	
Floor Area	●approx. 1250 sq. ft.
	●1 large room (approx. 1000 sq. ft.) & support storage (approx. 250 sq.ft.)

<b>CUSTODIAN/STORAGE</b>	
Floor Area	●approx. 360 sq. ft.
Functional Requirements	<ul style="list-style-type: none"> <li>●organized storage facilities, easy to read visually, lockable secure doors</li> <li>●1 room adjacent to central gathering space for custodial Storage &amp; seating &amp; mobile laptop cart storage</li> <li>●1 room near circulatory space with a service sink</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●mobile laptop storage carts w/ laptops, mobile/stack-able hard seating</li> <li>●shelving and millwork as required</li> </ul>
Material Quality	●sustainability, functional, durable
Lighting	●ambient & directional lighting

<b>KITCHEN</b>	
Floor Area	●approx. 230 sq. ft.
Functional Requirements	<ul style="list-style-type: none"> <li>●site lines to exterior and central gathering point</li> <li>●transparency, welcoming, distribution point for breakfast &amp; snack program</li> <li>●ease of preparation of food</li> <li>●distribution point for catered community events</li> <li>●seating area for teachers &amp; students, table for buffet style food distribution</li> <li>●point for ticket collection and access to community events</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●wifi access points, access to central exchange server</li> <li>●commercial kitchen appliances, equipment &amp; millwork/storage</li> <li>●bar style seating at raised counter areas</li> <li>●countertops and plumbing for sink/dishwasher</li> <li>●table or point at counter for food distribution</li> <li>●touch screen LCD displays</li> <li>●information display walls</li> <li>●locked area for storage of money during community events</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●sustainability, functional, durable, colourful accents, innovation in material selections</li> <li>●graphic patterns</li> </ul>
Lighting	●ambient & pendant lighting, task lighting, track lighting

<b>CENTRAL GATHERING SPACE</b>	
Floor Area	●approx. 5500 sq. ft.
Functional Requirements	<ul style="list-style-type: none"> <li>●flexible open space</li> <li>●modifiable displays &amp; open project space for multiple uses</li> <li>●teacher's work space for supervision of students</li> <li>●mobile pods to allow for multiple spatial layouts depending on school/community use-control of space</li> <li>●gathering and access to internet technology</li> <li>●space for assemblies or various community use (conferences and art installations by local artists)</li> <li>●project space in combination with event or display or for construction space for inquiry based school projects</li> <li>●central area of focus for presentations, conferences, assemblies</li> <li>●ability to connect with classroom spaces</li> <li>●Projection surface</li> <li>●Connectivity to power and wireless data</li> <li>●spaces to accommodate whole classes, small groups, &amp; one on one sessions</li> <li>●access to kitchen for purchase/distribution of food</li> <li>●small group interaction with technology</li> <li>●stage for presentations and creative play with access to behind the scenes prep area</li> <li>●access to daylight</li> <li>●visual connections throughout</li> <li>●ability to separate spaces</li> <li>●comfortable &amp; casual seating</li> </ul>

<b>CENTRAL GATHERING SPACE</b>	
Functional Requirements	<ul style="list-style-type: none"> <li>●acoustic controls</li> <li>●small gathering nooks</li> <li>●modifiable display walls</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●mobile working pods incorporating seating, and traditional and digital display capabilities</li> <li>●small gathering pods</li> <li>●multifunction/modifiable plug wall as display system and wall finish</li> <li>●technology or non-digital elements to insert into plug wall</li> <li>●wifi access points, access to central exchange server</li> <li>●custom bench seating system with attached LCD display touch screens and bar stools</li> <li>●skyfold partition system with acoustic fabric and glazing</li> <li>●ceiling &amp; wall with acoustic fabric panels</li> <li>●large scale projection screen (with projector) or LCD screen (audio-visual technology)</li> <li>●stackable seating</li> <li>●stage area</li> <li>●soft furnishings</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●elements of flexibility &amp; ability to modify space</li> <li>●colourful accents &amp; innovation in material usage</li> <li>●durability, sustainability, &amp; functionality</li> <li>●Transparency</li> <li>●acoustic controls</li> <li>●graphic patterns</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>●ambient, directional, task, &amp; display lighting</li> <li>●ability to manipulate directional &amp; display lighting</li> <li>●provisions for glare reduction</li> <li>●light controls for varying lighting scenes</li> </ul>

<b>TYPICAL CLASSROOM</b>	
Quantity	<ul style="list-style-type: none"> <li>●6 classrooms: grades 1-3</li> </ul>
Floor Area	<ul style="list-style-type: none"> <li>●approx. 1050 sq. ft. ea.</li> </ul>
Functional Requirements	<ul style="list-style-type: none"> <li>●space for teaching &amp; group &amp; individual work</li> <li>●customizeable, fun space for students; sense of identity within school community</li> <li>●mobile furnishings: seating &amp; horizontal worksurfaces (class determines layout)</li> <li>●Vertical visual display surface</li> <li>●vertical erasable writing surface</li> <li>●Projection surface</li> <li>●connections to adjacent classrooms and central gathering space, ability to open classroom up</li> <li>●transparency to other spaces and ability to control level of transparency for sake of student's concentration</li> <li>●acoustic controls</li> <li>●storage and workspace for teacher</li> <li>●small reading nook for individual use – escape point</li> <li>●Connectivity to power and wireless data</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●mobile laptop storage carts with laptops</li> <li>●Skyfold partition system with acoustic fabric and glazing</li> </ul>

<b>TYPICAL CLASSROOM</b>	
Equipment	<ul style="list-style-type: none"> <li>●soft seating</li> <li>●access to central exchange server</li> <li>●wifi access points and LAN for teacher's desktop computer system</li> <li>●cubbies with panels for students to individualize</li> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●demountable wall system</li> <li>●moveable workspace and storage for teacher</li> <li>●tackable fabric display walls</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●sustainability, functionality, durability</li> <li>●neutrals with colourful accents</li> <li>●Comfort</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>●ambient &amp; task, lighting controls, control of daylight</li> </ul>

<b>NURSERY/KINDERGARTEN</b>	
Floor Area	<ul style="list-style-type: none"> <li>●approx. 3560 sq. ft.</li> </ul>

<b>GATHERING NOOKS &amp; CIRCULATION</b>	
Floor Area	<ul style="list-style-type: none"> <li>●approx. 7500 sq. ft.</li> </ul>
Functional Requirements	<ul style="list-style-type: none"> <li>●transparency, information, display</li> <li>●circulation, wayfinding, vertical circulation</li> <li>●access and visual connections to exterior locations</li> <li>●art gallery display abilities – student &amp; local community (electronic &amp; traditional): text sound, image...</li> <li>●acoustic controls</li> <li>●playful identification of rooms/classrooms</li> <li>●peripheral corridor seating with display opportunities</li> <li>●soft seating within gathering nooks dispersed amongst circulatory paths</li> <li>●ability to connect with classroom spaces</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●elevator and four stairwells</li> <li>●LED diplays – wayfinding</li> <li>●wireless access points</li> <li>●integrated bench seating &amp; display walls</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> <li>●drinking water fountains</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●innovation in material selection</li> <li>●Colourful accents, graphic patterns</li> <li>●sustainability, functionality, durability</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>●ambient lighting, provision for glare reduction, lighting controls</li> <li>●colourful lighting strips integrated into dropped ceiling</li> <li>●display lighting and ability to manipulate its direction</li> </ul>

<b>WASHROOMS: STAFF, STUDENT, PUBLIC</b>	
Floor Area	●approx. 1050 sq. ft.

<b>ART ROOM/LEARNING LAB</b>	
Floor Area	●approx. 1350 sq. ft.
Technological Equipment	<ul style="list-style-type: none"> <li>●digital displays and mobile worksurfaces</li> <li>●multifunction/modifiable plug wall/display system &amp; temporary digital installations</li> <li>●access to new forms of technology &amp; signing out of various forms</li> <li>●wifi access points and LAN for teacher's desktop computer system</li> <li>●access to central exchange server</li> <li>●mobile laptop storage carts w/ laptops</li> <li>●lighting controls</li> <li>●Smart Board &amp; projector, printers, scanners, digital cameras, video cameras, etc...</li> </ul>

<b>PERSONAL CARE</b>	
Floor Area	●approx. 200 sq. ft.

<b>CONFERENCE ROOM: STUDENT &amp; STAFF USAGE</b>	
Floor Area	●approx. 470 sq. ft.
Technological Equipment	<ul style="list-style-type: none"> <li>●ability to connect to web cam conferences with other schools across Canada &amp; internationally</li> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●wifi access points, access to central exchange server</li> <li>●demountable wall system with sliding doors</li> </ul>

<b>STAFF ROOM</b>	
Floor Area	●approx. 1570 sq. ft.
Technological Equipment	<ul style="list-style-type: none"> <li>●demountable wall system</li> <li>●wifi access points, access to central exchange server</li> </ul>

<b>GYMNASIUM</b>	
Floor Area	<ul style="list-style-type: none"> <li>●approx. 5050 sq. ft.</li> <li>●includes 330 sq. ft. Storage &amp; mechanical, 200 sq. ft. Canteen, &amp; 400 sq. ft. Changerooms</li> </ul>

<b>PARKS &amp; RECREATION WINNIPEG</b>	
Floor Area	<ul style="list-style-type: none"> <li>●approx. 1290 sq. ft.</li> <li>●includes 100 sq. ft. Storage, 160 sq. ft. Office, &amp; remaining multifunction space</li> </ul>

## SECOND FLOOR

approx. 31 000 sq. ft.

<b>GATHERING NOOKS &amp; CIRCULATION</b>	
Floor Area	●approx. 7500 sq. ft.
Functional Requirements	<ul style="list-style-type: none"> <li>●transparency, information, display</li> <li>●circulation, wayfinding, vertical circulation</li> <li>●access and visual connections to exterior locations</li> <li>●art gallery display abilities – student &amp; local community (electronic &amp; traditional): text sound, image...</li> <li>●acoustic controls</li> <li>●playful identification of rooms/classrooms</li> <li>●peripheral corridor seating with display opportunities</li> <li>●soft seating within gathering nooks dispersed amongst circulatory paths</li> <li>●ability to connect with classroom spaces</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●elevator and four stairwells</li> <li>●LED displays – wayfinding</li> <li>●wireless access points</li> <li>●integrated bench seating &amp; display walls</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> <li>●drinking water fountains</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●innovation in material selection</li> <li>●Colourful accents, graphic patterns</li> <li>●sustainability, functionality, durability</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>●ambient lighting, provision for glare reduction, lighting controls</li> <li>●colourful lighting strips integrated into dropped ceiling</li> <li>●display lighting and ability to manipulate its direction</li> </ul>

<b>SUPPORT</b>	
Floor Area	●approx. 1000 sq. ft.
Technological Equipment	<ul style="list-style-type: none"> <li>●wireless and LAN access points, access to exchange server</li> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●lighting controls</li> </ul>

<b>DAYCARE</b>	
Floor Area	●approx. 2900 sq. ft.

<b>TYPICAL CLASSROOM</b>	
Quantity	●6 classrooms: grades 1-3
Floor Area	●approx. 1050 sq. ft. ea.
Functional Requirements	<ul style="list-style-type: none"> <li>●space for teaching &amp; group &amp; individual work</li> <li>●customizeable, fun space for students; sense of identity within school community</li> <li>●mobile furnishings: seating &amp; horizontal worksurfaces (class determines layout)</li> <li>●Vertical visual display surface</li> <li>●vertical erasable writing surface</li> <li>●Projection surface</li> </ul>

<b>TYPICAL CLASSROOM</b>	
Functional Requirements	<ul style="list-style-type: none"> <li>●connections to adjacent classrooms and central gathering space, ability to open classroom up</li> <li>●transparency to other spaces and ability to control level of transparency for sake of student's concentration</li> <li>●acoustic controls</li> <li>●storage and workspace for teacher</li> <li>●small reading nook for individual use – escape point</li> <li>●Connectivity to power and wireless data</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●mobile laptop storage carts with laptops</li> <li>●Skyfold partition system with acoustic fabric and glazing</li> <li>●soft seating</li> <li>●access to central exchange server</li> <li>●wifi access points and LAN for teacher's desktop computer system</li> <li>●cubbies with panels for students to individualize</li> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●demountable wall system</li> <li>●moveable workspace and storage for teacher</li> <li>●tackable fabric display walls</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●sustainability, functionality, durability</li> <li>●neutrals with colourful accents</li> <li>●Comfort</li> </ul>
Lighting	<ul style="list-style-type: none"> <li>●ambient &amp; task, lighting controls, control of daylight</li> </ul>

<b>CENTRAL GATHERING SPACE</b>	
Floor Area	<ul style="list-style-type: none"> <li>●2150 sq. ft.</li> </ul>
Functional Requirements	<ul style="list-style-type: none"> <li>●transparency to other locations &amp; views to lower central gathering space</li> <li>●modifiable displays</li> <li>●flexible open space</li> <li>●interactive wall surface</li> <li>●moveable soft furnishings</li> <li>●gathering and access to internet technology</li> <li>●additional upper viewing area for conferences in space below</li> <li>●potential community gallery/art installation space connected to student's inquiry work</li> <li>●acoustic controls</li> <li>●ability to connect with classroom spaces</li> <li>●Connectivity to power and wireless data</li> </ul>
Equipment	<ul style="list-style-type: none"> <li>●microsoft Surface soft seating modules</li> <li>●wifi access points, access to central exchange server</li> <li>●mobile displays and digital screens</li> <li>●mobile pods with digital and traditional display capabilities</li> <li>●acoustic fabric: ceiling and wall treatment</li> <li>●comfortable &amp; casual seating</li> <li>●acoustic controls</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> </ul>
Material Quality	<ul style="list-style-type: none"> <li>●innovation &amp; interactive in material selection</li> <li>●Colourful accents, graphic patterns</li> <li>●sustainability, functionality, durability</li> </ul>

<b>CENTRAL GATHERING SPACE</b>	
Lighting	<ul style="list-style-type: none"> <li>●ambient, directional, task, &amp; display lighting</li> <li>●ability to manipulate directional &amp; display lighting</li> <li>●provisions for glare reduction</li> <li>●light controls for varying lighting scenes</li> </ul>

<b>LEARNING ASSISTED CENTER</b>	
Quantity	●2
Floor Area	●approx. 1050 sq. ft. ea.
Technological Equipment	<ul style="list-style-type: none"> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●wifi access points, access to central exchange server</li> <li>●light controls</li> </ul>

<b>LIBRARY</b>	
Floor Area	●approx. 3030 sq. ft.
Functional Requirements	●includes comfortable reading area
Technological Equipment	<ul style="list-style-type: none"> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●wifi access points, LAN access, access to central exchange server</li> <li>●touch screen LCD display tables</li> <li>●light controls</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> </ul>

<b>CHILD GUIDANCE CLINIC</b>	
Floor Area	●approx. 650 sq. ft.

<b>COMPUTER TECHNICIAN &amp; ART CONSULTANT</b>	
Floor Area	●approx. 960 sq. ft.
Technological Equipment	<ul style="list-style-type: none"> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●wifi access points, LAN access, access to central exchange server</li> <li>●touch screen LCD display tables</li> <li>●light controls</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> </ul>

<b>OPEN OFFICE</b>	
Floor Area	●approx. 350 sq. ft.

<b>MUSIC ROOM</b>	
Floor Area	●approx. 940 sq. ft.
Technological Equipment	<ul style="list-style-type: none"> <li>●Smart Board &amp; projector, printer, scanner</li> <li>●wifi access points, LAN access, access to central exchange server</li> <li>●light controls</li> <li>●multifunction/modifiable plug wall/display system</li> <li>●technology or non-digital elements to insert into plug wall</li> </ul>

**STORAGE/CUSTODIAL**

Floor Area	<ul style="list-style-type: none"> <li>●approx. 1090 sq. ft.</li> <li>●includes 90 sq. ft. Custodial, 128 sq. ft. Storage, remainder mechanical</li> </ul>
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**WASHROOMS: STAFF, STUDENT, PUBLIC**

Floor Area	●approx. 1050 sq. ft.
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**BASEMENT**

approx. 29000 sq. ft.

**BOILER ROOM**

Floor Area	●approx. 870 sq. ft.
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**TRANSFORMER VAULT**

Floor Area	●approx. 95 sq. ft.
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**SWITCH ROOM**

Floor Area	●approx. 130 sq. ft.
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**ELEVATOR MACHINE ROOM**

Floor Area	●approx. 130 sq. ft.
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**UNEXCAVATED SPACE**

Floor Area	●approx. 5440 sq. ft.
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**CRAWL SPACE**

Floor Area	●approx. 22000 sq. ft.
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**APPENDIX B:  
DESIGN DRAWINGS, FURNITURE, & FINISHES**



Site Plan  
Scale: NTS

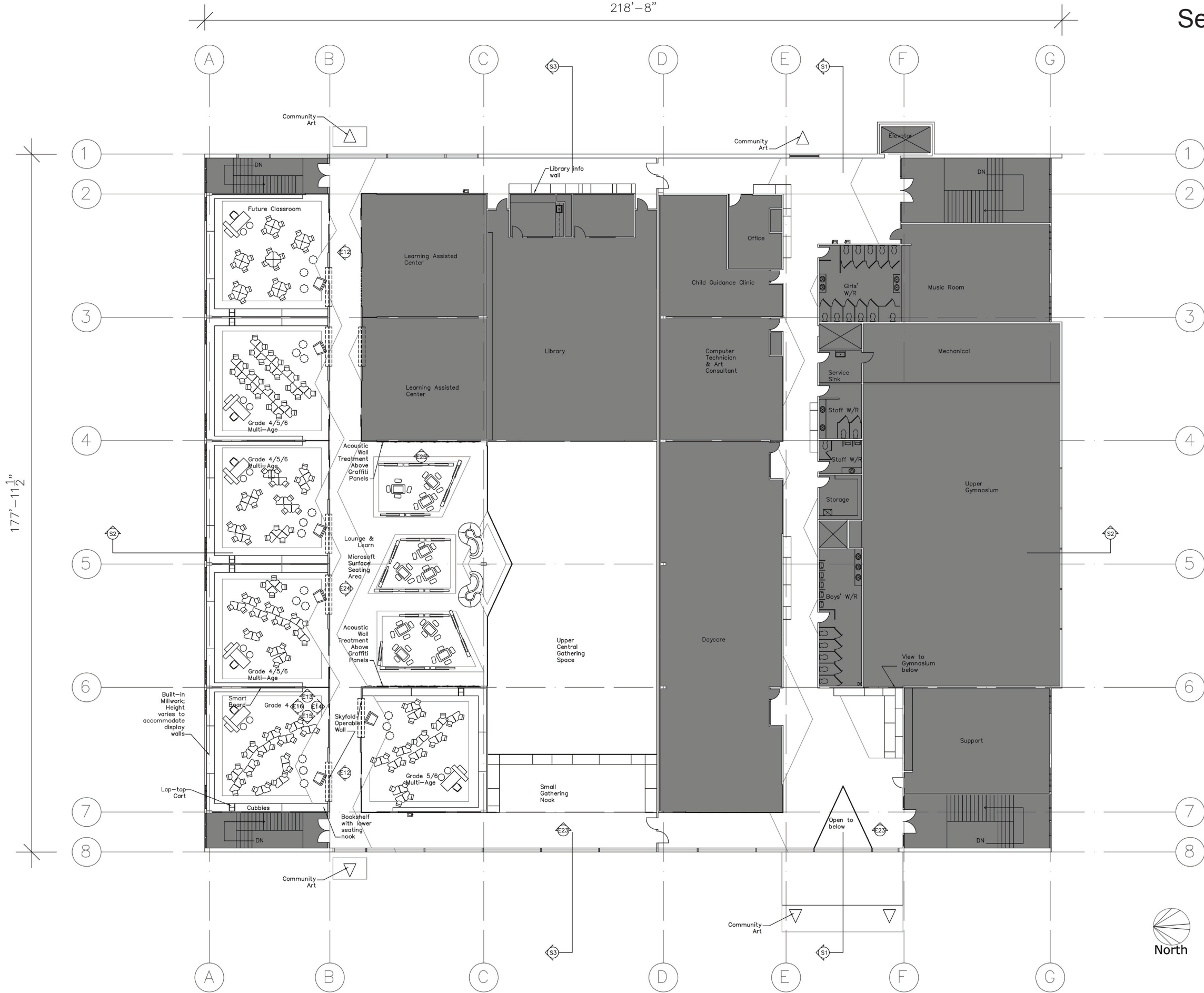


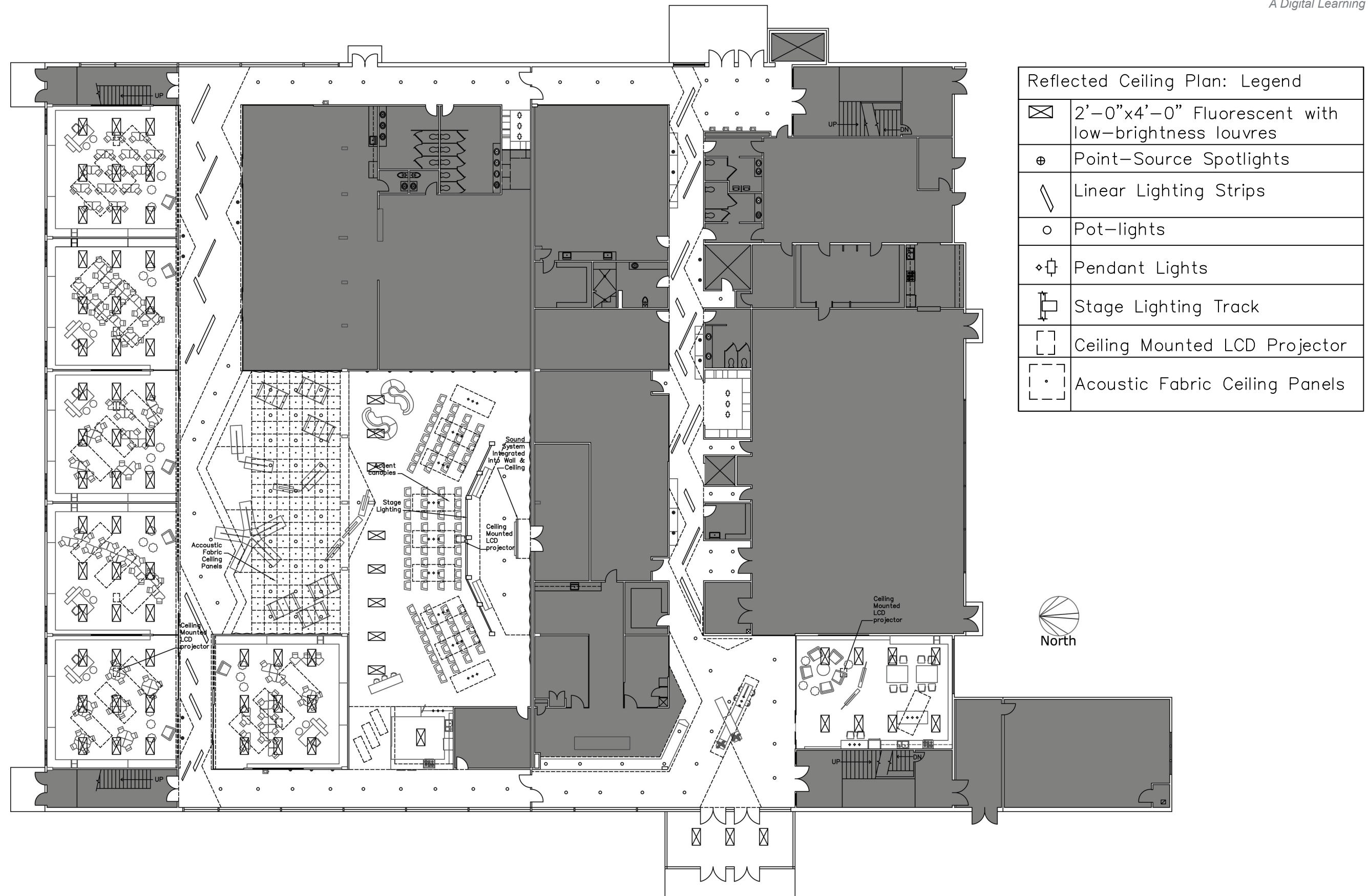




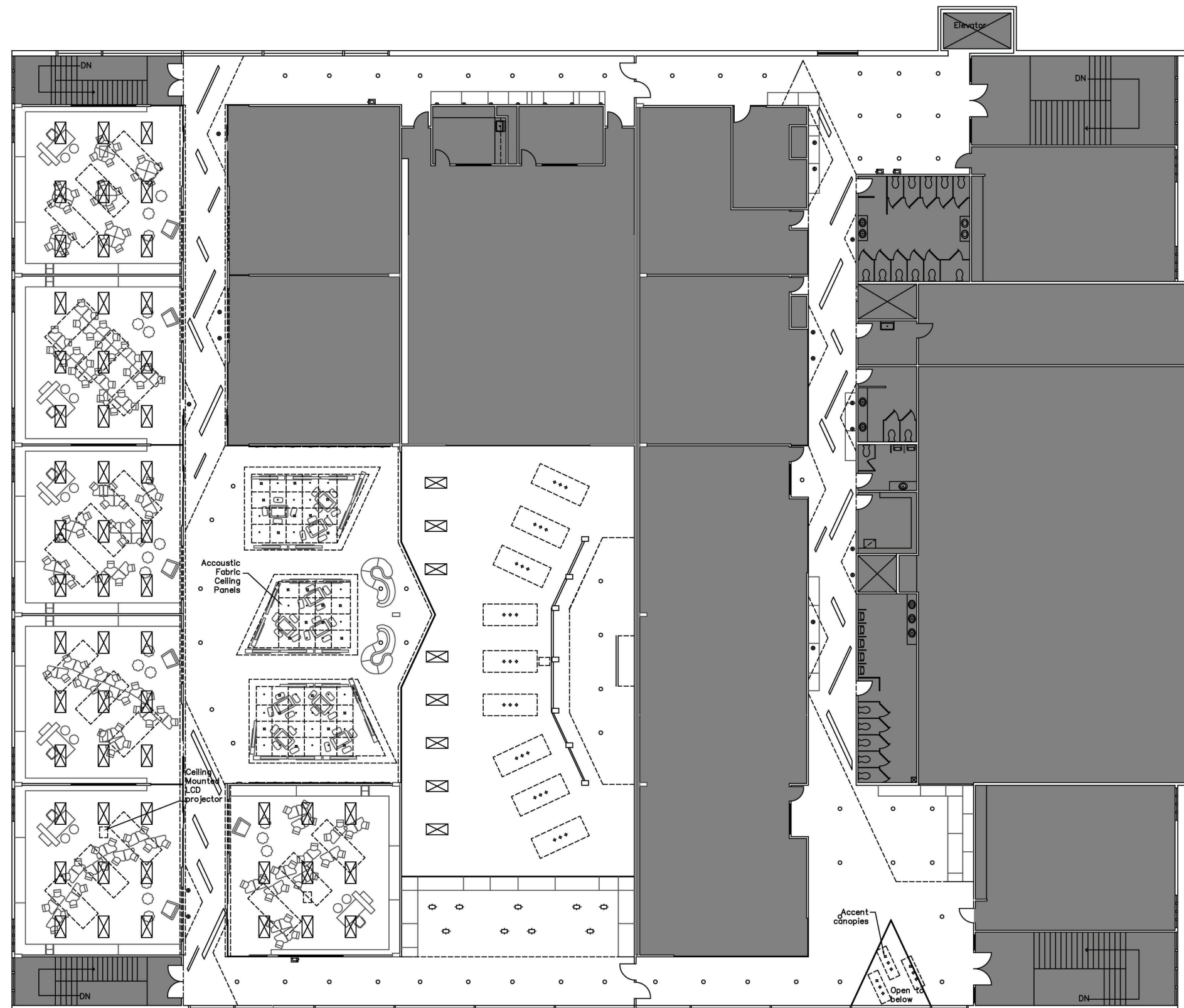
# Second Floor Design Plan

Scale: NTS





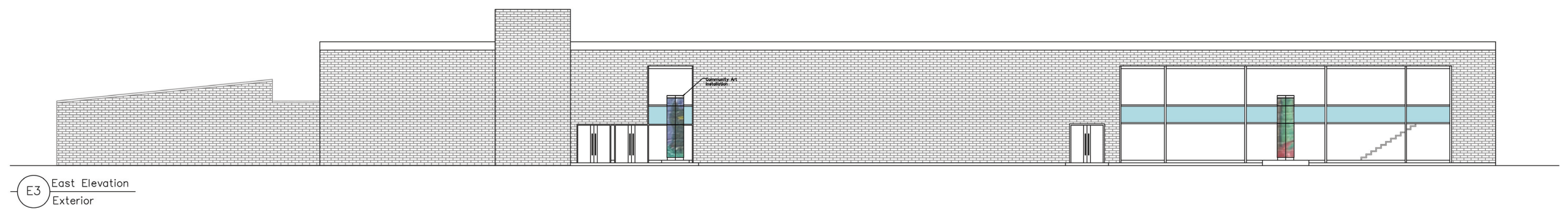
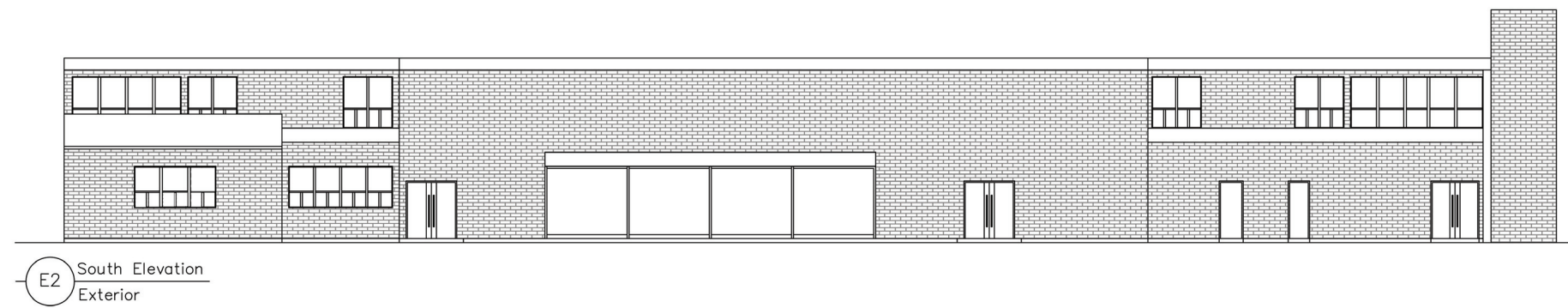
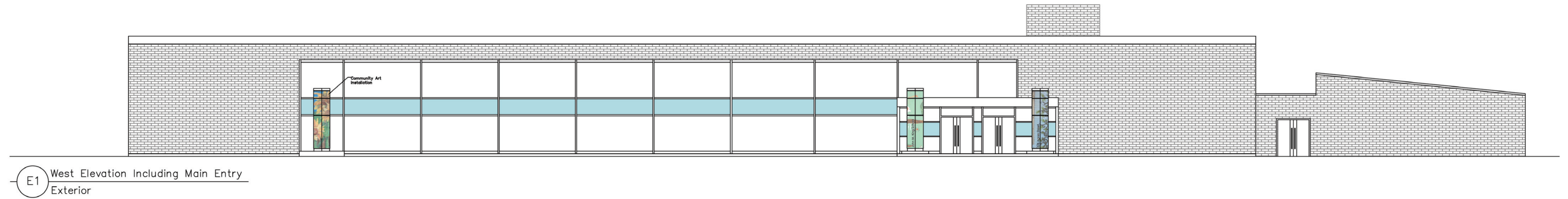
Main Floor Reflected Ceiling Plan  
Scale: NTS



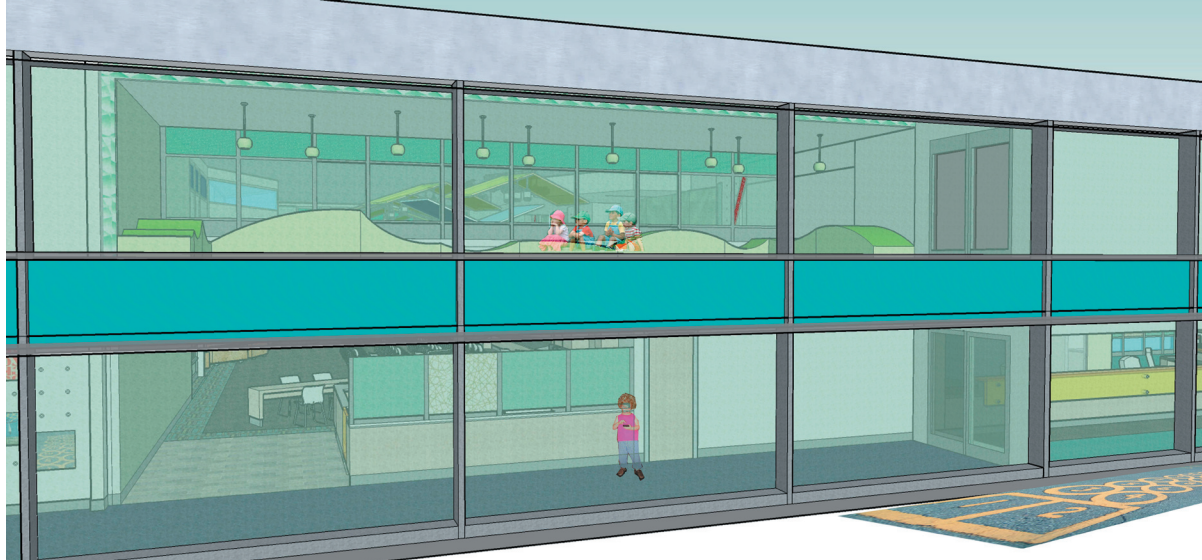
Reflected Ceiling Plan: Legend	
	2'-0" x 4'-0" Fluorescent with low-brightness louvres
	Point-Source Spotlights
	Linear Lighting Strips
	Pot-lights
	Pendant Lights
	Stage Lighting Track
	Ceiling Mounted LCD Projector
	Acoustic Fabric Ceiling Panels



Second Floor Reflected Ceiling Plan  
Scale: NTS



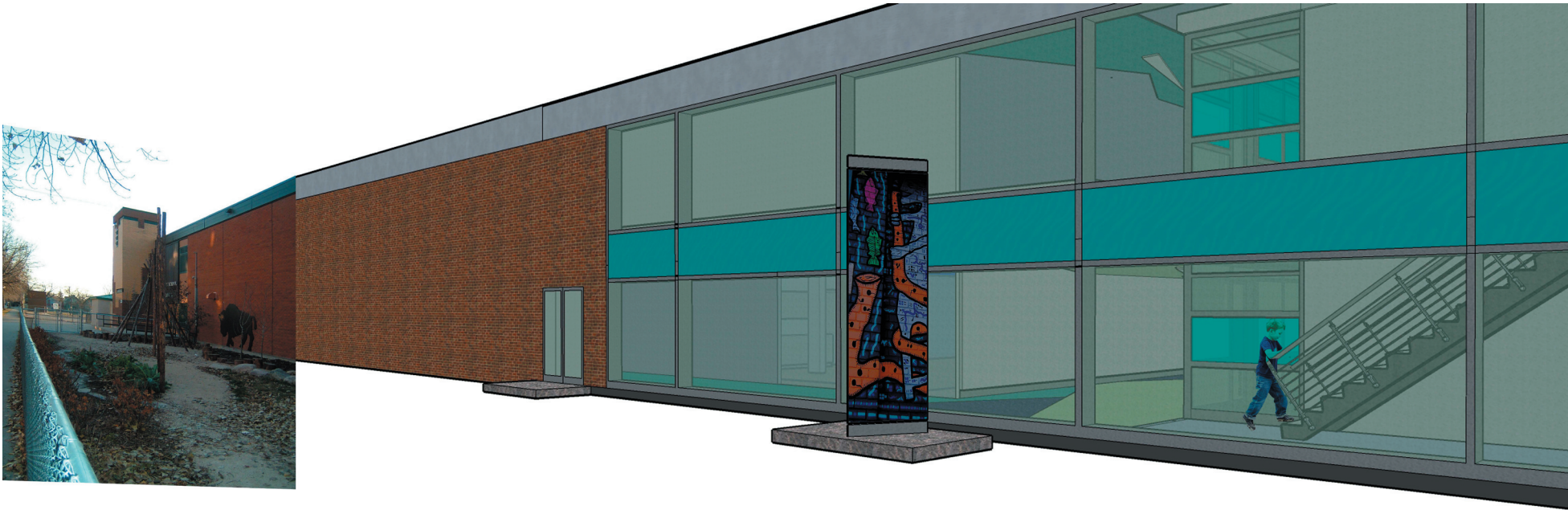
Exterior Elevations  
Scale: NTS



View of West Facade



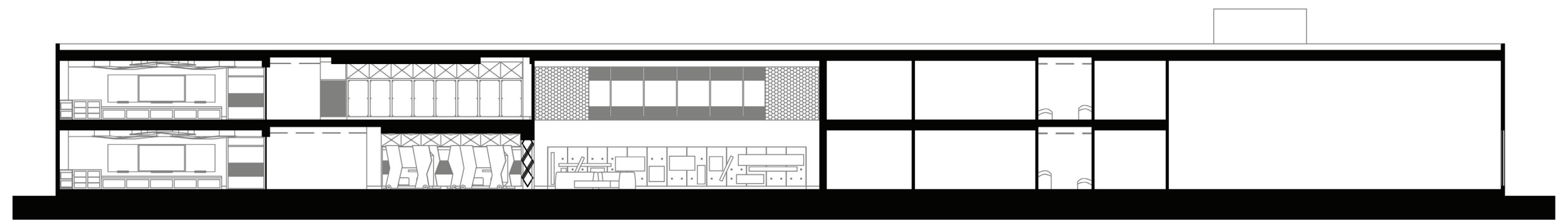
View of West & South Facades



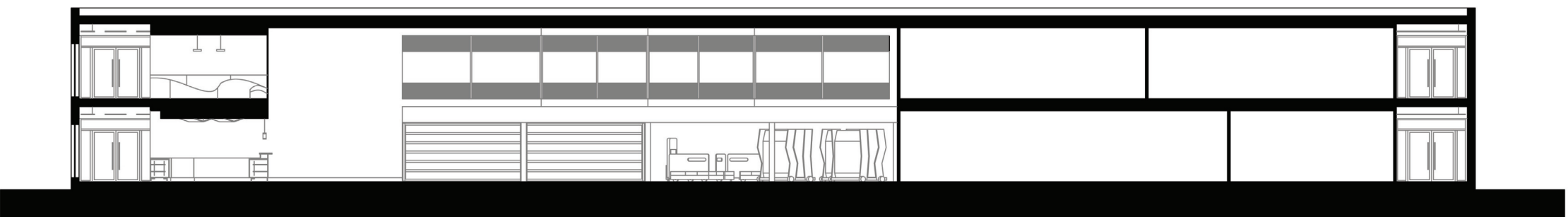
View of East Facade



S1 Section

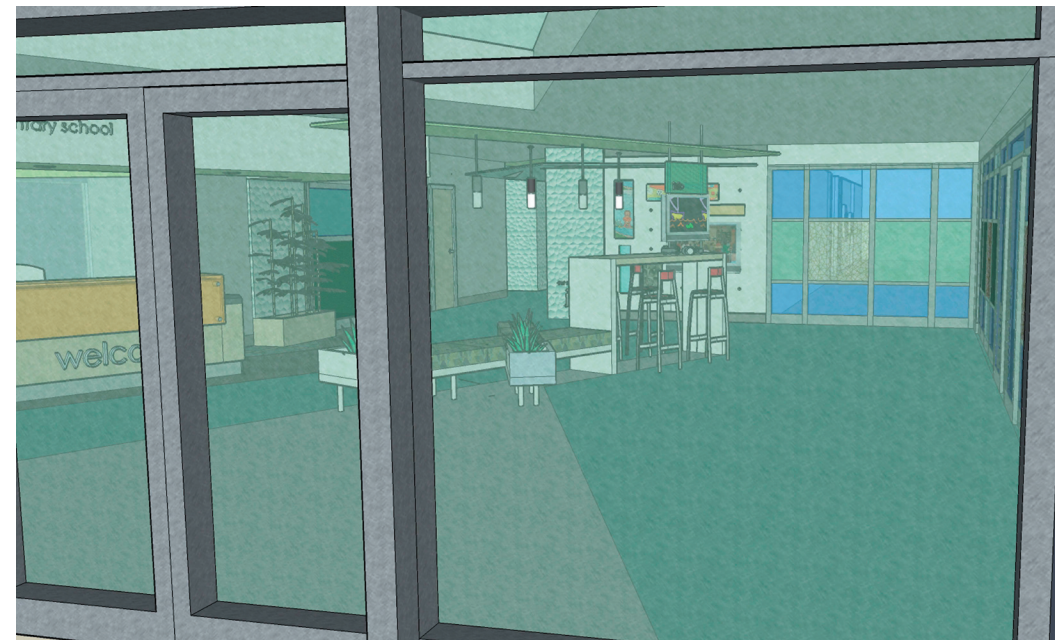
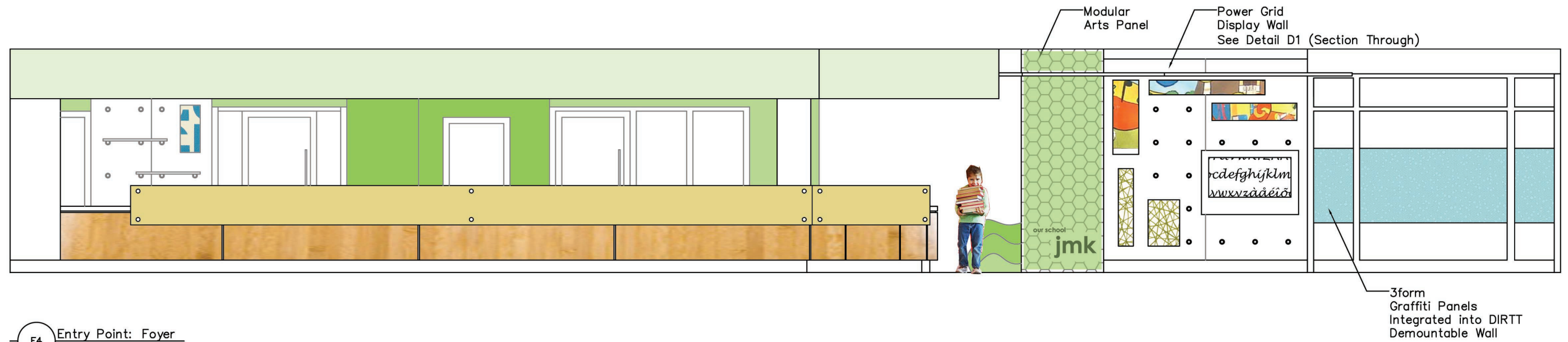


S2 Section

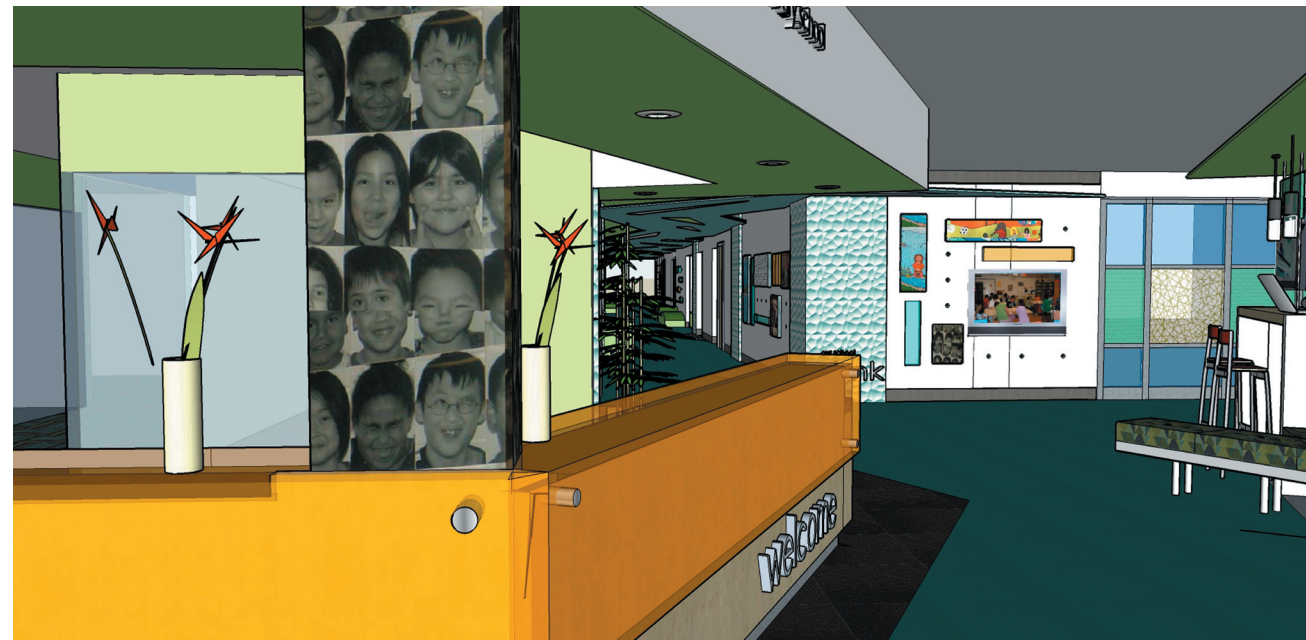


S3 Section

Sections  
Scale: NTS



View of Foyer from Vestibule



Reception Desk Towards Power Grid Wall



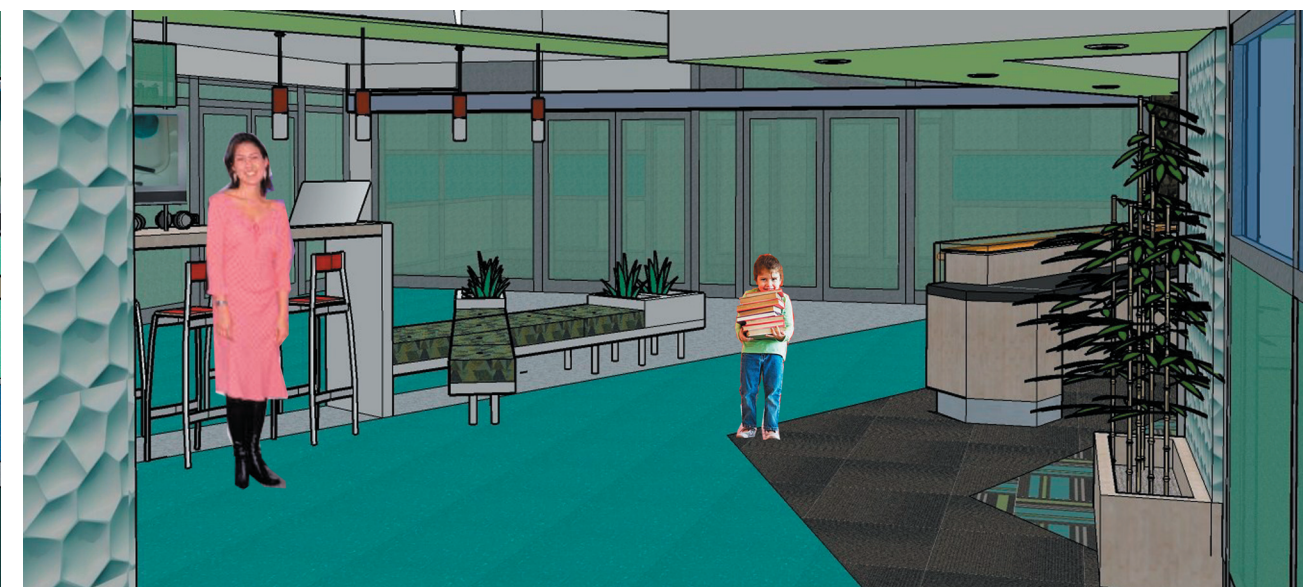
View Towards Family Room



Bench Seating with Information Touch Display

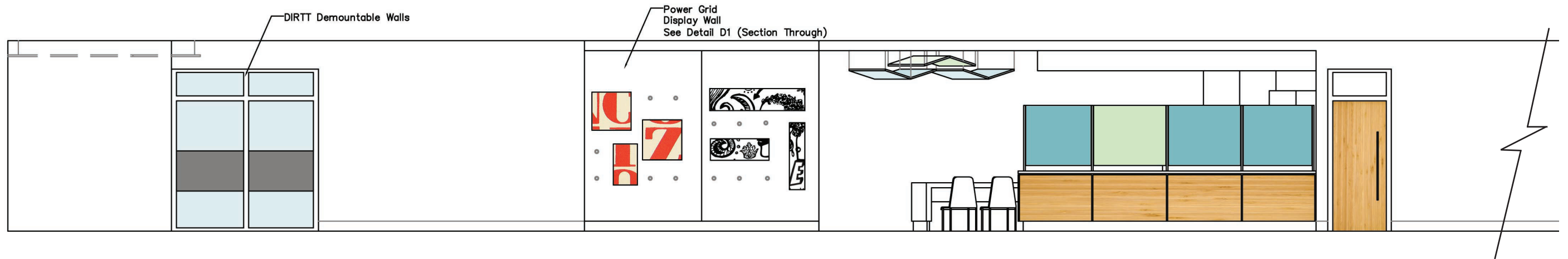


Graffiti Visitor Walls

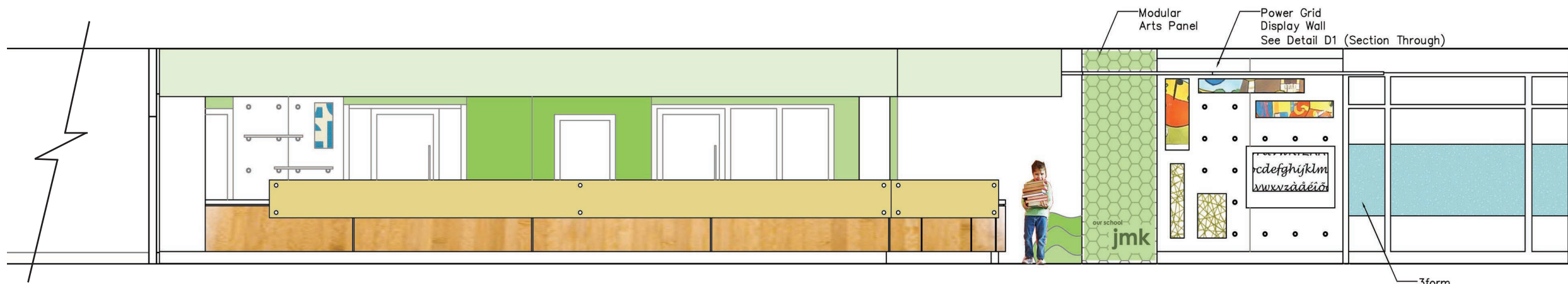


View Towards Front Entrance

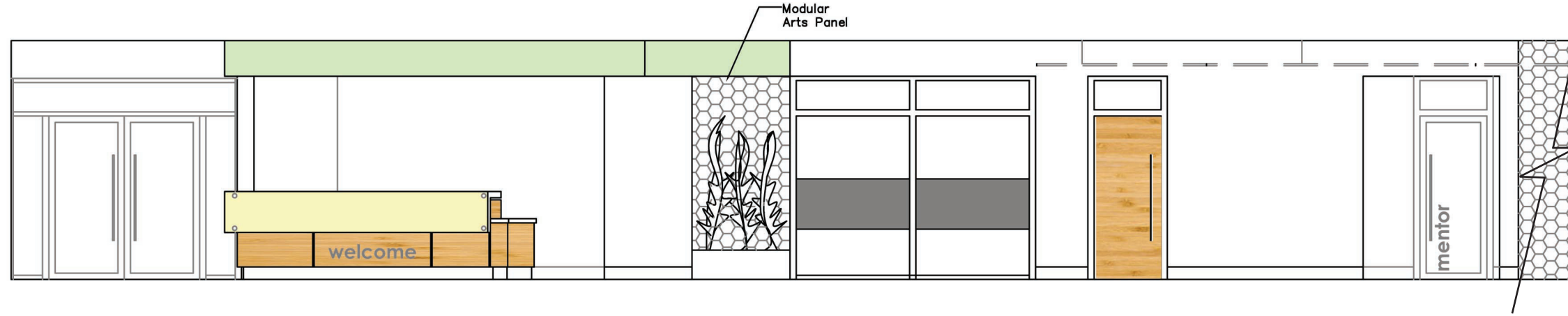
### Foyer Views



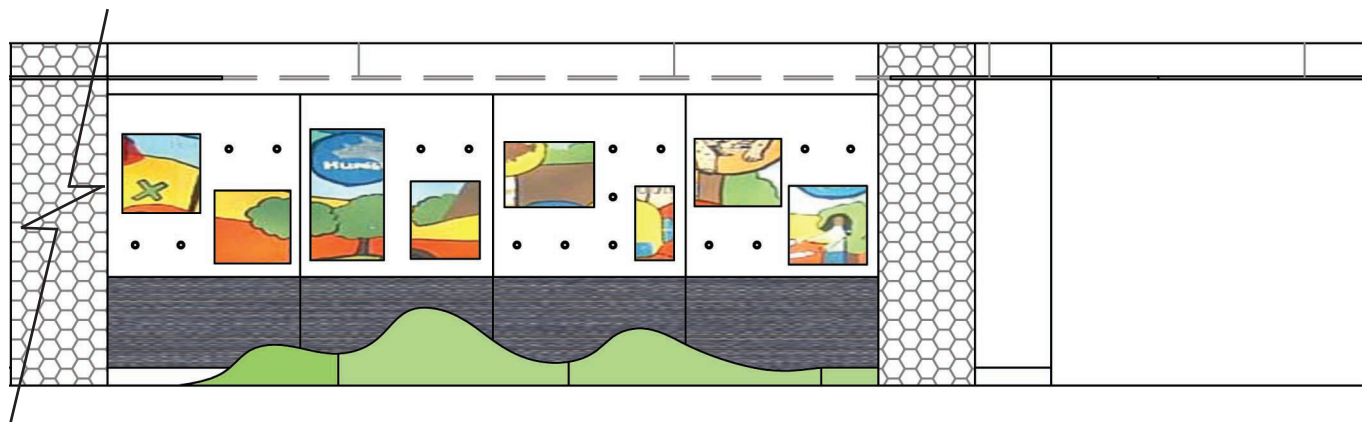
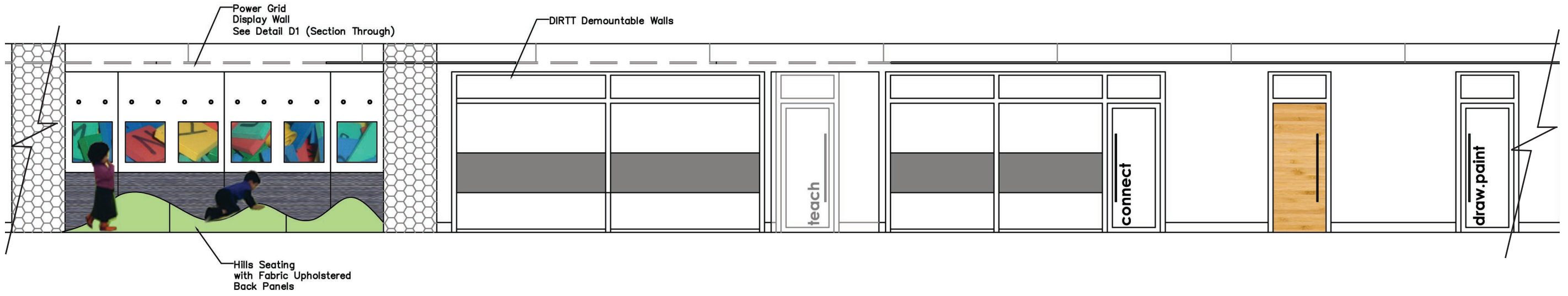
E5 West Corridor Including Foyer & Reception  
Main Floor



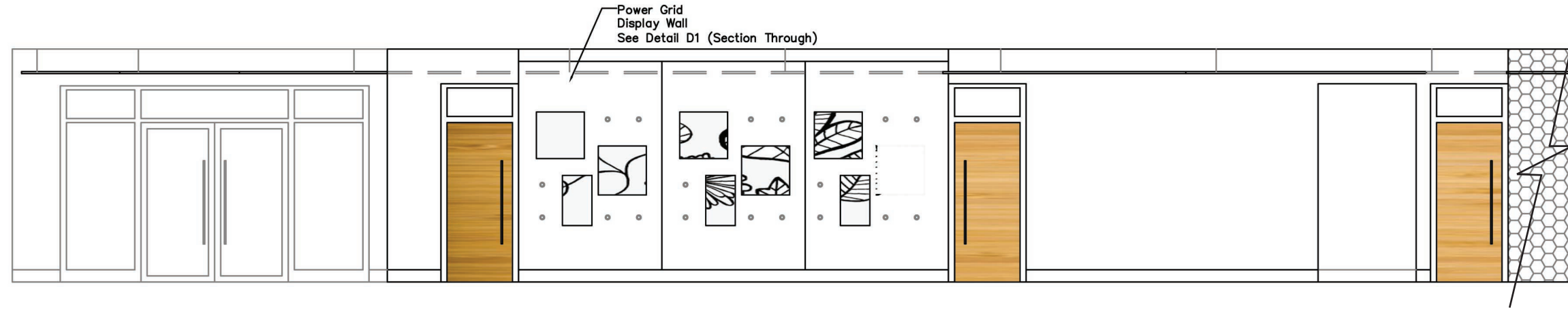
Corridor Elevation  
Scale: 3/16"=1'-0"



E6 South Corridor Looking North  
Main Floor

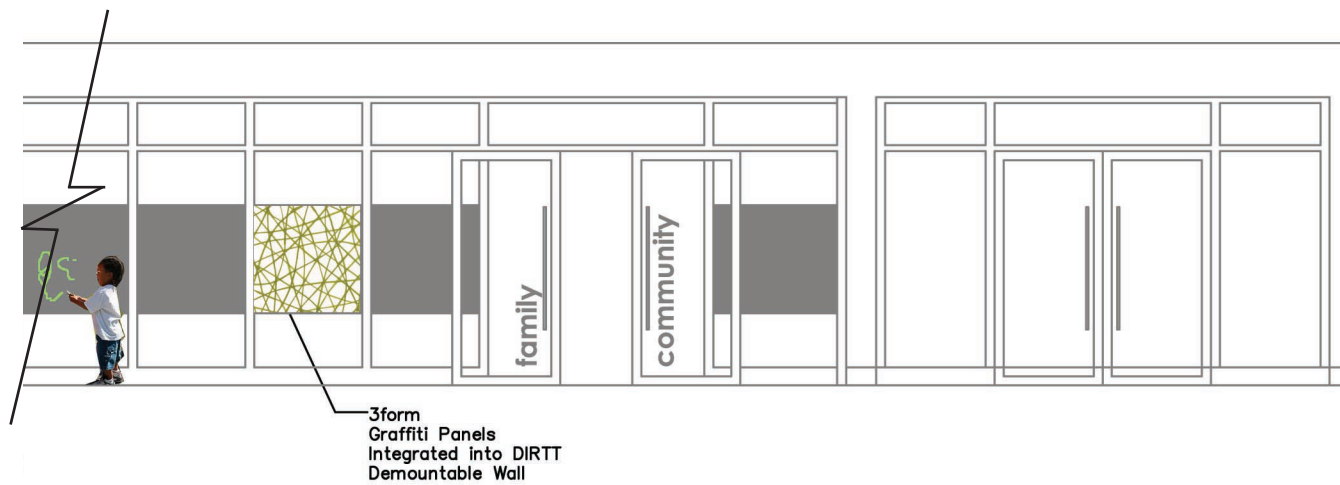


Corridor Elevation  
Scale: 3/16"=1'-0"

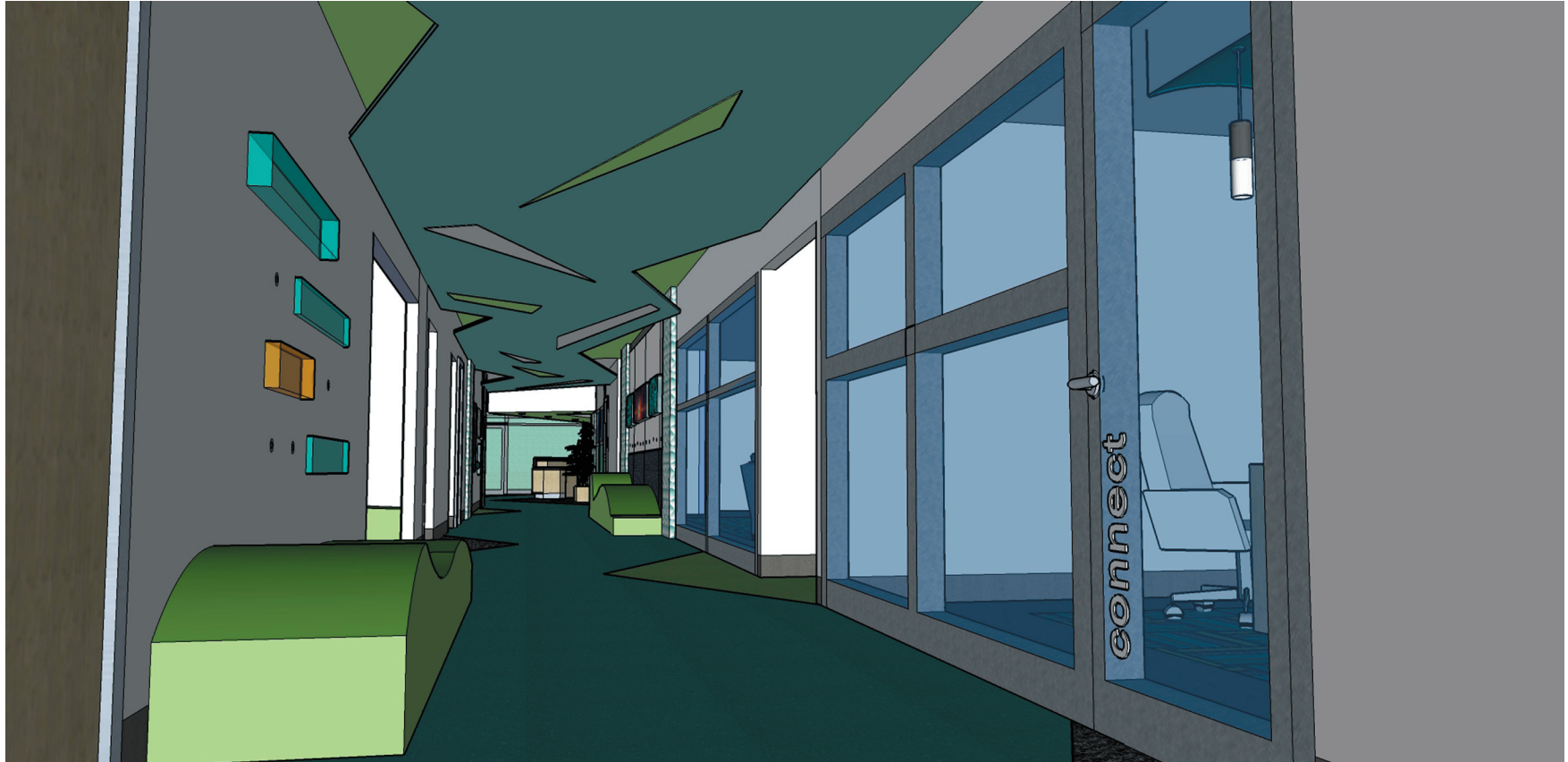
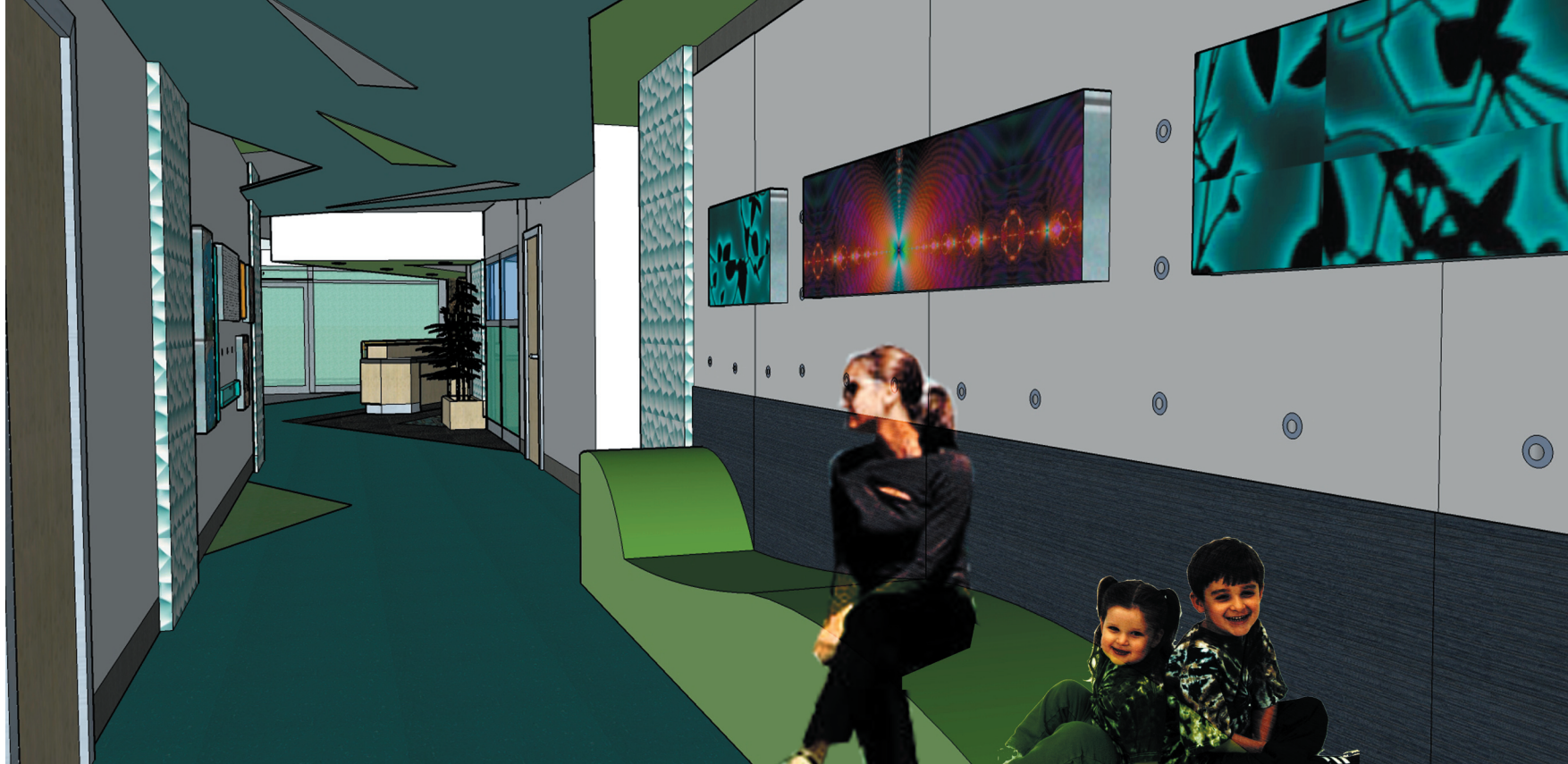


E7 South Corridor Looking South  
Main Floor

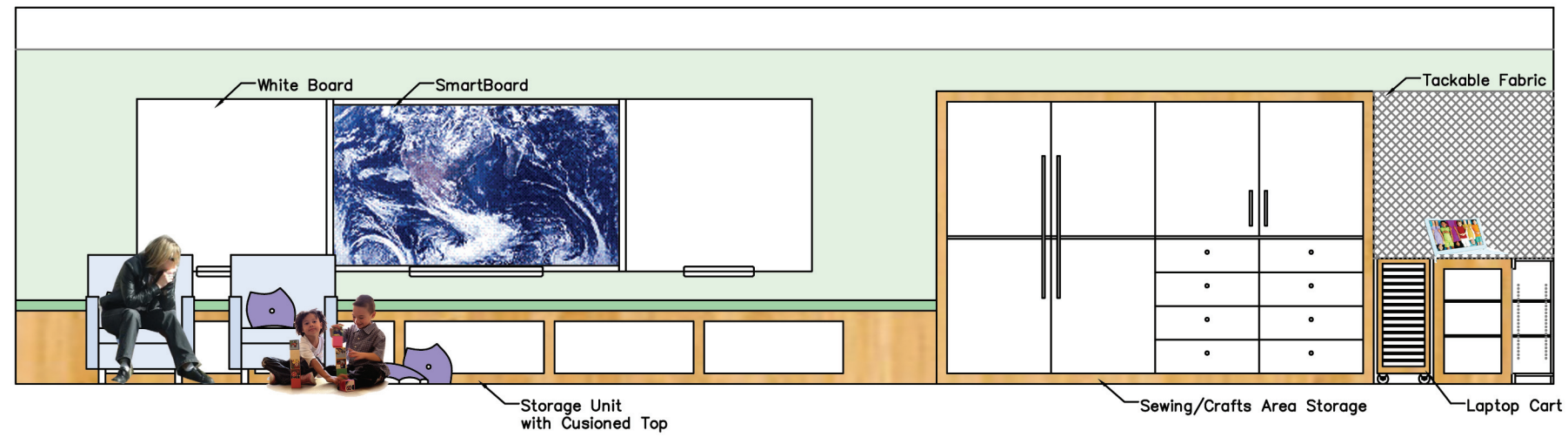
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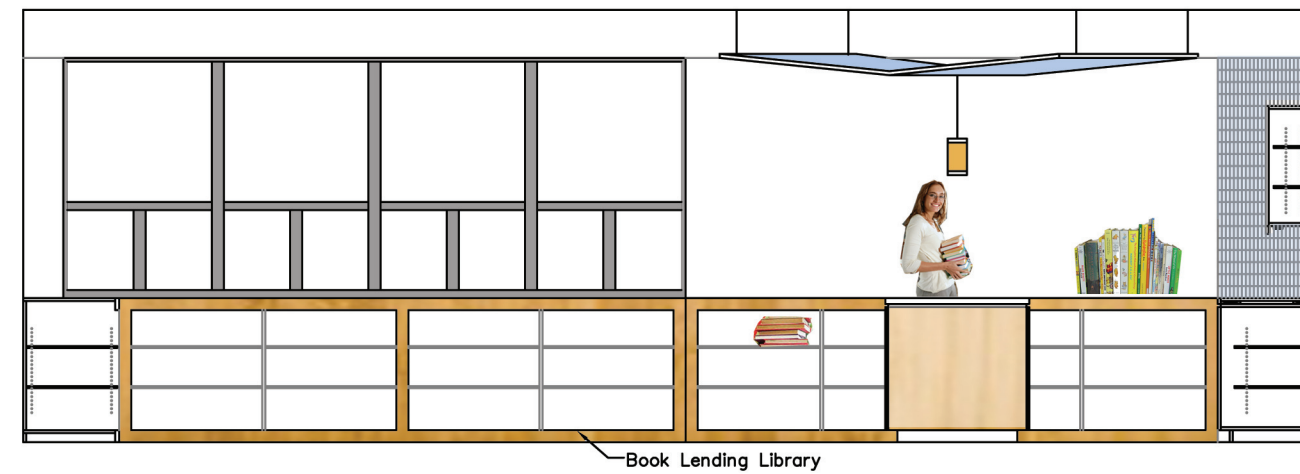
Corridor Elevation  
Scale: 3/16"=1'-0"



Corridor Views  
Grid Wall with Art & Lighting



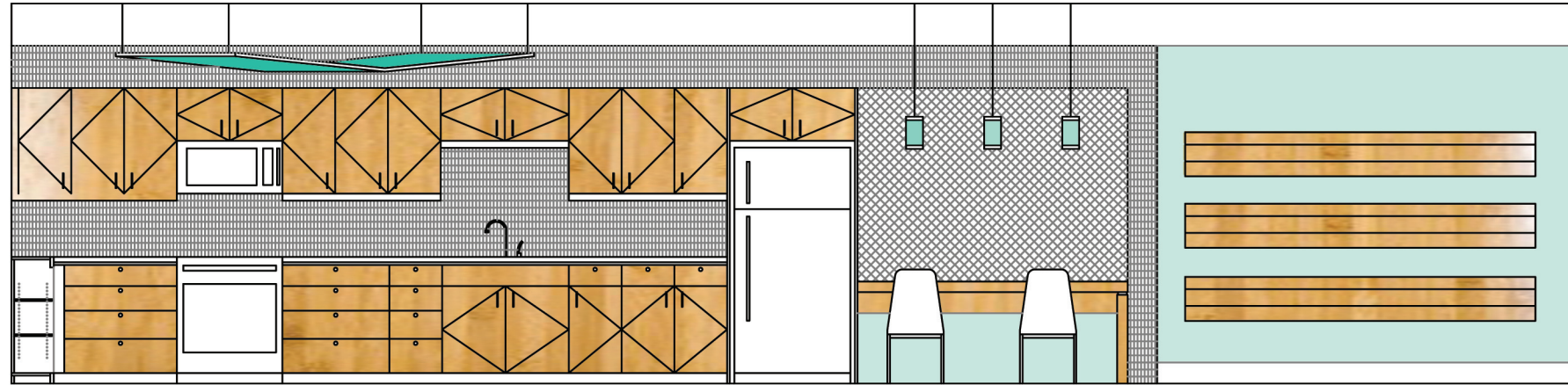
E8 Family Room: East Elevation  
Main Floor



E9 Family Room: South Elevation  
Main Floor

## Family Room Elevations

Scale: 1/4"=1'-0"



E10 Family Room: West Elevation  
Main Floor



E11 Family Room: North Elevation  
Main Floor

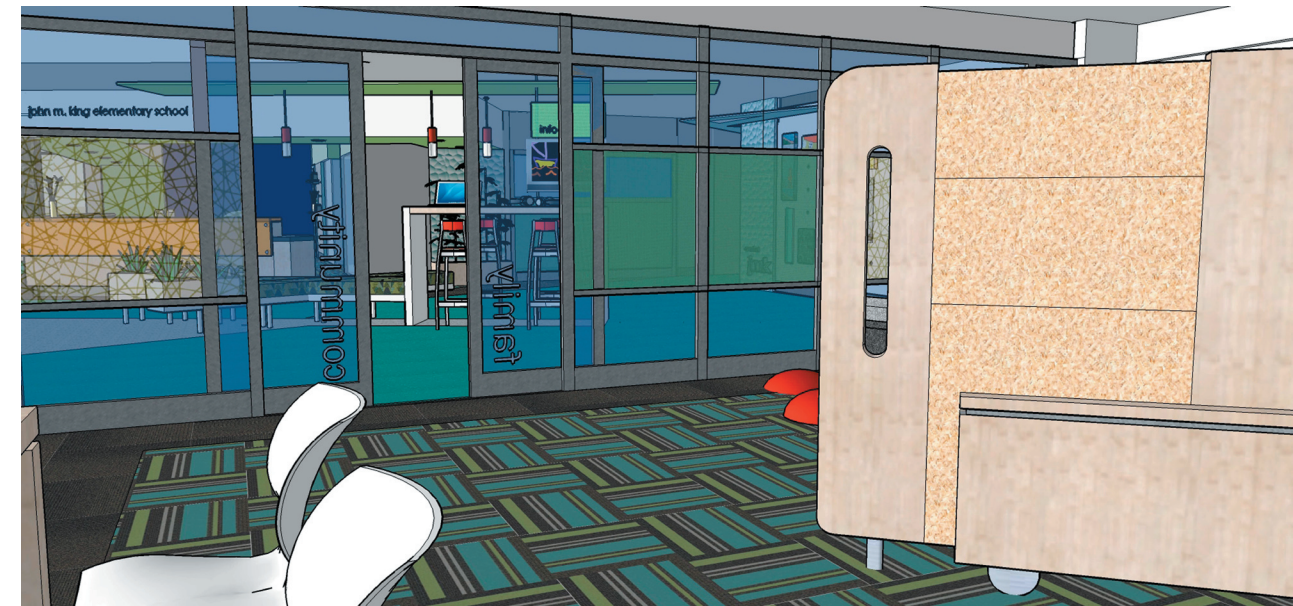
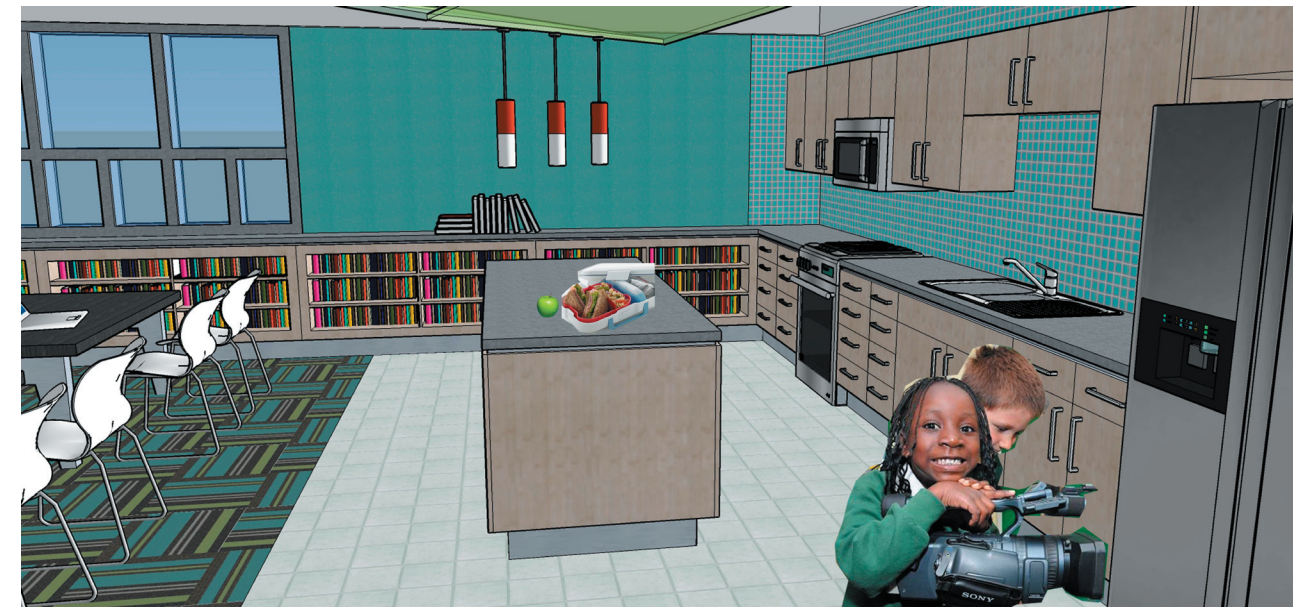
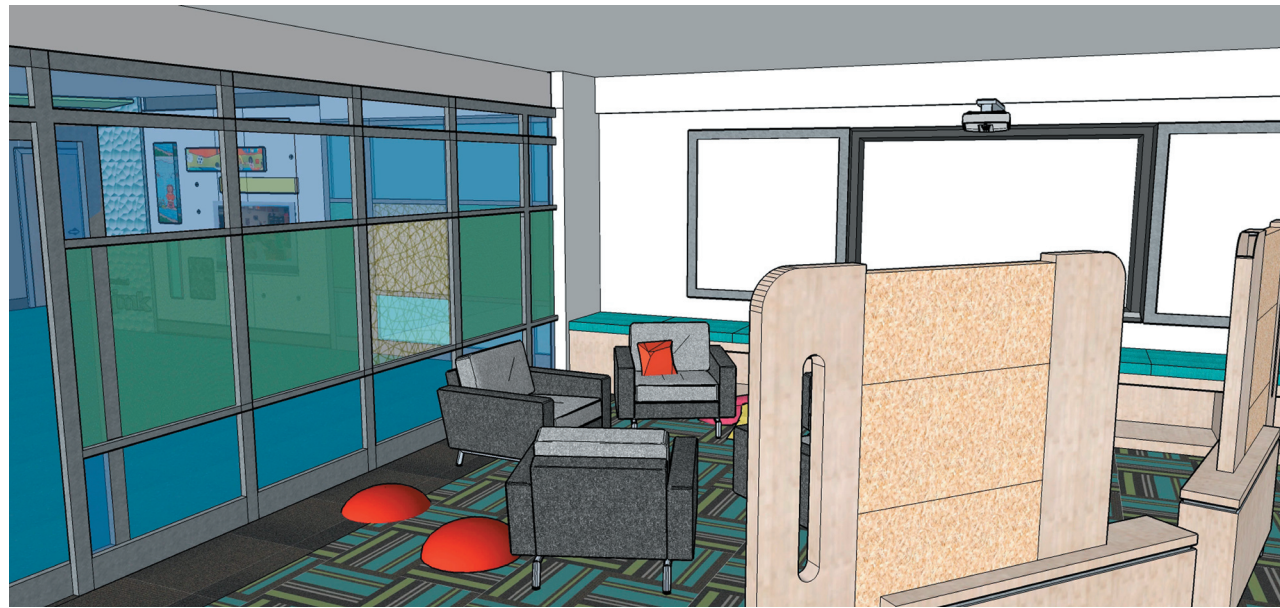
3form  
Graffiti Panels  
Integrated into DIRTT  
Demountable Wall

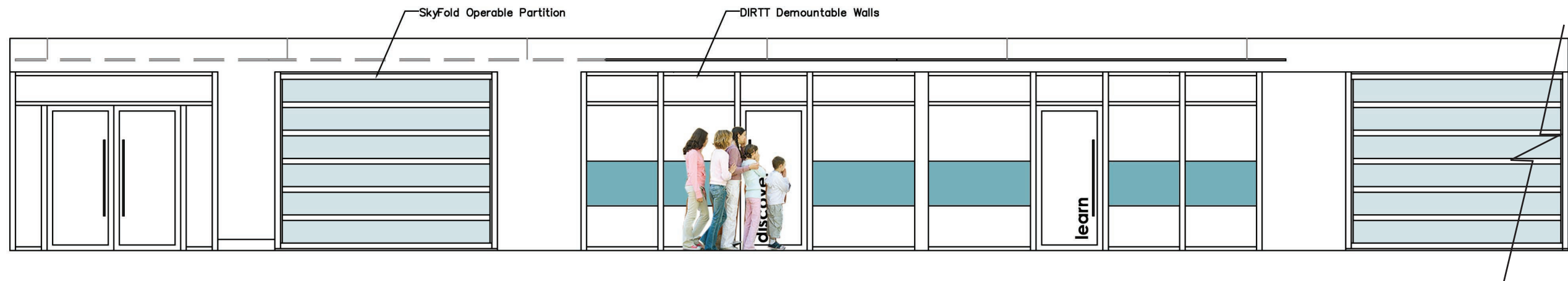
## Family Room Elevations

Scale: 1/4"=1'-0"



Family Room Views

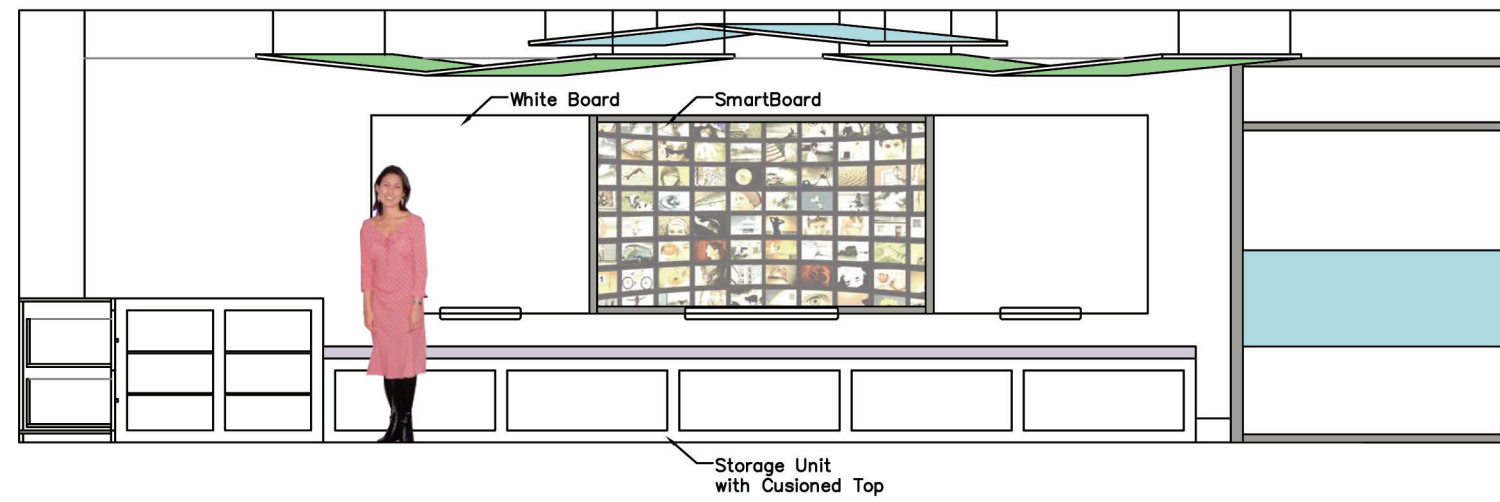




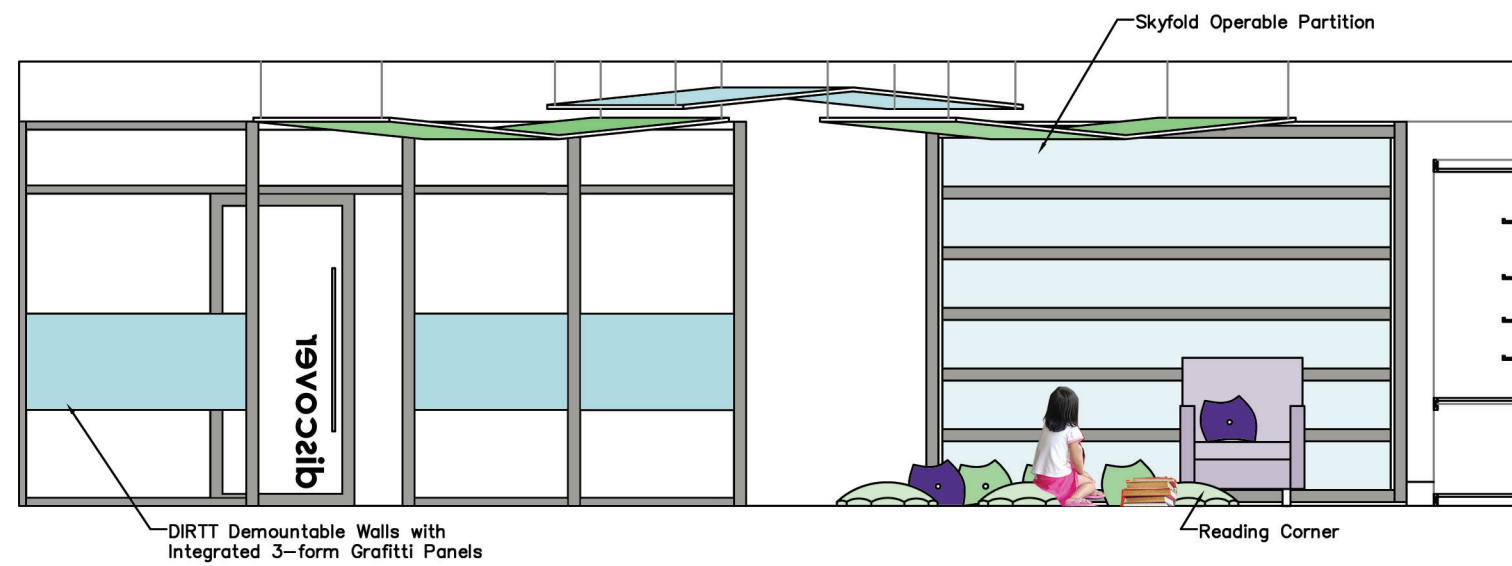
E12 Typical Classroom Corridor  
Main/Second Floors



Classroom Corridor Elevation  
Scale: 3/16"=1'-0"



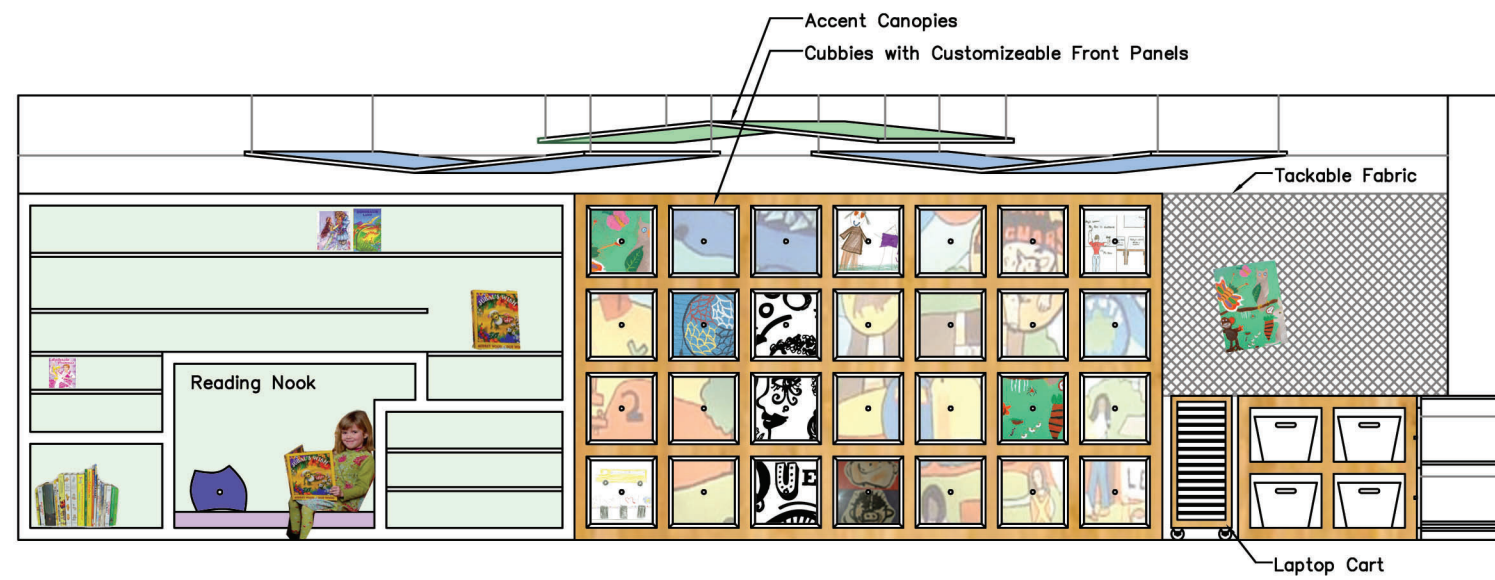
E13 Typical Classroom  
Main/Second Floors



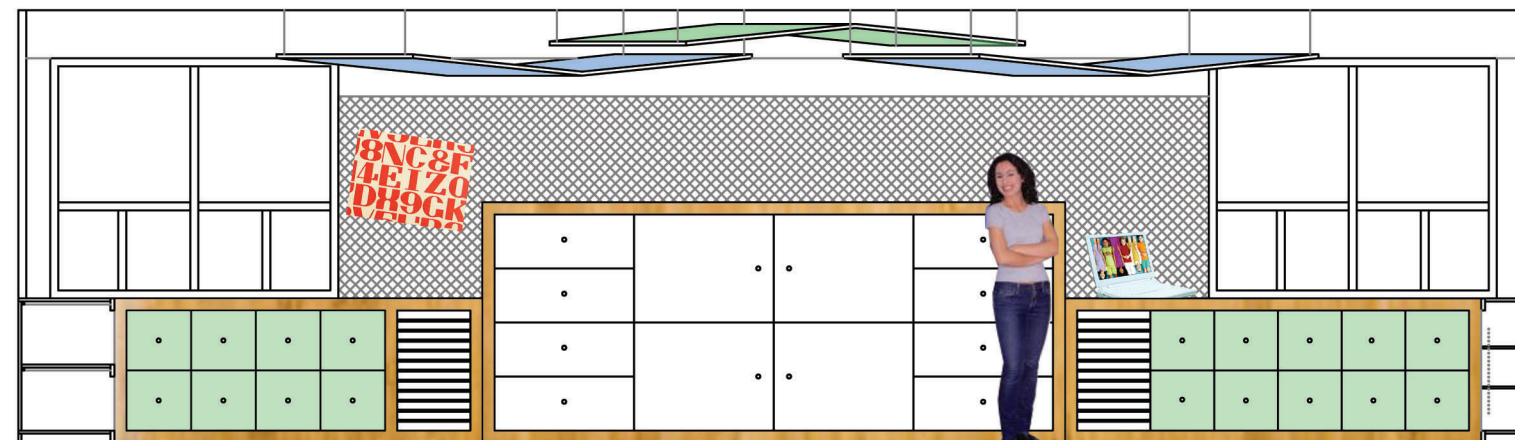
E14 Typical Classroom  
Main/Second Floors

## Classroom Elevations

Scale: 1/4"=1'-0"



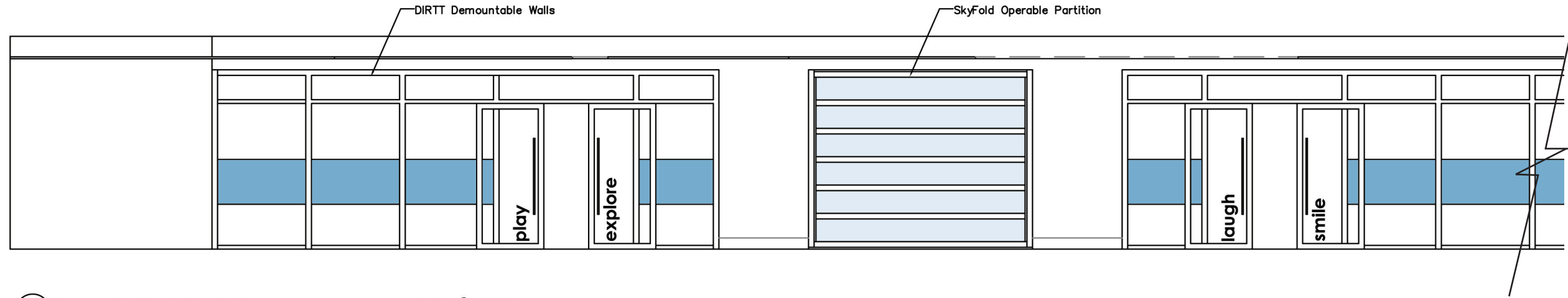
E15 Typical Classroom  
Main/Second Floors



E16 Typical Classroom  
Main/Second Floors

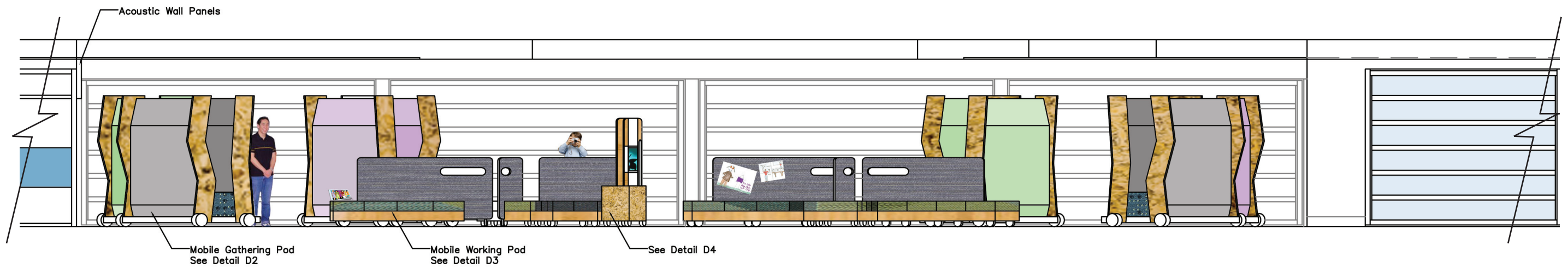
## Classroom Elevations

Scale: 1/4"=1'-0"

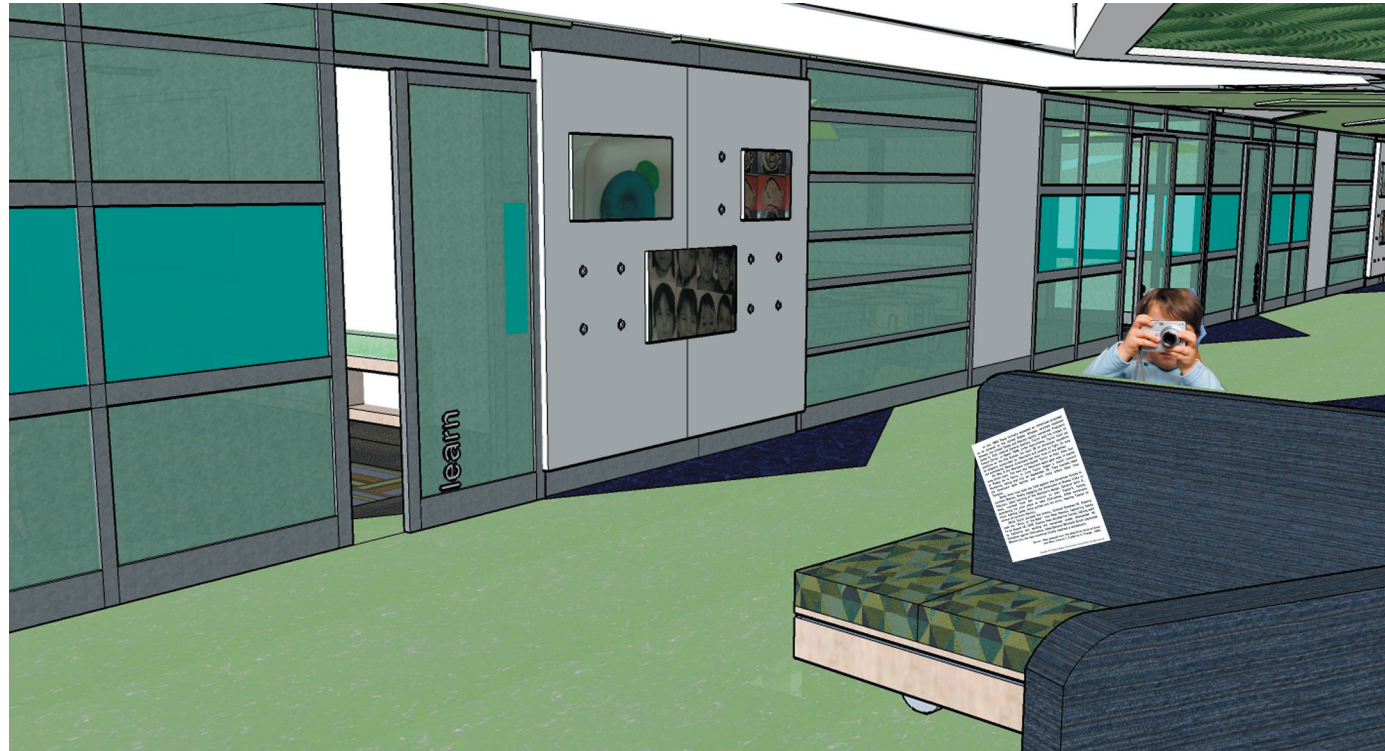


E17 Classroom Corridor Looking South  
Main Floor

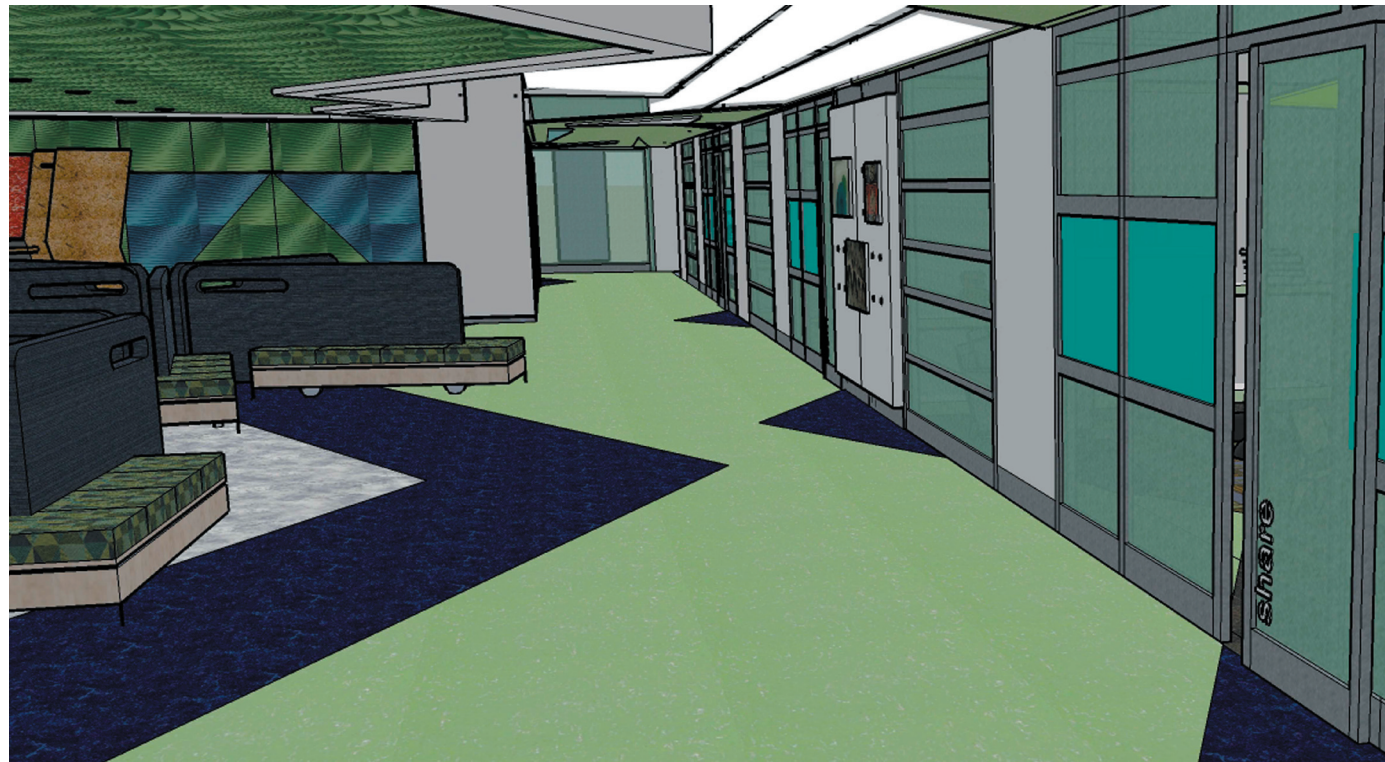
Scale:  $\frac{3}{16}'' = 1'-0''$

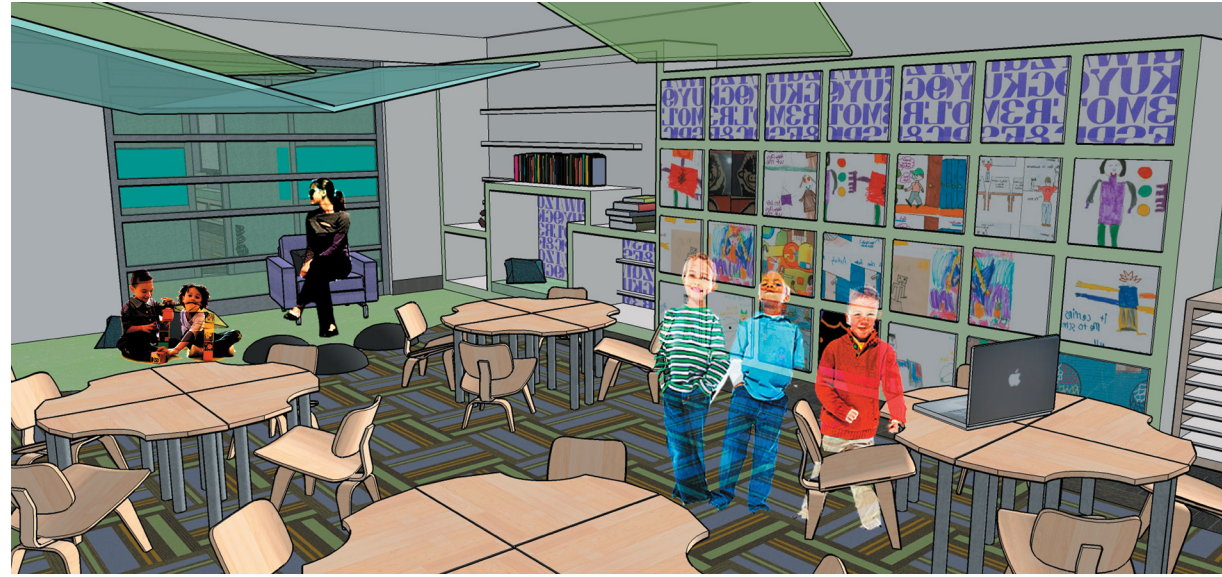


Classroom Corridor Elevation  
Scale:  $\frac{3}{16}'' = 1'-0''$

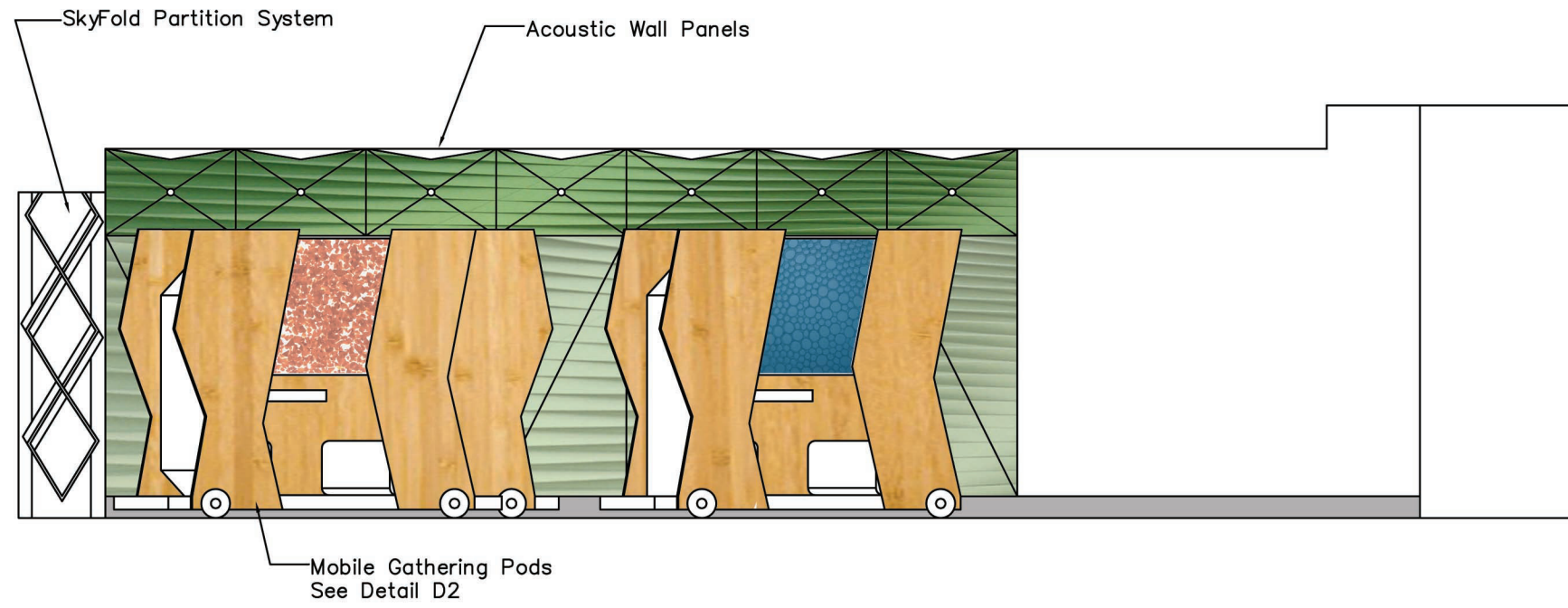


Classroom Corridor Views



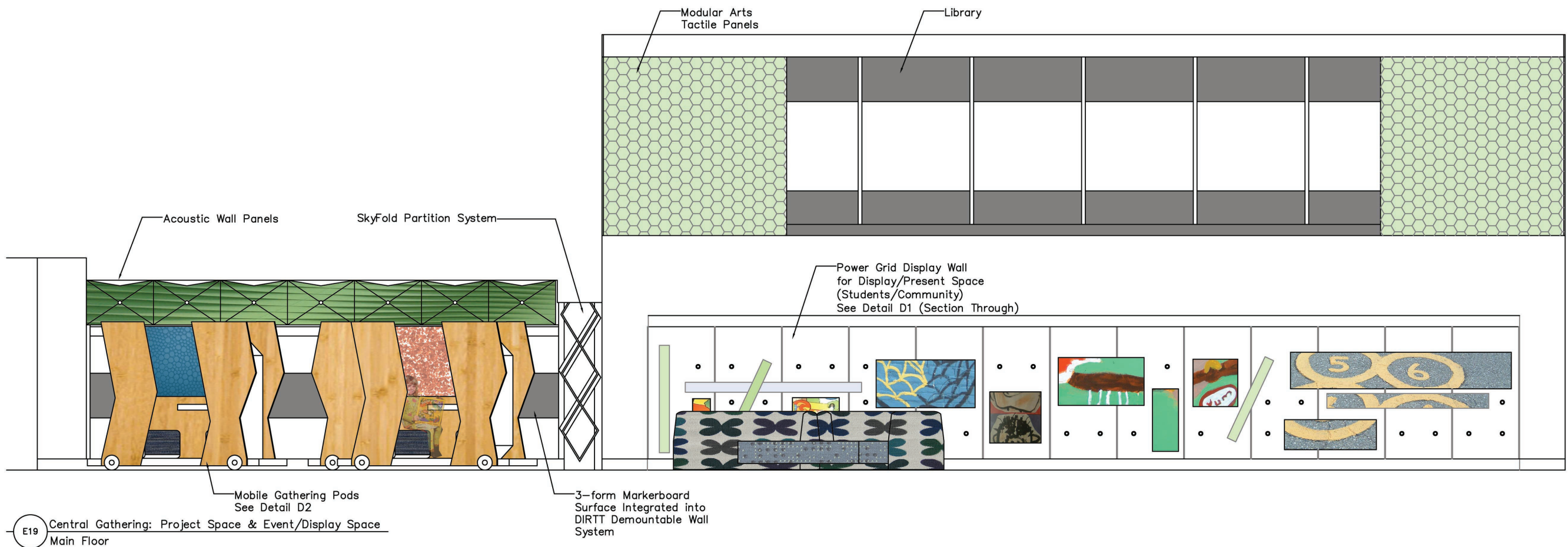


Classroom Views



E18 Central Gathering: Project Space  
Main Floor

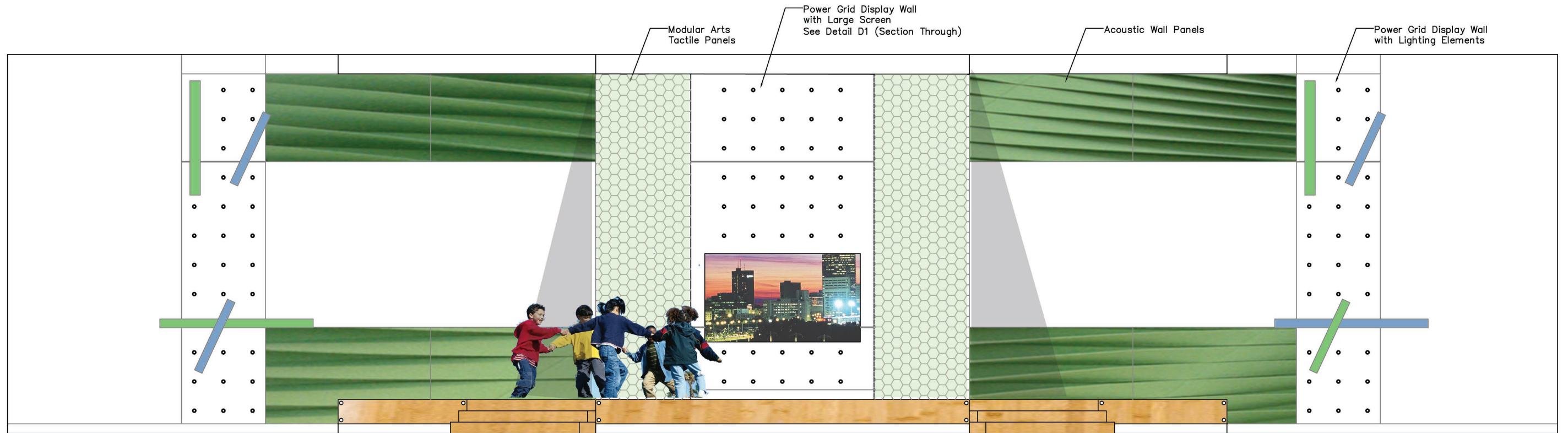
Scale: 1/4" = 1'-0"



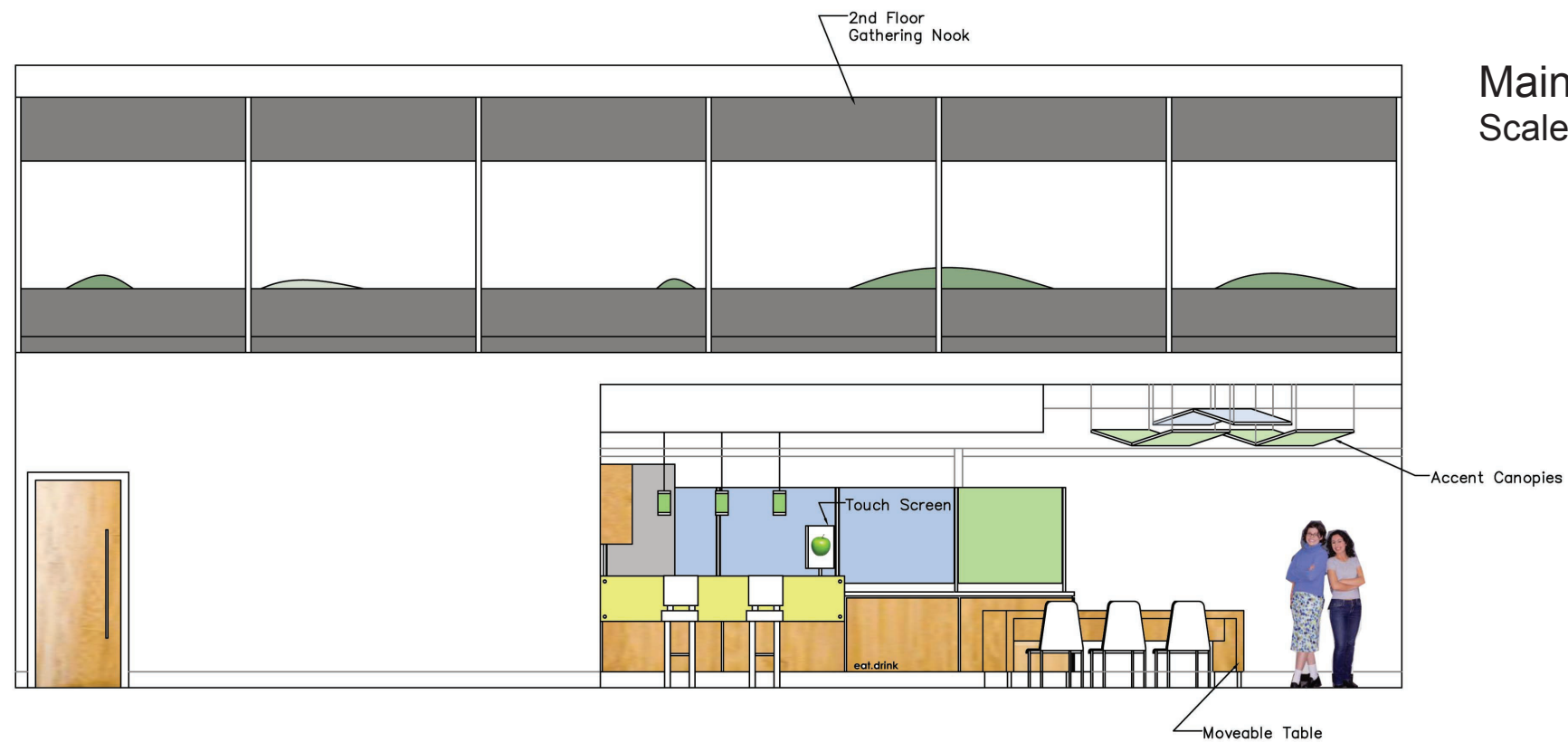
E19 Central Gathering: Project Space & Event/Display Space  
Main Floor

# Main Floor Central Gathering Space Elevations

Scale: NTS

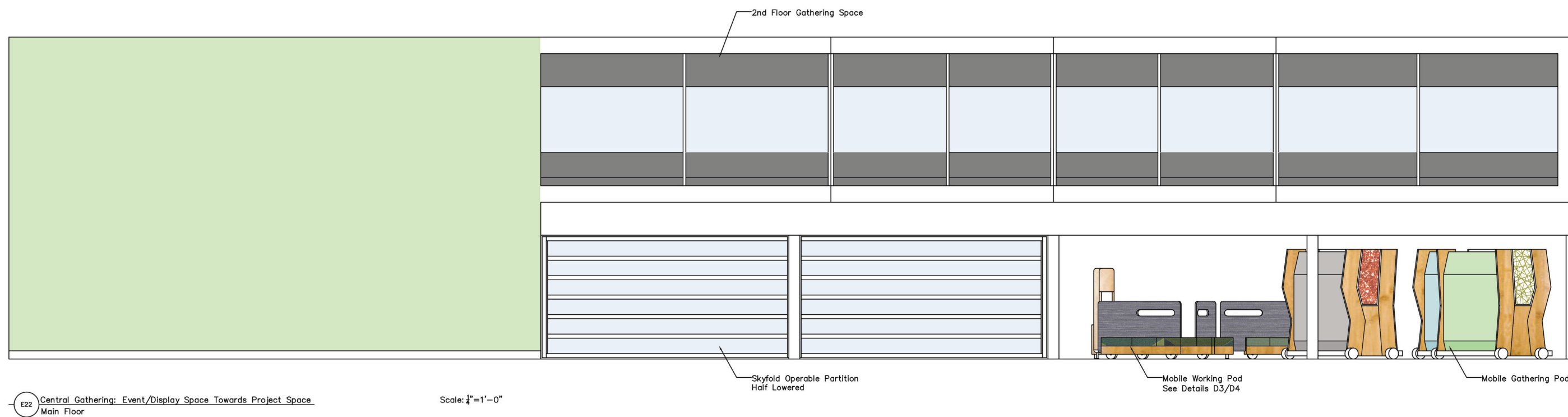


E20 Central Gathering: Stage in Event/Display Space  
Main Floor



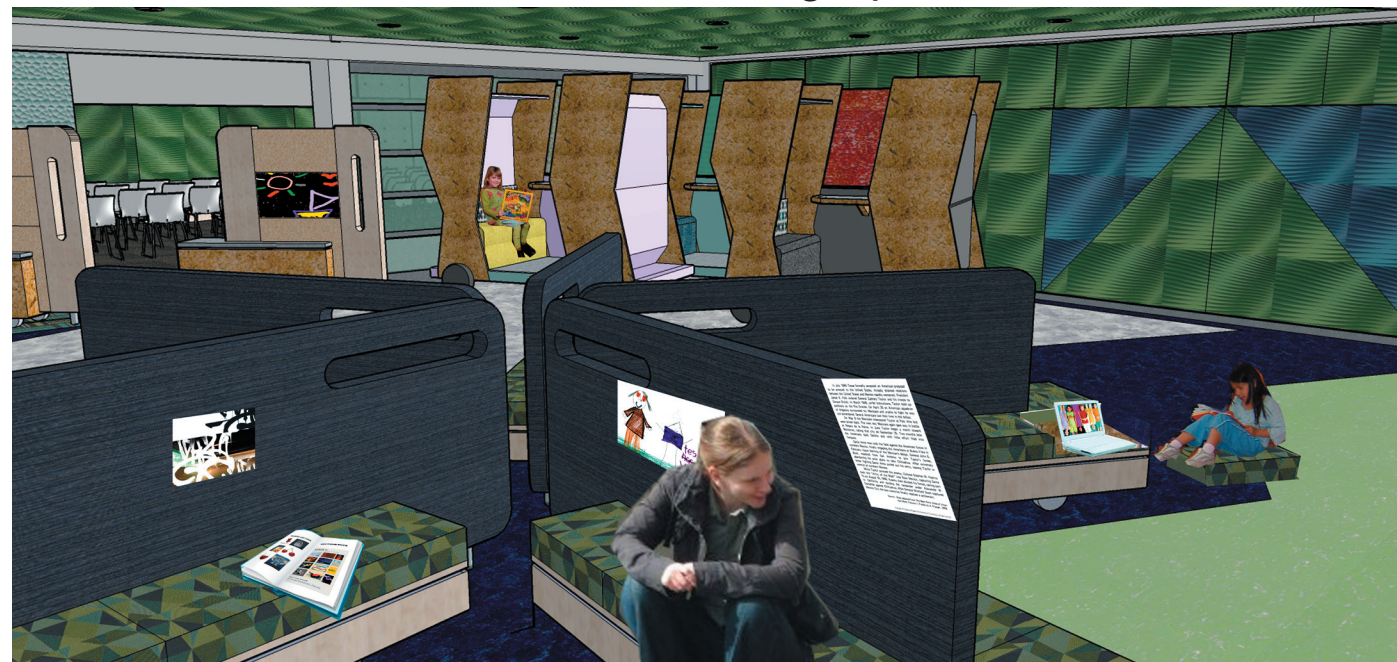
Main Floor Central Gathering Space Elevations  
Scale: NTS

E21 Central Gathering: Kitchen  
Main Floor



Main Floor Central Gathering Space Elevation  
Scale: NTS

### Views of Main Floor Central Gathering Space

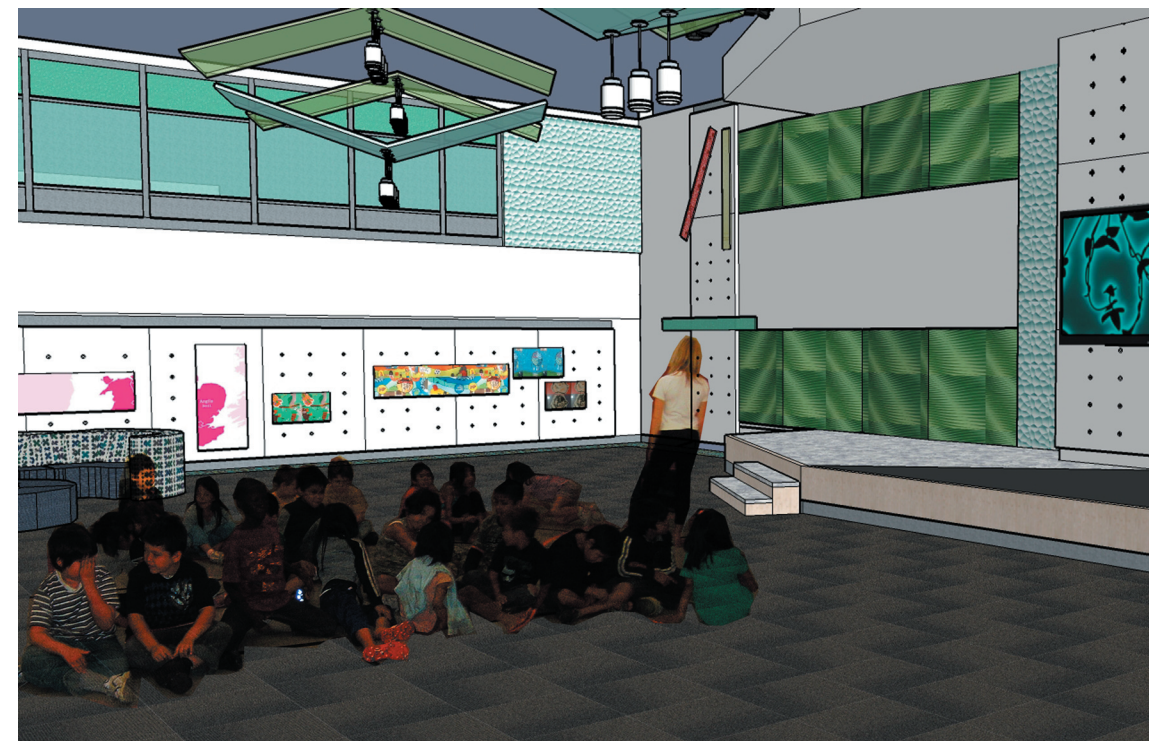
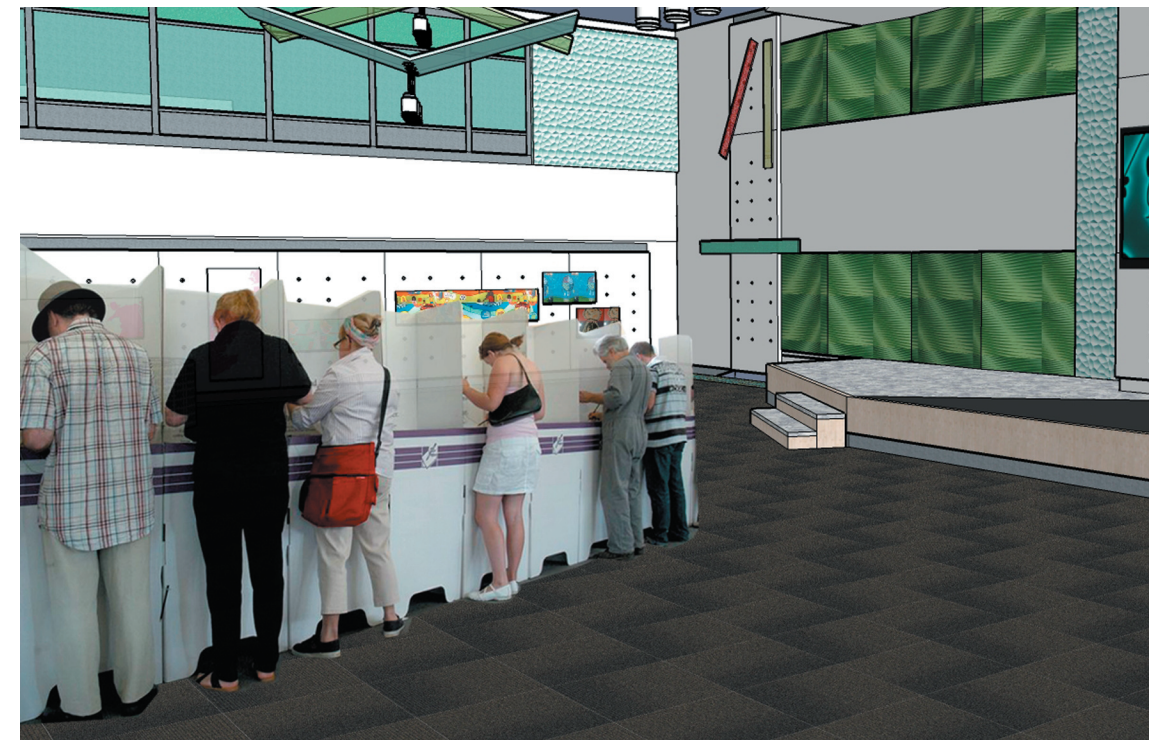
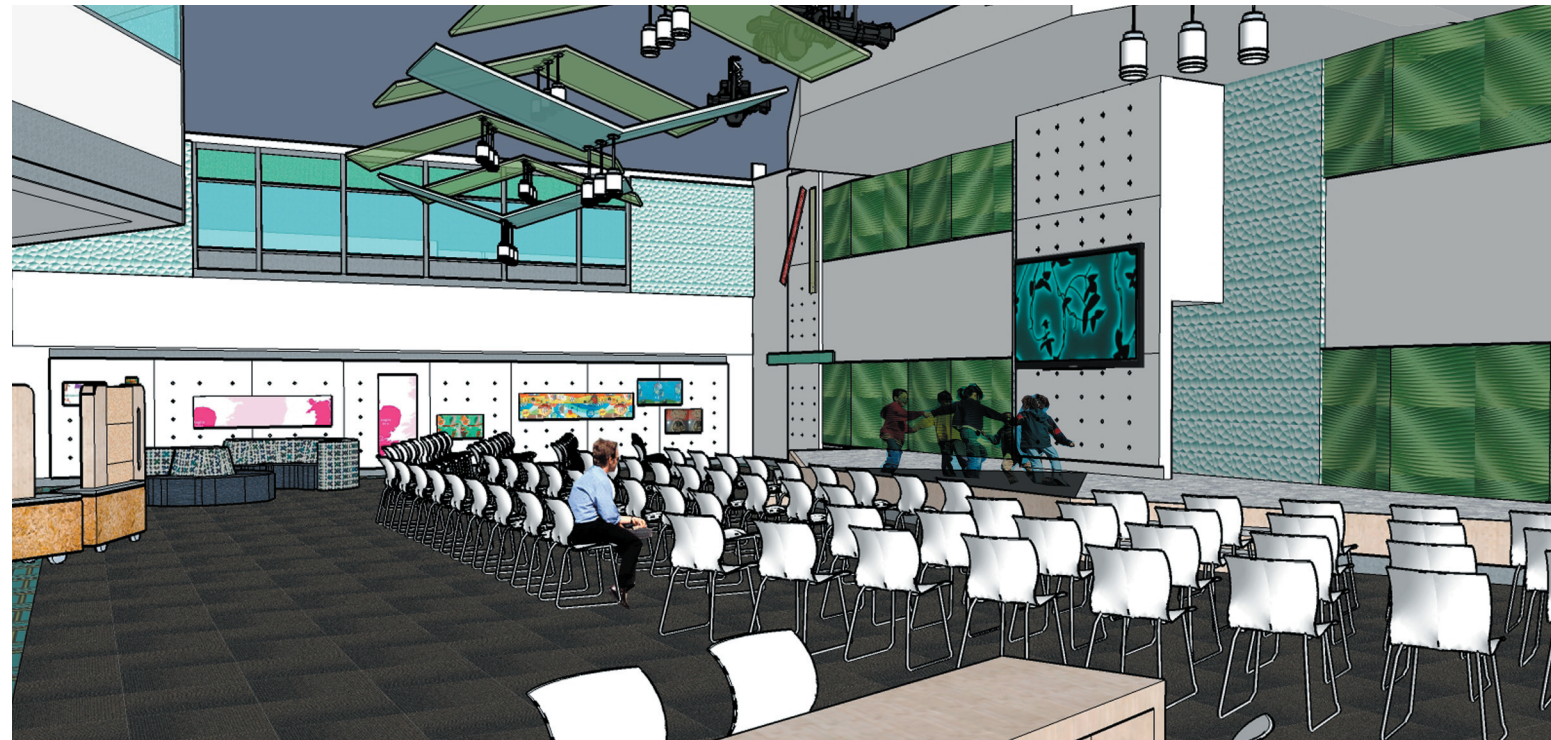


Project Space & Mobile Pods



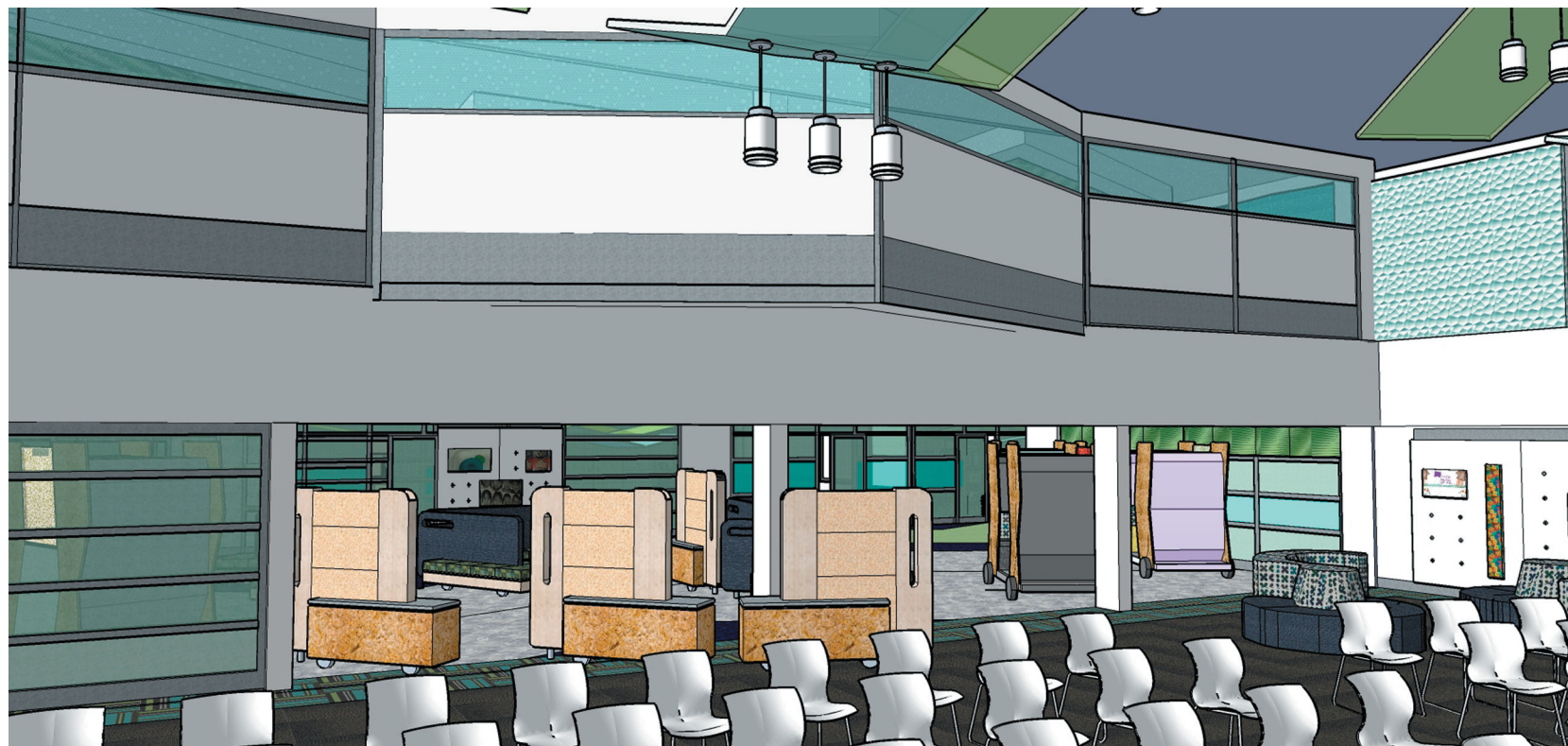
Project Space with View into Event Space

### Views of Main Floor Central Gathering Space

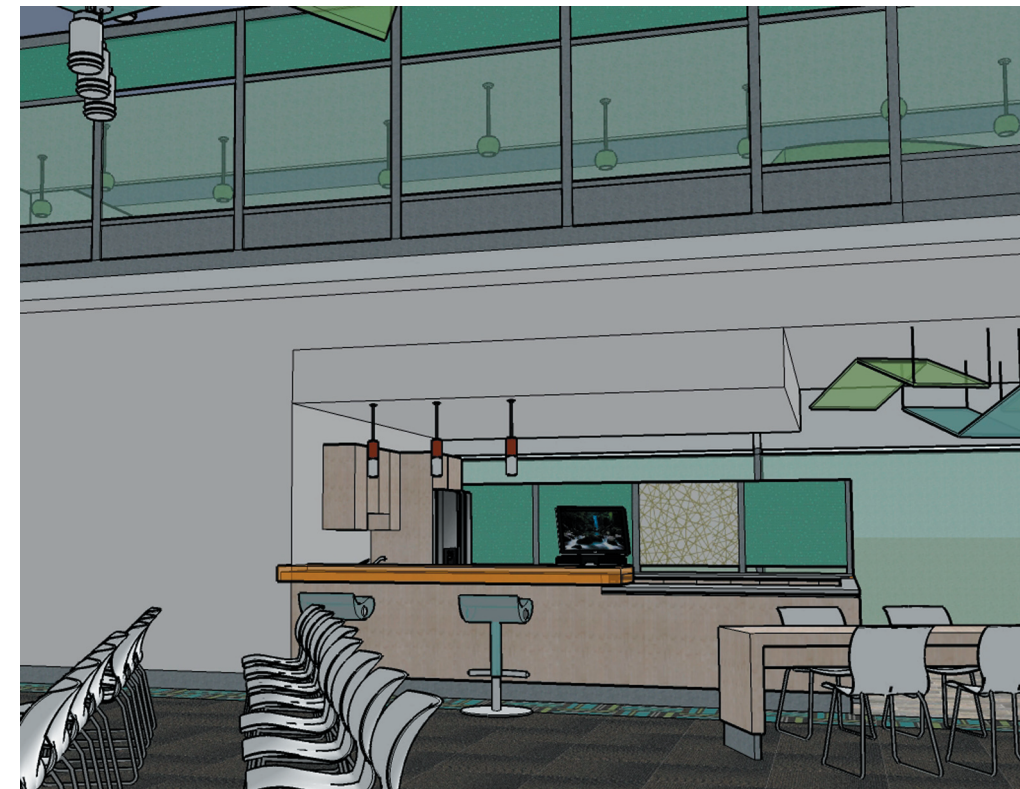


### Event Space & Stage: Multiple Uses

## Views of Main Floor Central Gathering Space

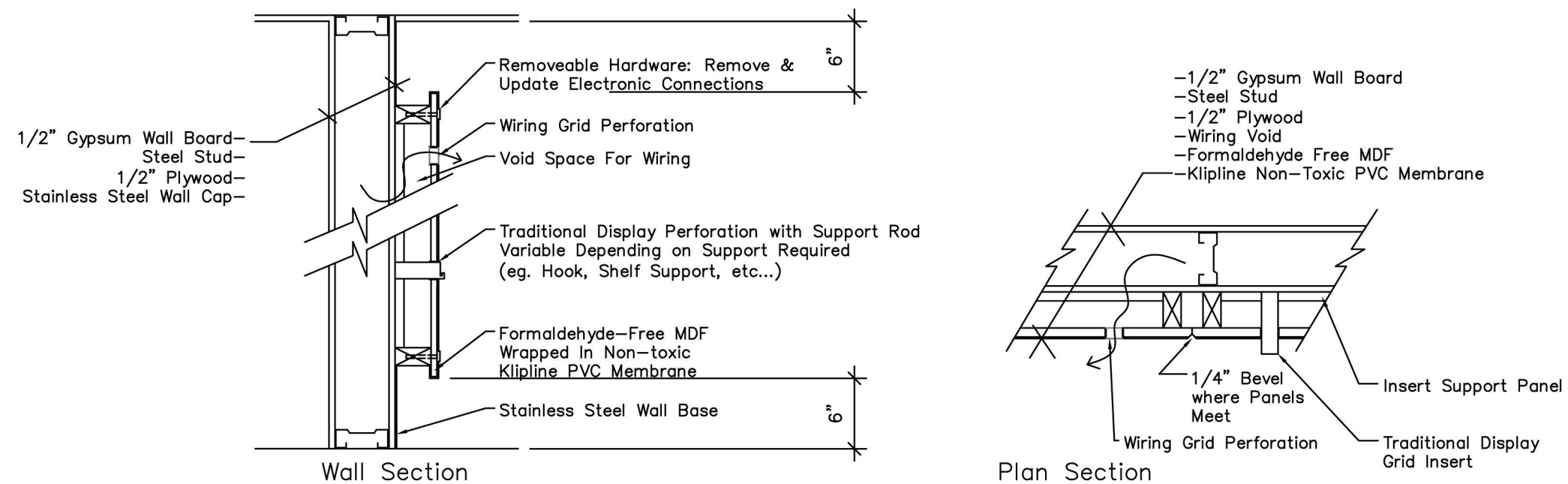


View Towards Project Space from Event Space

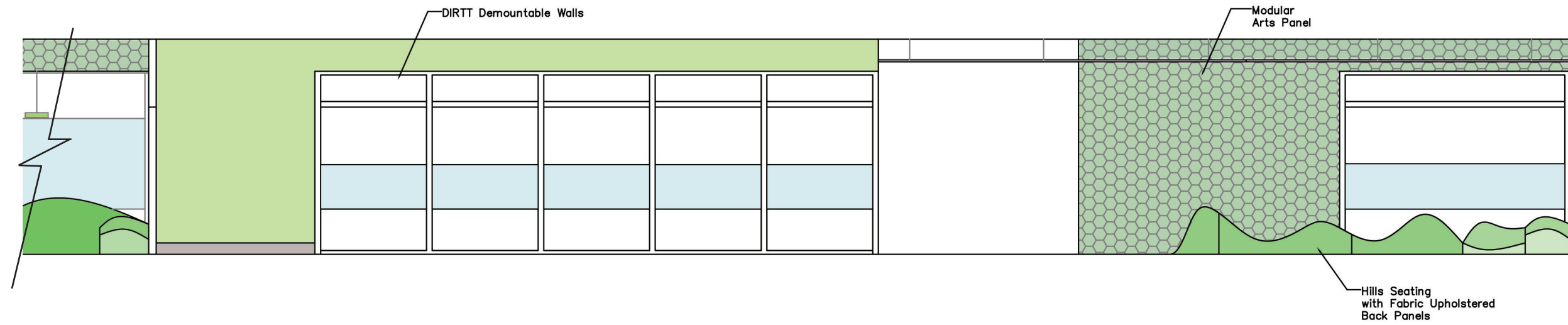
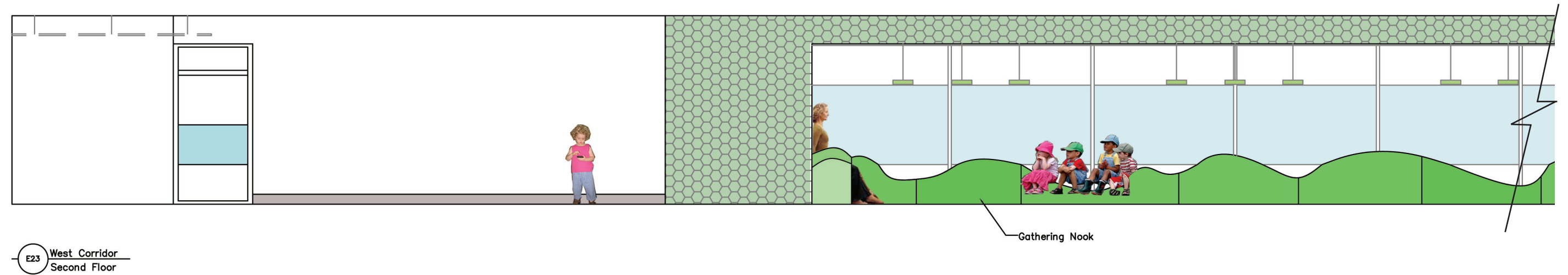


Kitchen Area in Event Space

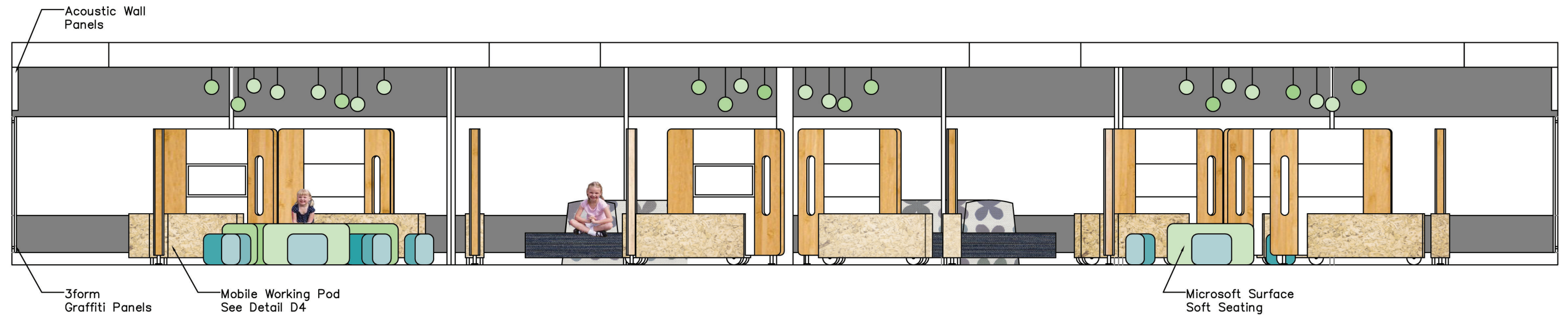
## Power Grid Wall Detail



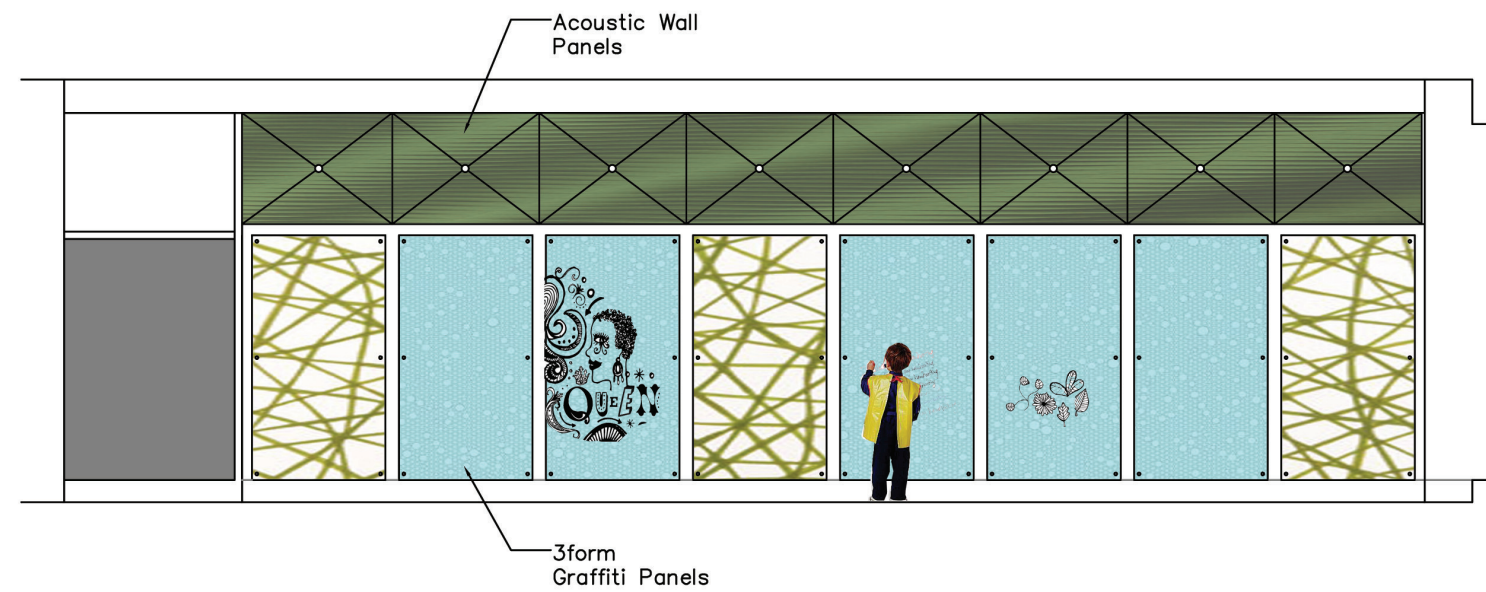
D1 Detail: Section Through Grid Wall Panel (Typical)  
Scale: 1"=1'-0"



Second Floor Corridor Elevation  
Scale: 3/16"=1'-0"



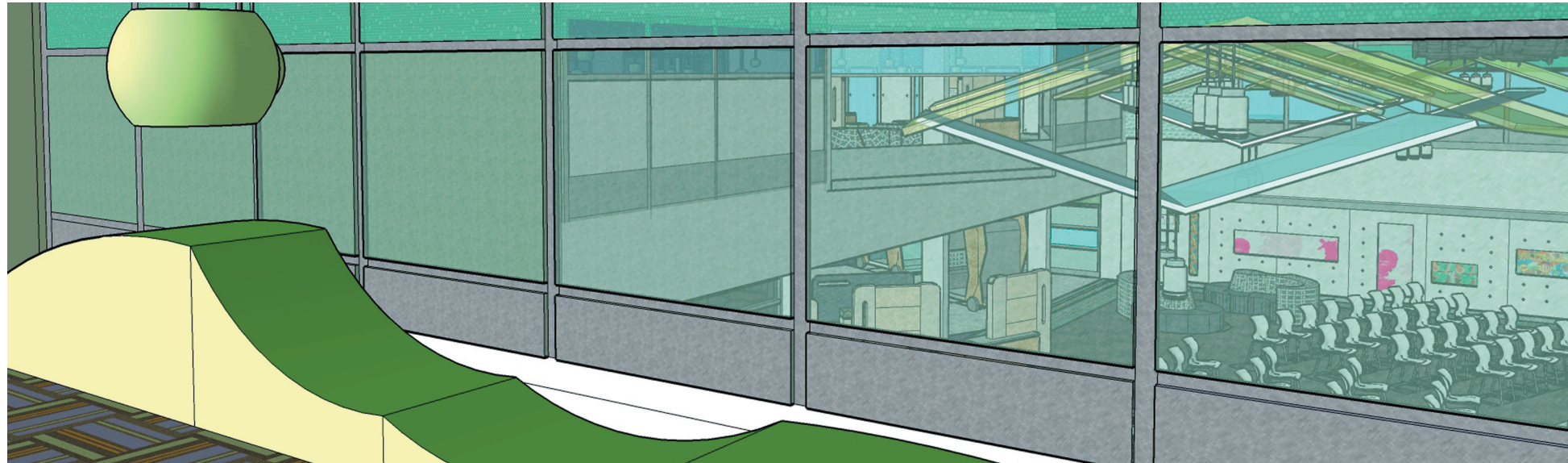
E24 Central Gathering: Lounge & Learn  
Second Floor



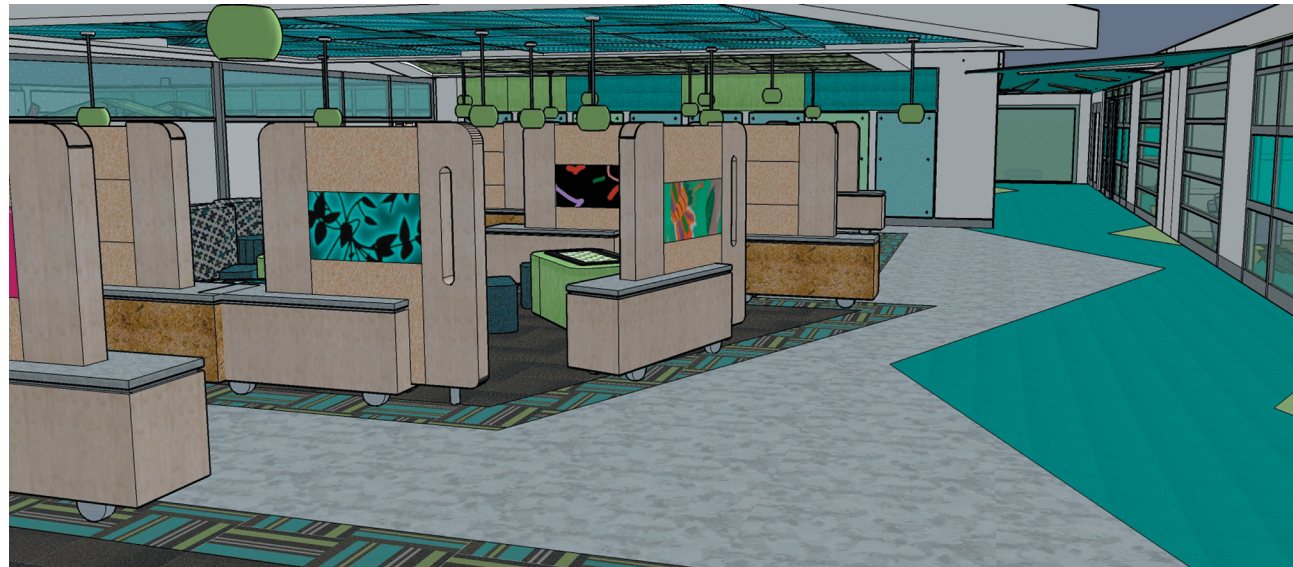
E25 Central Gathering: Lounge & Learn  
Second Floor

## Second Floor Central Gathering Elevations

Scale: NTS



View from Second Floor Gathering Nook to Main & Second Floor Central Gathering Spaces



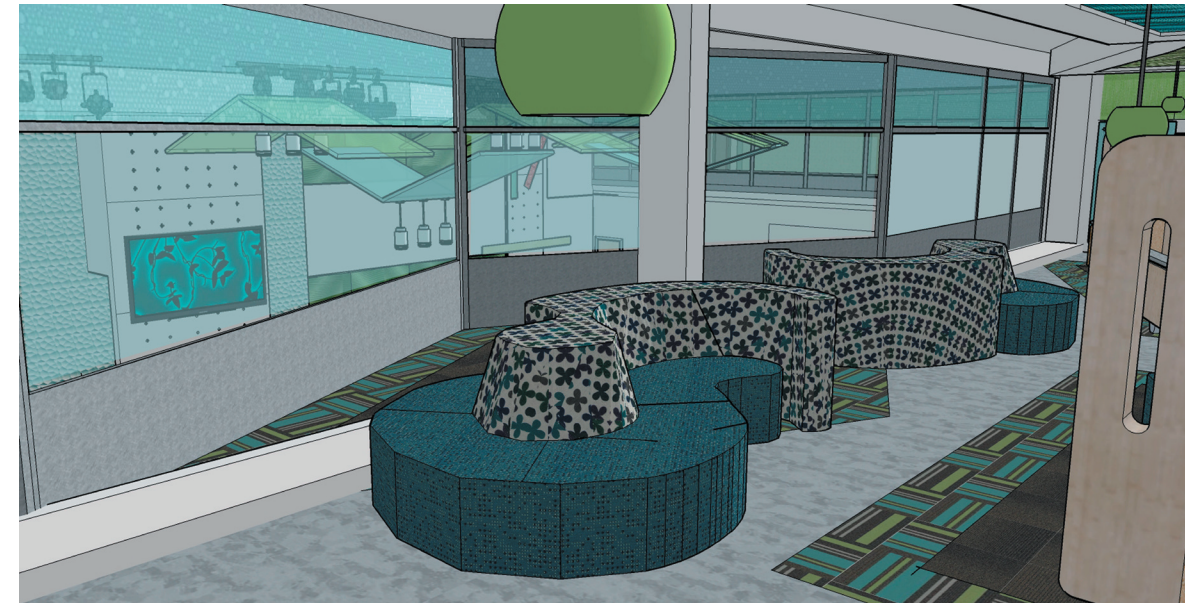
Second Floor Lounge & Learn Space



Microsoft Surface Soft Seating & Mobile Project Pods



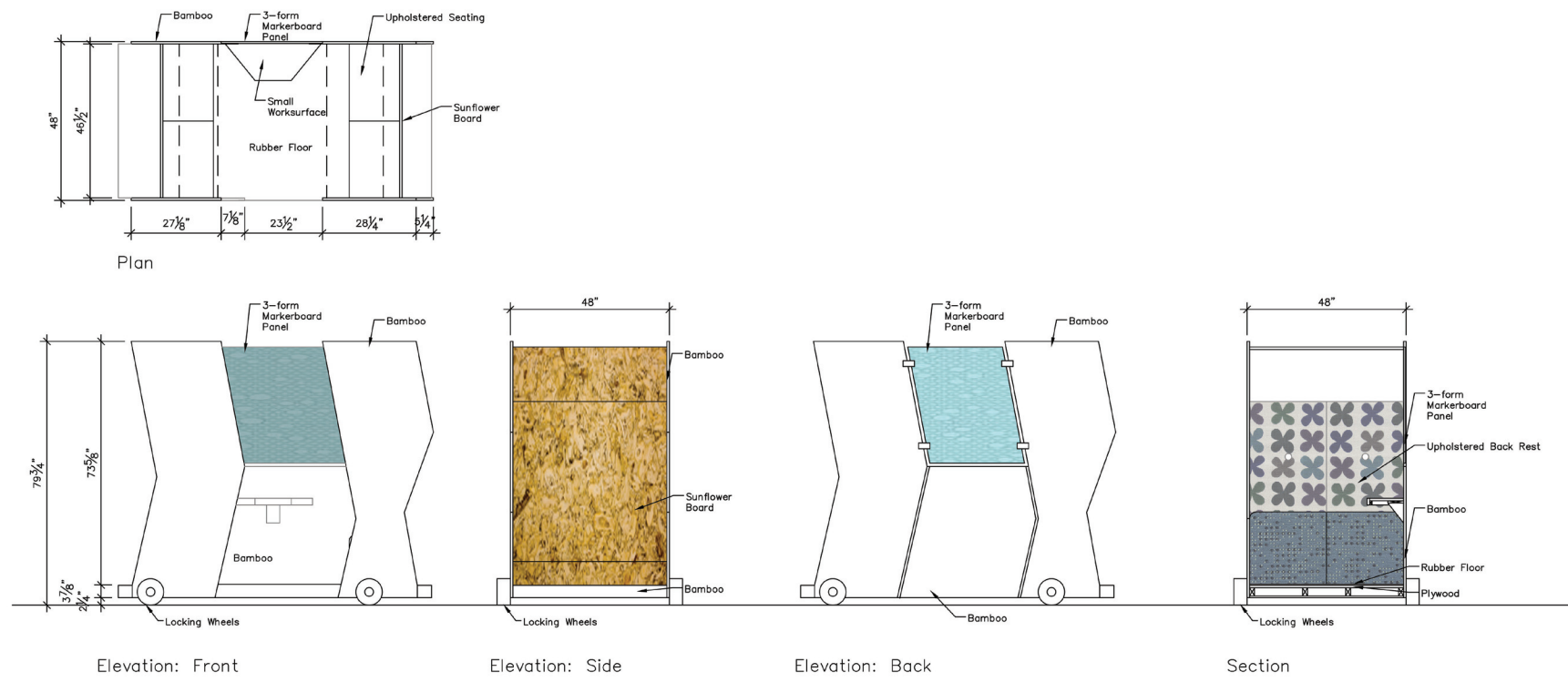
Graffiti Wall Panels & Acoustic Textiles



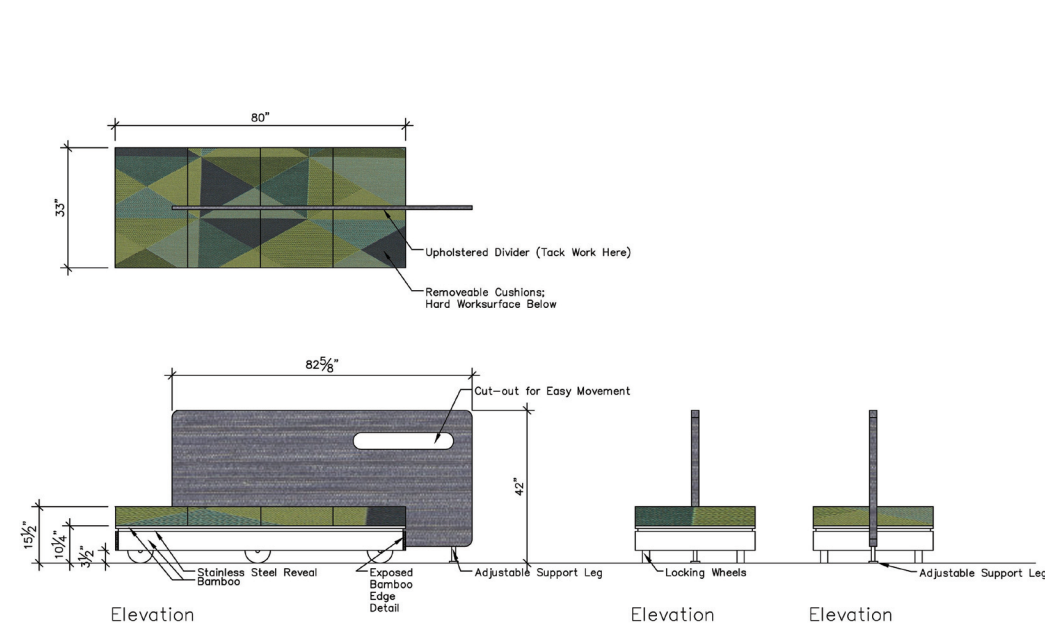
View from Second Floor Gathering to Main Floor Gathering

# Details

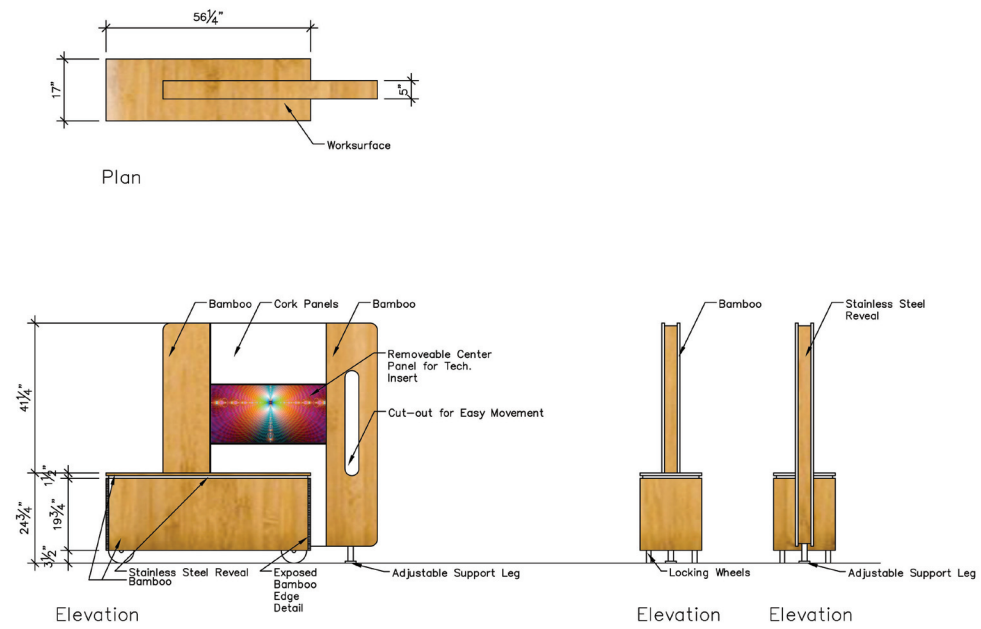
Scale: NTS



D2 Detail: Gathering Pod/Teacher's Station  
Scale: 1/2" = 1'-0"



D3 Detail: Working Pod Type A  
Scale: 1/2" = 1'-0"



D4 Detail: Working Pod Type B  
Scale: 1/2" = 1'-0"

# Furniture



Permission to use image not obtained



**1. Sorriso Chair**  
Atelier3  
Student Chair: Classrooms  
Permission to use image obtained on February 8, 2010  
©ISAFFsrl

**2. Liberty Task Chair**  
Human Scale  
Teacher Chair: Classrooms  
<http://www.humanscale.com>

**3. Chair Chair: Ebony**  
Bludot  
Stacking Chair: Family Room, Event Space  
Permission to use image obtained on February 2, 2010  
©Bludot

**4. Dome Chair by Sophie Larger**  
Play+  
Lounge Chair: Family Room, Classrooms  
Permission to use image obtained on February 8, 2010  
©Play+srl



**5. Hills by ZPZ Partners**  
Play+  
Landscape Chair: Corridors, Gathering Nooks  
Permission to use image obtained on February 8, 2010  
©Play+srl

**6. Isola 8**  
Nienkamper  
Lounge Chair: Main & 2nd Central Gathering  
Permission to use image obtained on February 3, 2010  
©Nienkamper

**7. Microsoft Surface**  
Microsoft  
Integrated into Soft Seating: 2nd Floor Gathering  
Permission to use image obtained on February 3, 2010  
©Microsoft



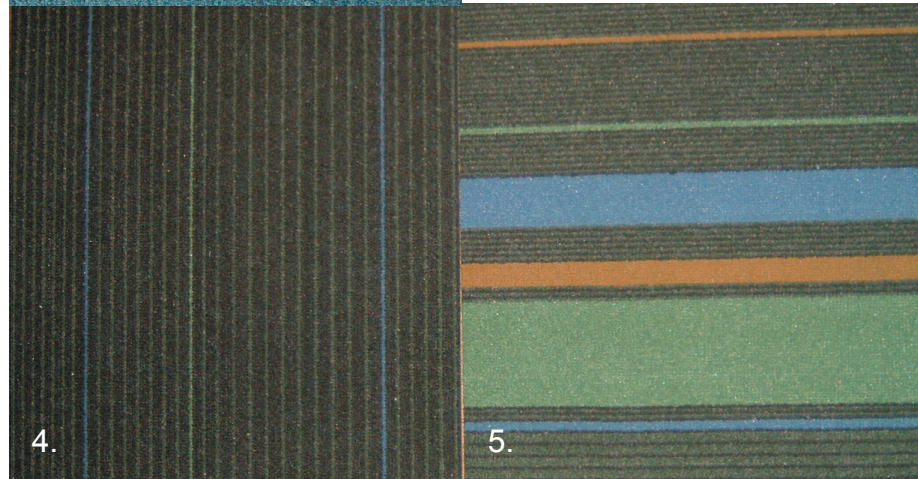
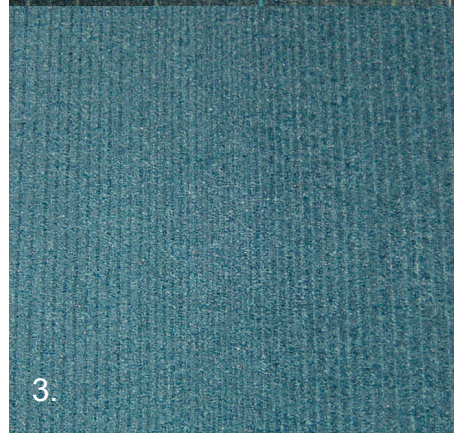
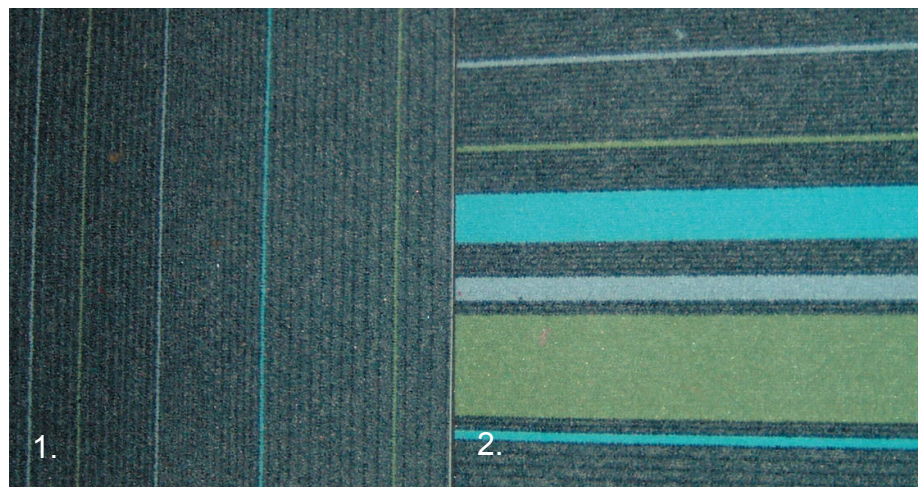
1. DIRTT Demountable Walls  
DIRTT  
Used Throughout  
Permission to use image obtained on February 4, 2010  
©DIRTT Environmental Solutions

## Furniture



2/3. Skyfold Classic Powerlift Partition  
Skyfold  
Operable Partitions: Classrooms, Main Central Gathering  
Permission to use image obtained on March 2, 2010  
©Railtech Ltd., Skyfold

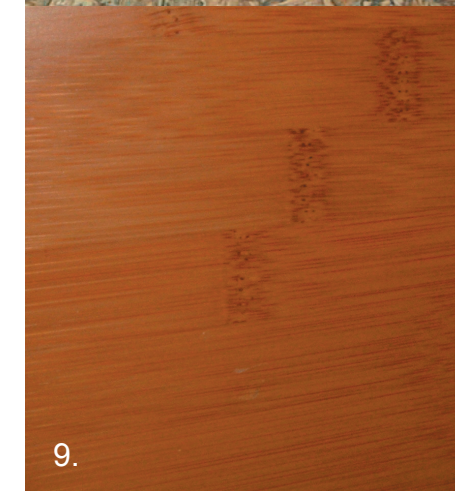
# Finishes



## Flooring



## Millwork



## Tabletop



**1.** Interface Carpet Tile  
Flatiron Collection; Pattern: 2nd Avenue; Colour: Canal  
Location: Reception, Family Room, Main Gathering (Event Space);  
Photograph by author

**2.** Interface Carpet Tile  
Flatiron Collection; Pattern: 3rd Avenue; Colour: Canal  
Location: Reception, Family Room, Main (Event Space) & 2nd  
Gathering; Photograph by author

**3.** Interface Carpet Tile  
Flatiron Collection; Pattern: 1st Avenue; Colour: Flannel  
Location: 2nd Gathering; Photograph by author

**4.** Interface Carpet Tile  
Flatiron Collection; Pattern: 2nd Avenue; Colour: Greene  
Location: Classrooms; Photograph by author

**5.** Interface Carpet Tile  
Flatiron Collection; Pattern: 3rd Avenue; Colour: Greene  
Location: Classrooms; Photograph by author

**6.** Roppe Rubber Flooring  
Main Colour Palette  
Colours: 633 Ginkgo, 606 Tropical Blue, M118 Peacock, 139 Deep Navy  
Location: Corridors, Classrooms, Main (Project Space) & 2nd Gathering  
Photograph by author

**7.** Johnsonite Rubber Flooring  
Neutral Colour Palette  
Colours: SLF Silversmith, 82 Black Pearl, APT Medallion, GGT Ironware  
& 2nd Gathering  
Photograph by author

**8.** Sunflower Board  
Location: Millwork  
Photograph by author

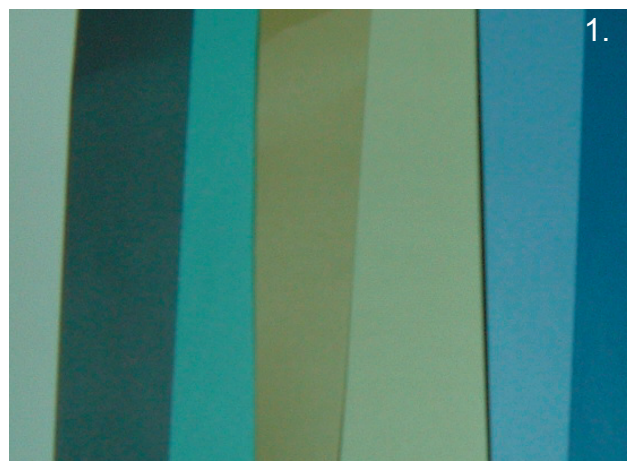
**9.** Bamboo  
Location: Millwork  
Photograph by author

**10.** 3 form Chroma  
Colour: Chroma Sea  
Location: Tabletops  
Permission to use image obtained on February 4, 2010.  
©3form

**11.** 3 form Chroma  
Colour: Chroma Vitamin C  
Location: Reception Desk, Kitchen Bar  
Permission to use image obtained on February 4, 2010.  
©3form

**12.** 3 form Chroma  
Colour: Chroma Cranberry  
Location: Various tabletops  
Permission to use image obtained on February 4, 2010.  
©3form

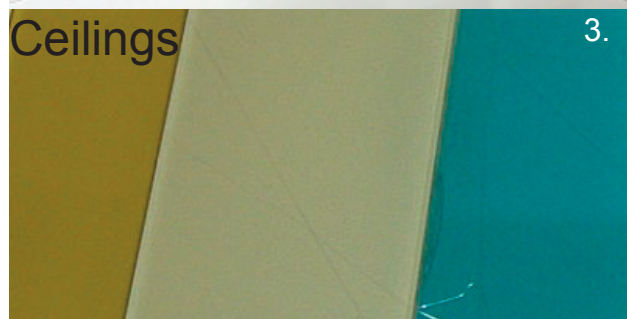
# Finishes



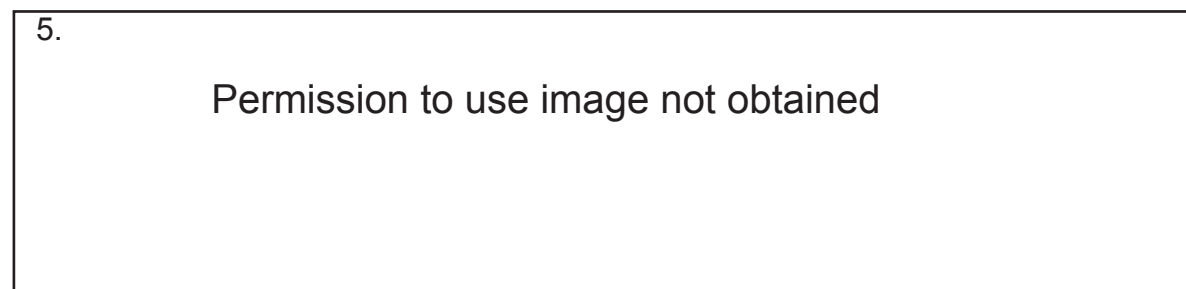
Walls



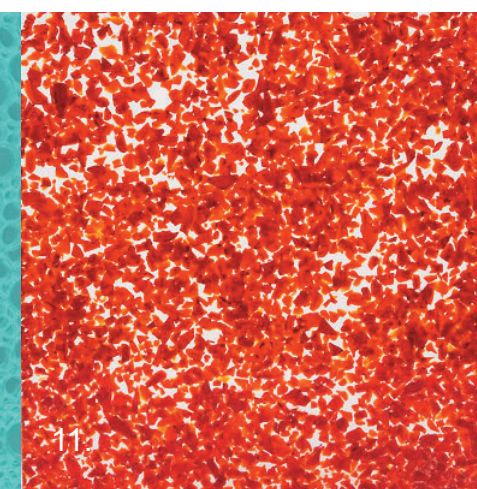
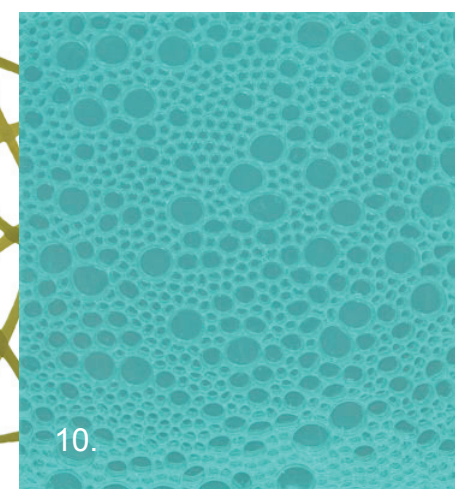
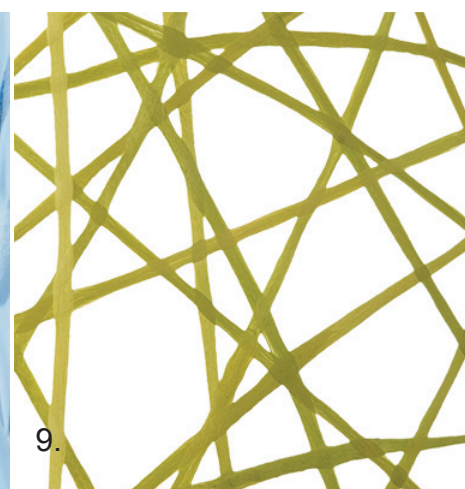
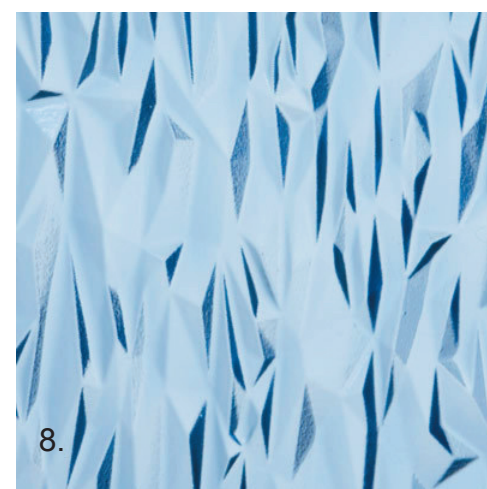
Ceilings



Fabrics



## Graffiti Wall Inserts & Textural Panels



**1.** Pratt & Lambert Paints  
Colours: Agate Gray POR-2213-000, Gettysburg POR-2242-000, Bounding Main POR-1318-000, Fennel POR-1667-000, Dried Moss POR-1666-000, Geneva Blue POR-1135-000, Shaded Climatis POR 1136-000.  
Location: Throughout  
Photograph by author  
**2.** Modular Arts Interlocking Rock Dimensional Wall Surface  
Pattern: Zelle  
Location: Corridors & Main Floor Event Space  
Permission to use image obtained on February 4, 2010.  
©2010 modularArts, Inc.  
**3.** Armstrong Accent Canopies  
Colours: Budding Creativity, Sage Happiness, Tranquility Teal  
Location: Classrooms, Event Space, Family Room, Kitchen  
Photograph by author

**4.** Maharam Fabrics  
Main Colour Palette  
Patterns: Current 006 Everglade, Even 002 Seedling, Crush 008 Ocean, Envelop 006 Biscayne, Cipher 012 Plume, Quatrefoil 004 Emerald  
Location: Throughout  
Photograph by author  
**5.** Textiles by Anne Kyyro Quinn  
Acoustic Wall & Ceiling Panels  
Location: Main & 2nd Gathering  
<http://www.annekyyroquinn.com/>.  
**6.** Maharam Fabrics  
Accent Colour Palette  
Patterns: Alphabet 002 Crimson on White (Wallpaper), Coach Cloth 009 Mars, Aria 016 Swerve  
Location: Throughout  
Photograph by author

**7.** Maharam Kvadrat Fabrics  
Neutral Colour Palette  
Pattern: Divina Melange 180  
Location: Throughout  
Photograph by author  
**8.** 3 form Varia Ecoresin  
Texture: Fractal  
Location: Integrated into DIRT walls  
Permission to use image obtained on February 4, 2010.  
©3form  
**9.** 3 form Varia Ecoresin  
Organics: Connection Envy  
Markerboard Surface  
Location: DIRT walls, gathering pods  
Permission to use image obtained on February 4, 2010.  
©3form

**10.** 3 form Struttura  
Fizz: Sea  
Markerboard Surface  
Location: DIRT walls, gathering pods  
Permission to use image obtained on February 4, 2010.  
©3form  
**11.** 3 form Varia Ecoresin  
Play: Crush Red  
Markerboard Surface  
Location: DIRT walls, gathering pods  
Permission to use image obtained on February 4, 2010.  
©3form

## APPENDIX C: SCHOOL-BASED RESEARCH & ETHICS

**LETTER TO PRINCIPALS OF POTENTIAL SCHOOLS PRE-SELECTION:**



**UNIVERSITY  
OF MANITOBA**

**Faculty of Architecture**

Department of Interior Design  
201 Russell Building  
84 Curry Place  
Winnipeg, Manitoba  
Canada R3T 2N2  
Tel: (204) 474-6578  
Fax: (204) 474-7532

February 19, 2009

INSERT NAME & TITLE OF CONTACT  
INSERT NAME AND ADDRESS OF SCHOOL

Dear Mr or Ms. ,

My name is Laura Bird, and I'm a final year Masters of Interior Design student at the University of Manitoba.

My final thesis/practicum project involves the participation of an elementary school in Winnipeg. I'm studying the relationship between elementary education and technology, and the ways in which the interior environment and the built-in technology of a school can be used as a learning tool, promoting interaction and preparing children for life in the twenty-first century. The final outcome of the project, assisted by research activities undertaken at a participating school, will be the conceptual design of a technology-influenced elementary school in Winnipeg.

I hope that by agreeing to participate in this project you will have the opportunity to contribute to my understanding of design for learning places and derive the benefit of seeing the significance of design in supporting your school's mission and vision. A copy of the completed work, which is being done for academic credit, will be provided to you.

If you agree to participate in this project you will be asked to allow me to carry out a number of research activities. They will involve interviews with several teachers to understand the current effect technology is having on the school environment and the lives of students and teachers.

In addition, I will undertake a group project with students. I will present to the children in-class, incorporating a brainstorming session and a small art project. All information collected will be kept anonymous, and no identifying information will be attached to project data. Consent forms will be provided for all participants.

I will be working with Professor Lynn Chalmers on this project. If you have any questions please contact Professor Chalmers at [REDACTED] or [REDACTED].

I appreciate your consideration of this project and hope that you may be able to assist me in obtaining real-world insights in my education.

Sincerely,

Laura Bird  
B.Env.D. (2004)  
Master of Interior Design Student  
Department of Interior Design  
Faculty of Architecture  
University of Manitoba.

**LETTER TO STUDENTS & PARENTS:**



**UNIVERSITY  
OF MANITOBA**

**Faculty of Architecture**

Department of Interior Design  
201 Russell Building  
84 Curry Place  
Winnipeg, Manitoba  
Canada R3T 2N2  
Tel: (204) 474-6578  
Fax: (204) 474-7532

July 24, 2009

John M. King School  
525 Agnes Street  
Winnipeg, MB R3G 1N7

Dear Parent or Guardian,

My name is Laura Bird, and I am a final year Masters of Interior Design student at the University of Manitoba. I am interested in conducting a research study with your child's summer CSI class.

My final thesis/practicum project involves the participation of an elementary school in Winnipeg. I am studying the relationship between elementary education and technology, and the ways in which the interior environment and the built-in technology of a school can be used as a learning tool, promoting interaction and preparing children for life in the twenty-first century. The final outcome of the project, assisted by research activities undertaken at your child's school, will be the conceptual design of a technology-influenced elementary school in Winnipeg.

If you agree to allow your child to participate in the research, they will be included in a group workshop directed by myself on the morning of Thursday, July 30, or Friday, July 31. I will be presenting to the children in-class, the outcome of which will be the creation a small art or drawing project. All information collected will be kept anonymous, and no identifying information will be attached to project data. Consent forms will be provided for all participants.

I will be working with Professor Lynn Chalmers on this project. If you have any questions please contact Professor Chalmers at [REDACTED].

I appreciate your consideration of this project.

Sincerely,

Laura Bird  
B.Env.D. (2004)  
Master of Interior Design Student  
Department of Interior Design  
Faculty of Architecture  
University of Manitoba

## STUDENT & PARENT CONSENT FORM:



UNIVERSITY  
OF MANITOBA

## Faculty of Architecture

Department of Interior Design  
201 Russell Building  
84 Curry Place  
Winnipeg, Manitoba  
Canada R3T 2N2  
Tel: (204) 474-6578  
Fax: (204) 474-7532

July 24, 2009

Student & Parent Consent Form

Research Project Title: A Digital Community: Elementary School Design

Researcher: Laura Bird

**This consent form is only part of the process of informed consent. It should give you the basic idea of what the research is about and what student's participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.**

University of Manitoba student, Laura Bird, who is currently in the process of completing a practicum/thesis as a requirement for her Master of Interior Design degree, is studying the relationship between elementary education and technology. She is studying ways in which the interior environment and the built-in technology of a school can be used as a learning tool, promoting interaction and preparing children for life in the twenty-first century.

On Thursday, July 30, and Friday, July 31, as part of the summer CSI program at John M. King School, students will be asked to participate in a presentation by Laura Bird. The approximately one-hour workshop will include brainstorming and a small art or drawing project which will be collected at the end of the session or the next day. Drawings will be returned to the students the following week.

Information gathered will be used to inform the conceptual re-design of John M. King School. All information regarding identification will be kept anonymous, and students will be identified in the project only by age and gender. Any photographs taken during the workshop will not include any identifying information in the final document. Only Laura Bird and her supervisor, Lynn Chalmers, will have access to information collected until it is analyzed and discussed in the final thesis/practicum. In terms of risks and benefits of the research, there are no risks to the subjects, or to a third party. All gathered information, as above, will be kept anonymous. Potential benefits include an increased awareness of the field of design and the creation of discussion and learning amongst students and teachers.

Once the thesis project is complete, feedback will be given to John M. King School in the form of a design package which illustrates the outcome of the design project. The package will display how information gathered impacted the final design. All data collected through the duration of the study will be disposed of by January 31, 2010.

**Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and give permission for the student noted to participate as a subject. In no way does this waive the student's or your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You or the student is free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your and the student's continued participation should be as informed as your initial consent, so you should**

**feel free to ask for clarification or new information throughout participation.**

Researcher: Laura Bird [REDACTED]

Supervisor: Lynn Chalmers [REDACTED]

**This research has been approved by the Fort Garry Campus Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122, or e-mail [margaret\\_bowman@umanitoba.ca](mailto:margaret_bowman@umanitoba.ca).**

**Research has also been approved by the Winnipeg School Division.**

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Participant (Student)

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Parent or Guardian's Signature & Date

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Relationship to Student

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Researcher and/or Delegate's Signature & Date

## TEACHER CONSENT FORM:



UNIVERSITY  
OF MANITOBA

## Faculty of Architecture

Department of Interior Design  
201 Russell Building  
84 Curry Place  
Winnipeg, Manitoba  
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Tel: (204) 474-6578  
Fax: (204) 474-7532

### School Staff Consent Form

Research Project Title: A Digital Community: Elementary School Design  
Researcher(s): Laura Bird

**This consent form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.**

University of Manitoba student, Laura Bird, who is currently in the process of completing a practicum/thesis as a requirement for her Master of Interior Design degree, is studying the relationship between elementary education and technology. She is studying ways in which the interior environment and the built-in technology of a school can be used as a learning tool, promoting interaction and preparing children for life in the twenty-first century.

In order to gather information, fifteen to twenty-minute interviews with teachers at John M. King School will be conducted. Information will be recorded by hand or type-written notes. No sound recording will be used. Questions will involve individual teacher's background, present teaching experience with respect to design and technology in schools, and what they expect or would like to see in schools in the future.

Information gathered will be used to inform the conceptual design of an elementary school in Winnipeg. All information regarding identification will be kept anonymous, and no identifying information will be attached to data, or indicated in project documents. Only Laura Bird and her supervisor, Lynn Chalmers, will have access to information collected until it is analyzed and discussed in the final thesis/practicum. At this time, as above, all information regarding identification will be kept anonymous.

**Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.**

Researcher: Laura Bird [REDACTED]  
Supervisor: Lynn Chalmers [REDACTED]

**This research has been approved by the Fort Garry Campus Research Ethics Board. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122, or e-mail [margaret\\_bowman@umanitoba.ca](mailto:margaret_bowman@umanitoba.ca). A copy of this consent form has been given to you to keep for your records and reference.**

\_\_\_\_\_  
Participant's Signature & Date

\_\_\_\_\_  
Grade(s) Taught

\_\_\_\_\_  
Researcher and/or Delegate's Signature & Date

## **Interview Questions: Principal & Vice Principal**

### **Elementary School Teachers & Technology**

#### A: Background

1. Tell me about your current position within the school.
2. How long have you been teaching?
3. What aspect of teaching is most important to you?
4. What are some of the daily challenges in your job that you face?
5. What is your perception of the neighbourhood around the school and the community's identity?
6. Does the school currently have any programs addressing students with different learning needs?
7. Tell me about programs, like inquiry-based learning, and any others that your school is currently working with.
8. Give me a brief description of student demographics or their backgrounds.
9. Does the school ally with anyone in the neighbourhood – share resources etc...?
10. Tell me about parent and community resources the school currently provides? Is the school used by the community after hours?
11. What are the approximate numbers of teachers and number of service staff?
12. What is the number of classes in each grade? What is the average number of students per class?

#### B: Everyday Life: Technology & Design in Social Environments

1. How does technology impact your work, and how has this changed since you began teaching?
2. What is your view of students' current levels of exposure to technology?
3. In your opinion, in a child's life, what technologies do they seem to experience first? Does the type of technology a child is familiar with vary greatly from grade 1 to grade 6?
4. What are your views on the current use and amount of technology in

society?

### C: School Design

1. What aspects of design are currently used in the school to encourage a sense of pride and a sense of place?
2. What aspects of physical design within the school are currently working well in terms of you performing your job efficiently and comfortably?
3. What aspects of physical design within the school allow for the creation of a positive learning environment for the students?
4. What aspects of physical design within the school are not working well?
5. Do you have an example of or experience with a positive instance of the integration of technology into the physical environment of a school or a learning place (ex. Museum, library)?

### D: Present Experience in Schools

1. Do you have a personal computer? Is it provided for work in the school, and/or do you use a computer at home for work?
2. Is the amount of technology-based learning and amount of exposure to technology in schools adequate in terms of preparing children for the realities of the 21<sup>st</sup> century? Why/why not?
3. Where is technology located, and how is it used to support the curriculum?
4. Do you think technology could be used to encourage creativity, teamwork, and pride in accomplishment? Do you have any examples?

### E: Future

1. Give an example, or examples of how you think technology could be integrated effectively and responsibly into your current school. Eg. Certain locations in school – concentrated, dispersed, peripheral?
2. Do you view technology as something that could be used to better connect students who are together in a physical classroom space, as well as possibly connect those who are at a distance?
3. Do you think technology could be better integrated with the curriculum, and specifically the subjects you teach, to increase

students' quality of education?

- What is the current relationship between technology and curriculum?
- Are there ways you would like to use technology that you are not currently able to?

4. What, if any, technologies do you think are detrimental to students' education?

5. What principle changes do you deem as necessary in order to improve current/past trends in school and learning environment design?

### **Interview Questions: Teachers**

#### Elementary School Teachers & Technology

##### A: Background

1. What class are you currently teaching?
2. What age group does that encompass?
3. How many students do you teach? And what subjects?
4. How long have you been teaching?
5. What aspect of teaching is most important to you?
6. What are some of the daily challenges in your job that you face?
7. What is your perception of the neighbourhood around the school?
8. How would you describe the school's identity?

##### B: Everyday Life: Technology & Design in Social Environments

1. How does technology impact your work, and how has this changed since you began teaching?
2. What is your view of your students' current levels of exposure to technology?
3. In your opinion, in a child's life, what technologies do they seem to experience first? Does the type of technology a child is familiar with vary greatly from grade 1 to grade 6?
4. What are your views on the current use and amount of technology in society?

### C: School Design

1. What aspects of design are currently used in the school to encourage a sense of pride and a sense of place?
2. What aspects of physical design within the school are currently working well in terms of you performing your job efficiently and comfortably?
3. What aspects of physical design within the school allow for the creation of a positive learning environment for the students?
4. What aspects of physical design within the school are not working well?
5. Do you have an example of or experience with a positive instance of the integration of technology into the physical environment of a school or a learning place (ex. Museum, library)?

### D: Present Experience in Schools

1. Do you have a personal computer? Is it provided for work in the school, and/or do you use a computer at home for work?
2. Is the amount of technology-based learning and amount of exposure to technology in schools adequate in terms of preparing children for the realities of the 21<sup>st</sup> century? Why/why not?
3. In what ways do you currently use technology to teach your students?
4. Where is technology located, and how is it used to support the curriculum?
5. Do students work individually, in groups, or both when interacting with technology?
6. Do you think technology could be used to encourage creativity, teamwork, and pride in accomplishment? Do you have any examples?

### E: Future

1. Give an example, or examples of how you think technology could be integrated effectively and responsibly into your current school. Eg. Certain locations in school – concentrated, dispersed, peripheral?
2. Currently, many schools utilize the appliance-based approach of technology and computers. Do you value the idea of a more seamless

integration in the classroom or other learning environments?

3. Do you view technology as something that could be used to better connect students who are together in a physical classroom space, as well as possibly connect those who are at a distance?

4. Do you think technology could be better integrated with the curriculum, and specifically the subjects you teach, to increase students' quality of education?

- What is the current relationship between technology and curriculum?
- Are there ways you would like to use technology that you are not currently able to?

5. What, if any, technologies do you think are detrimental to students' education?

6. What principle changes do you deem as necessary in order to improve current/past trends in school and learning environment design?