
A Journal for
Built Environment Strategies

Catapult Schools

Designing Schools for Student Success

K-12

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CatapultSchools.ca

We're launching CatapultSchools.ca, a thought leadership website, to explore how school design contributes to student success. We offer a platform to integrate educator priorities and perspectives with architects' ideas on how to shape school environments to serve these goals.

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About Catapult

We see buildings as strategic tools. We bring senior management together with architects to discuss how buildings can be shaped to enhance organizational objectives. Our work is a blend of publishing, needs assessments, and consultations.

It's time to have a fresh conversation about school design. What type of schools should we be building? What environments help students and teachers succeed? How should we shape schools to better serve communities and to engage parents? We hope this *Journal* is a good way to start the discussion.

We believe educators must have a voice in this conversation. You know that student success is more than test scores; it's about healthy, happy, motivated learners. The evidence is clear that school buildings can help or hinder that progress and we need your leadership and input to make sure we're moving in the right direction.

A school's environment, optimized for student and teacher success, will be an ongoing asset to any Board as they work to help students achieve. This is an opportunity to rethink what we are building: Is a school simply low-cost shelter? Or can it be a dynamic tool for educators? Help us rethink Ontario's school design.

Sincerely,



HOLLIS HOPKINS, PUBLISHER
CATAPULTSCHOOLS.CA

We shape our
buildings,
and afterwards

our buildings
shape us.

—Winston Churchill

Part 1

- /Why School Buildings Matter
- /An Educator's Roundtable
- /Architect's Toolbox
- /Conclusion: Built Environment Strategy



Why school buildings

Matter

Christopher Hume

The classroom isn't just a space in which we learn, it is a space *from* which we learn.

AS OBVIOUS AS THAT TRUTH MAY SOUND, it has been long in the learning. Indeed, education boards in Canada are more likely to focus on what things cost than what they're worth. Though that's not hard to understand in an age of official austerity, the fact is that if we value our kids, we must also value the schools they attend. If we are content to let them do with buildings where air quality is poor, lighting dim, and rooms feel isolated and oppressive, we are telling them they don't matter. By contrast, schools in healthy buildings are those in which students, teachers, and staff do better. It's that simple.

A perfect example is the Bridgepoint Health Care Centre, which opened in July 2013, in Toronto. The building is designed to give every patient not just a room but a room with a view. Fresh air is pumped throughout continually and connections with the neighbourhood are emphasized. Though the project cost a small premium, health experts say it will reduce recovery times by between one-third and one-half. In other words, buildings have a huge effect on those who spend time within their walls.

In Ontario, the progression of educational architecture is easily charted. To look at schools from the late nineteenth and early twentieth centuries is to see buildings that imparted a strong sense that what took place inside was held in the utmost seriousness. Architecture also situated these schools in a cultural continuum that dates back to ancient Greece and Rome. But clearly, school architecture of these by-gone decades served institutional, not individual, needs. Students entered the school on its terms, not theirs. Just as there were dress codes, there were architectural codes. Like other important civic buildings we knew schools were important because they *looked* it. A certain gravitas was inherent in the very arrangement of columns, stairwells, doors, and windows.

Today, of course, good architecture serves the individual not the institution. In the case of schools, that means students are the new object of the designer's attention. The personal discomfiture tolerated in earlier

“Students are the new object of the designer's attention. In the twenty-first-century school, students and teachers are the starting point for all design decisions.”

— Christopher Hume, Author, *Toronto Star*

times has gone the way of rote memorization. In the twenty-first-century school, students and teachers are the starting point for all design decisions. As attitudes to education have shifted in favour of self-directed learning, the traditional hierarchical structure of a classroom with desks facing the teacher has given way to a more informal arrangement. Interaction among students, once forbidden at the threat of the strap, isn't just allowed, it is encouraged.

Consequently, the model contemporary school is a place of open spaces that are comfortable, connected, filled with light, and deliberately part of the larger world beyond. Students, experts tell us, learn not by sitting at desks for hours on end but by exchanging ideas, consulting, talking, and moving around.

One of the first examples of this new approach, Glen Park Public School in Toronto, was organized around a courtyard garden and a library, which are the physical, social, and emotional heart of the building. Accessible through multiple entrances, the library can be expanded when necessary to function both as an intimate space of story-telling and gathering place for the whole school community. Designed in the late 1990s by two firms, Taylor Hariri Pontarini and Rieder, Hymmen & Lobban, the school was conceived with maximum input from students, teachers, parents, and neighbours. The underlying idea of the project was to create a building that both expressed and exemplified the notion of community. It is the opposite of the traditional school, which was a fortress-like centre of learning, the ivory tower, a place where the rest of us weren't welcome.

At Kuwabara Payne McKenna Blumberg's McKee Public School (1998) in Willowdale, the library also sits at the centre of things. Talking about McKee, the architects refer to the concept of a community of classrooms positioned around a central court using simple circulation systems, transparency and natural light.

Located in the middle of a low-rise suburban enclave, the two-storey building structure is straight-forward and

easy to navigate. Its glazed exteriors add a sense of openness and transparency that enhances the feeling of the school as an extension of the neighbourhood.

Thomas Wells Public School in Scarborough, the first LEED (Silver) public school in Canada, was commissioned by the Toronto District School Board as a sort of living demonstration project. The intention was to promote the idea that the needs of environmental design and education overlap effortlessly.

Once again, the building is arranged around a double-height library surrounded by south-facing classrooms, corridors, and courtyards organized in clusters. Inside, glass walls and interior windows mean the building is flooded with natural light. Designed by Baird Sampson Neuert Architects, Thomas Wells opened in 2005 and has since been recognized as one of the most important examples of twenty-first-century school architecture in Toronto.

Eglinton Spectrum Public School, completed in 1999, also offers a worthy re-examination of the elementary school. Designed by Teeple Architects in joint venture with Shore Tilbe Irwin, the L-shaped building sits on a busy corner in North Toronto. As a result, it looks inward, away from the street. Though that has been criticized, in this case, it was a valid response: pupils would otherwise be forced into a playground bordered by two heavily trafficked streets. Inside, however, Eglinton is as integrated as a building can be. With its interior windows—some of them portholes—pupils and teachers are always in contact.

Even beyond the realm of the public school, the trend toward openness and architectural transparency has changed everything from condos and community colleges to hospitals and office buildings. It's not just that we love glass, but that we long to be part of something larger than ourselves—the world. The appeal of bringing the outside in, of blurring the line between the natural and the man-made, runs deep. You don't have to go to school to learn that. 



Christopher Hume

Christopher Hume is an architecture critic and covers urban affairs for the Toronto Star. He moves beyond the condo to look at other forms of residential design in Toronto. www.thestar.com/authors/hume_christopher.html

Student Success: An Educator's Roundtable

School environments can be shaped so they contribute to student and teacher success. To design such a school, architects look to educators to identify what environment is most useful.

For this first issue, Hollis Hopkins, the publisher of Catapult Schools, explores how schools can be designed to realize student success. She conducted a series of in-depth interviews with some of Ontario's leading K-12 educators. The focus of the interviews (pages 8-13) is to understand how students and teachers need to think, feel, and act in order to perform at their highest level. In part two of this journal, we have asked top K-12 architects to share their perspectives on how schools can be designed to create these performance environments.



Hollis Hopkins

Hollis Hopkins is the publisher of the *Journal* and CatapultSchools.ca website. She is a founding partner at Catapult Inc. and conducts interviews and workshops with senior management as part of the Needs Assessment Tool, synthesizing research that informs the Built Environment Strategy. hollis@catapultinc.ca

Roundtable

Gerri Gershon
Warren Hoshizaki
Marguerite Jackson
Shelley Laskin
Sue Pfeffer
David Thomas



Gerri Gershon,
Trustee,
Toronto District
School Board



Warren Hoshizaki,
Director of
Education and
Senior
Management
Team,
District School
Board of Niagara



**Marguerite
Jackson,**
former CEO,
Education
Quality and
Accountability
Office



Shelley Laskin,
Trustee,
Toronto District
School Board



Sue Pfeffer,
Superintendent,
Toronto District
School Board



David Thomas,
Director
of Education,
Upper Canada
District School
Board

“This is about the whole child and spending more time on the physical, emotional, spiritual, and intellectual wellness of students. How do they relate to others and others relate to them? How are they doing as a person?”

— David Thomas, Director of Education, Upper Canada District School Board

Hollis Hopkins:

How do you define the notions of student success and achievement and what is the distinction, if any, between them?

Warren Hoshizaki/Senior Management Team: Every student has to have a measured starting point. If they are moving along the continuum, *that* is student success. Student achievement is the bar we set for everyone and we should always have a higher bar so students can keep reaching. Things evolve and change because students drive teaching.

Marguerite Jackson: Success and achievement can't really be separated that much because a child's sense of well-being in every dimension contributes a great deal to the likelihood that he or she will master these achievements. There are three factors: one, the teacher cares for and about me; two, the teacher helps and challenges me to learn things I never thought I could; three, the teacher has fun working with me.

Gerri Gershon: Student success is about helping students do their personal best, in school and in life. Schools are more than teaching kids math and history, it's also how to be successful human beings so they will want to continue learning the rest of their lives.

HH:

Focusing on academic success, list the kinds of thinking or cognitive skills you are trying to develop in both students and teachers.

MJ: One thing that contributes substantially to cognitive development is development of language and use of words. When children are in a language-rich environment the likelihood they are ready for school and can explore and thrive in other areas is much, much higher.

GG: Linked to that is communication and speaking publicly. This has always been important but is even more so now. Children also need to be open to different ways of thinking and looking at things. This is absolutely vital. We don't test for creativity or analytical thinking or common sense. We don't test for compassion and empathy but students with those skills may end up being the most successful.

Sue Pfeffer: If a student is learning to set goals for themselves and was completely unfocused before, then they have now acquired a life skill they can apply in any setting. A lot more attention is now being paid to how a student moves from here to there.

MJ: Many children come to school with advantages and it is our responsibility to demonstrate we have maximized on those advantages. If children come to school where they haven't had those supports and advantages then the orientation of the school has to be towards helping those kids get it. It isn't because they don't have the ability—they simply haven't been in the right circumstance and environment.

Shelley Laskin: Student achievement is defined by the skills students are going to need—and it's not just by

“Schools have to provide the skills students need to be successful and the spaces needed to support those skills.”

— Shelley Laskin, Trustee, Toronto District School Board

being the smartest kid in the class or getting good marks. Schools have to provide the skills they need to be successful and the spaces needed to support those skills. It is not always going to be in a book or through a lesson in a classroom. Kids are so smart and capable. Schools need to ignite all these ways of thinking, especially creativity, the root of academic success.

WH/SMT: There has been a shift too on how students demonstrate their learning. It used to be that everyone did the same project. Now the measure is what your skill set is and how is the best way for you to show me your learning and your thinking. We are developing critical thinkers and that's what matters. Some will use technology to show their thinking and others will use the opportunity to show us through a creative arts aspect. A good teacher will give them all of those ways of demonstrating it.

HH:

Technology has had a profound impact on the education system. What has changed about how we need to think to be successful in the twenty-first century?

SP: We have to use technology to support the way kids learn today and not the way we learned in the past. For instance, they memorize very little. They no longer have to when they can find it out in seconds. However, learning to discriminate and how to decide whether content is factual or not is the real learning. We want that kind of critical and media literacy. What can they find out to balance perspectives so they can make better decisions?

SL: Many kids would choose a phone over just about any other necessity. It's not about status; it's about connectivity and it's social. They need to make these connections so we have to be more flexible and transformative in our thinking about schools. The challenge is, we don't truly know what we are building for.

WH/SMT: Continuous learning for everyone in the organization is really important and technology is at the heart of this. We are in a dynamic, changing environment and we must change along with it and be progressive, innovative, and on the front edge of things. Technology is no longer an add-on or a spot on your timetable but rather a tool you use in everything you learn and teach. Staff has to have an understanding and the capacity to use it so they can engage quickly. When kids ask questions, they can say “let's look that up” instead of “let's move to the lab and boot up that machine; it'll be about 15 minutes class, but we'll get to it.”

David Thomas: Teachers must convert their imperative to that of a co-instructor of new knowledge. We are moving to a coaching model where a teacher spends more time dealing with the ethical, moral, and character issues of learning than the information itself. Teachers will play an important role in setting up a more purposeful and meaningful learning community wherein the learner has the ability to negotiate who they are going to learn from and whether you are meaningful and relevant. When teachers lose their relevance, this generation will get their information through Google.

“Absenteeism is a significant cost to our success and is a direct result of stress-related conditions for both children and staff. Our people resources are our biggest asset and we need to nurture this”

— Sue Pfeffer, Superintendent, Toronto District School Board

HH:

How do you activate and nurture a desire to learn?

MJ: Children need to be actively engaged in doing things when they are learning and they will learn as a result. The classroom needs to be set up in such a way that the child is increasingly doing work on their own—and this is not by sitting—but by probing, enquiring, finding out. We must make sure the program and environment is engaging, fun, and demonstrative so children are actively engaged and are making the journey of learning we want them to.

DT: But where and how they learn are linked. They should be able to match and manipulate their physical environment to how they take in information. I am a pacer, but in a typical grade three or six classroom that behaviour is not encouraged. My CFO would prefer to close his office door, put the head phones on, and focus on his work. My Associate Director would gather a team of four or five other people to problem solve. Kids would enjoy and thrive if they had those different types of learning but I’m not sure the typical classroom gives that opportunity.

SP: Students *and* teachers need to feel empowered and that they have some control over their day and how they are going to learn and teach. There has to be choice. How is it relevant, what is the life application, is there an “aha” for student and teacher? If teachers and students are empowered to have that broad conversation you will have things come out you never dreamed of. Teachers have to have confidence that they can let go and that their students know or noticed more than they did.

HH:

What about emotional well-being? How do you want students and teachers to feel at school?

SL: We want them to *feel* success, even more than getting 90%, to come to school and go home feeling happy.

DT: We all want kids to read and write, but let’s also identify new measures that identify that they are doing better. We have the highest rate of childhood anxiety. We are medicating kids in grade two for anxiety disorders that we never had before. Let’s become a bit more sophisticated in terms of accountability and what we are choosing to measure to see if a child is thriving. Physical, emotional, intellectual, and spiritual safety—the essence of their soul. If we can provide this they will thrive and be the ones who cure cancer and solve hunger. Why? Because we told them they can! But they should also have the emotional strength to be resilient and persevere in the face of failure.

GG: You want students to feel safe and comfortable, physically but also psychologically. That they can say things that they are not teased about, can express that they don’t understand something. I want teachers who will say, “If you don’t understand something then please give me another chance. Tell me what you don’t know so I can try again.” This puts the onus on the teacher and not the child.

MJ: They know that’s where they want to go because that is where they want to explore with a sense of anticipation. We also need to hear, see, and be reminded about what is great about being a teacher and why it is so much fun. What do I love about working with children and what do I see children do that really gives me joy. Reframe the conversation.

“We have to value physical health as much as academic achievement because one contributes to the other.”

— Shelley Laskin, Trustee, Toronto District School Board

DT: Yes, it’s got to be fun to be there—I think Google will fire a person for being too serious. The lateral thinking that goes along with play is so critical. Kids are learning when they are at the sand table and by playing dress-up. They are learning about gravity and placeholders. Somehow, that has to become the grade 12 physics room too. The notion of play ended when Dewey and Ryerson established straight rows in trying to control the learner for the industrial age. Design of the learning environment will be critical if we break this notion. We should try to control the outcome, not the learner.

SP: But sometimes it’s the physical environment of the school itself. There were schools I walked into and I felt instantly depressed—the dark post-war set up with very few windows and long corridors. In other schools I would feel completely uplifted and the light was fantastic. There are some that just have a prison feel. That kind of environment is just so unhealthy but if you walk in as a self-reliant, confident, well-rested little being, you could probably be in the basement and do fine. However, the majority of our kids are not like that so they need that nurturing feel around them.

HH:

What are some of the factors that can detract from their emotional well-being?

SP: People burn out when they have lost all influence and control. And we see little kids show signs of stress all the time. Adults carry around an inordinate amount of stress, which kids feel. If I am a super stressed parent doing a demanding job, the day I flew out the door snapping at my kids to hurry up, I knew they didn’t have a good day. This speaks to the importance of helping kids develop their network early. Who can they count on? I think our teachers also need that support. It is a very lonely job if you aren’t taught to do that.

MJ: More teachers are talking about mental health and emotional issues around children not having self-control. Perhaps children being on their own at home more or having more unstructured time where they don’t have the adults who help them shape those boundaries. It becomes an issue for teachers if they have one or two children like that because they really can hijack the class. How can they manage children who can’t manage themselves?

HH:

How important is health and overall physical comfort and well-being to a student’s academic performance?

SL: Health is their overall mental and physical well-being—that preparedness to learn. We have to value the physical health attributes as much as the academic achievement attributes because one contributes to the other. It went from not even including it to now at least saying the words “student achievement and well-being.” Now we have to demonstrate that we actually care about a student’s well-being.

WH/SMT: To do this you also have to at least provide the basics—temperature control has a huge impact on the learning environment. Acoustics can be a challenge. Kids can’t learn if they can’t hear or concentrate. Good air quality is important. These considerations all play a key role in our ability to do our work effectively.

GG: Physical comfort is always important. Most people want to be in a room with a lot of light.

“The single most important thing the education system must work on is relationship building at every level and with all stakeholders.”

– Shelley Laskin, Trustee, Toronto District School Board

SL: There has to be opportunities to decompress and have some downtime to sit quietly or run around and scream and yell. Addressing physicality has to be a part of their entire day, not just 20 minutes of mandated physical activity. That is why we need to move away from sitting at a desk for 60 minutes, then a 15-minute break, then sit quietly through lunch. We encourage activity in kindergarten so why do we stop it in grade one and say, “Now it’s time to learn so you have to sit in one place.” No they don’t!

MJ: We have had ourselves jarred about the physical activity piece. Because there is so much sedentary activity on behalf of society generally and with children certainly in terms of TV and technology. You hear a lot more about needing children to get physically active. It is something we have slid behind on and it should absolutely be given more attention.

HH:

What are the issues you face in ensuring a health-focussed environment?

WH/SMT: There is a mandate to provide daily physical activity but if you only have one gym there is a timetable challenge. We have to look for other opportunities to engage these kids physically. For instance, how do you engage students outdoors? We have been having a lot of discussion around the fact that we have lots of buildings and no playgrounds. How can we move from the traditional playground structure to creating an outdoor learning space for activities that don’t just happen within the four walls of a building?

MJ: We have to help kids stay healthy because levels of absenteeism negatively impacts a child’s success. People think the child is only in kindergarten, it doesn’t make

a difference, but it does. A young child is probably even more vulnerable than adults with coping skills. They miss a day of kindergarten because they are sick and something new has been started, they don’t know how to orient themselves back in and it takes a very skilled teacher to help them do that.

DT: We want kids to read and write yet we have the most obese kids in the last 100 years. We have for the first time in history, kids who have diabetes at age 10 because they are 60 to 80 pounds overweight. Our grandchildren’s life expectancy is shorter than ours. We have moved to testing their physical condition because we know that a physically fit person who feels confident about themselves will probably outperform someone who is 35–100% above their [ideal] body mass. They have to be confident that they can physically take on the activities necessary to move to the next level and have the energy to get through the day. We want them to feel comfortable in their own skin.

HH:

It seems there has been a real move to focus on the individual and her or his needs. Is there still a directive to help students have a more external perspective?

MJ: The goal of public school is for children to become responsible, participating citizens. Coming to school is not just about sitting with paper and pencil or computers but that the environment that you create is a learning one that allows for the development of a young person who understands what it’s like to live

“We have to facilitate their ability to have good relationships. That they can relate well to people and people relate well to them is really, really important.”

– Gerri Gershon, Trustee, Toronto District School Board

amongst other people and contribute to a community of other people.

SL: Students’ learning environment is our teaching environment. The single most important thing the Board and education system must work on is relationship building at every level and with all stakeholders. In doing this we show that we value diversity, inclusion, and collaboration. If you have developed a relationship with someone then you have mastered much of the skills you will need to be successful.

WH/SMT: Learning is social and we sometimes struggle with getting those spaces where we can get a group of 3 or 5 or half the class to learn together. And this is true for staff as well. If you are in a big rectangle space it is hard to reconfigure for learning off all kinds.

SP: They need skills to build a network of supports. This goes back to the need to build better relationships between home and school. As a parent I believe my child is the most important one in the class and the child believes that too. The damage is they fail to make connections with the other kids. We need to intentionally teach emotional intelligence, and as a teacher I also need to have those skills.

SL: We also have a responsibility to help them to socialize safely and respectfully. They are socializing but they don’t even know who they are socializing with. Help them know the boundaries so they can set limits for themselves. We should care much more about *how* they use their phone rather than *that* they use their phone.

GG: We have to facilitate their ability to have good relationships. That they can relate well to people and people relate well to them is really, really important. If they don’t have a good relationship with teachers or are being rejected by friends and peers, it is hard for them to learn.

DT: We think that little Joey’s reading ability is more important than his ability to work with others in the classroom. They brought 7,000 scientists together to put the man on the moon. I am not sure that our kids have

those collaboration skills now. How do I work with you and how do you work with me?

HH:

Where do external stakeholders like parents and the community at large fit in?

MJ: We want an environment that establishes and promotes a symbiotic relationship between teachers, students, and families but it can be difficult to find the easy partnership with parents. Some of that is the city-based urban environment. There is a lot of anonymity and so where schools would have been really integrated into the community at large, you now have to have staff and school leadership work very hard to make that happen.

WH: We want students *and* their families to feel welcome and have a sense of ownership. When you think of neighbourhood primary schools, kids are walking in with parents. We want to promote parent engagement but where is that place for parents to meet other than to huddle outside of the kindergarten gate because principals often don’t want parents congregating?

SL: Schools matter. They are community infrastructure and they should be thought of as importantly as firestations or police stations. The Board will only be as good as its local schools and local schools will only be as good as how they engage with their parents and their community. 

See Part 2: “How School Design Can Impact Student Success” to learn how Architects address some of these key issues.

Architect's Toolbox

Good design is not more expensive; It's more thoughtful.

Good design is thinking design. Architects consider a multitude of factors and make use of the tools and principles outlined here to shape buildings. When these factors are optimized, buildings not only function well, they have a positive effect on their occupants and their environments.

For more information and research on how buildings work and about these tools, go to www.CatapultSchools.ca

1 / Air Quality

Clean air is vital to good health. However, biological and chemical contamination can have a negative impact. Mould can damage structural materials and cause respiratory problems (especially in children). Long-term exposure to chemical contamination can cause irritation, induce allergic reactions and even affect the central nervous system. Chemical contamination can be caused by certain construction materials, finishes, and cleaning products. To avoid air quality problems, select building materials that offer low chemical emission rates and allow for good ventilation. The resulting decreased levels of carbon dioxide has been shown to increase the speed at which students complete tasks.

2 / Lighting

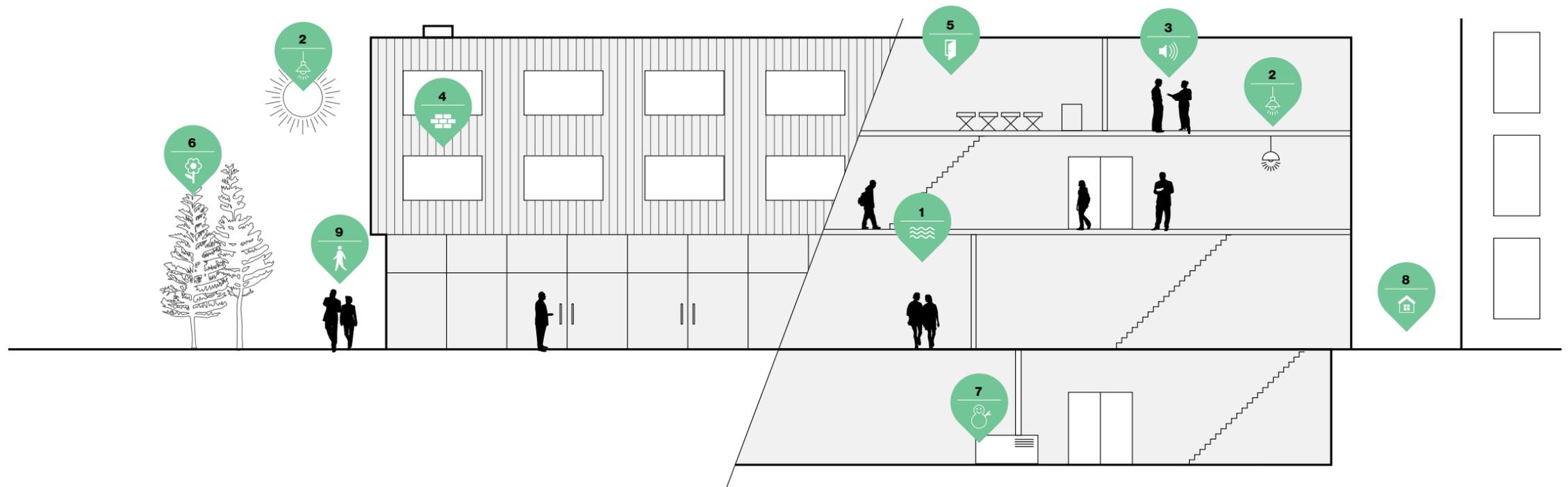
Architects measure lighting – illuminance – as the amount of visible light spread over a given area. It is measured in "lux" with a typical classroom having an illuminance of 300 to 500 lx. Daylight from more than one orientation and artificial lighting options should be combined to ensure vivid colours and well-defined objects. Illumination that is consistent and evenly distributed is integral to a usefully designed classroom. Good lighting is crucial to learning and studies have shown that daylight is particularly beneficial. Natural light helps students maintain a healthy circadian rhythm, which encourages healthy sleep patterns. A lack of daylight, meanwhile, can delay production of cortisol, a hormone that helps students concentrate.

3 / Acoustics

There are two acoustic elements that influence teaching and learning: ambient noise and reverberation. Excessive ambient noise – the amount of noise created by everything but the teacher's voice, including noise from outside the classroom – can make it difficult for students to understand and absorb information. A classroom that reverberates sound, or echoes, can also compromise speech intelligibility. A teacher's voice should ideally be at least 15 decibels (dB) louder than all other sounds in the classroom – a measure known as the signal-to-noise ratio. A number of studies conducted over the past ten years have shown that excessively noisy classrooms can impair students' concentration and make reading and memorization more difficult.

4 / Materials

Materials are all the physical components that make up a building. Durability, as well as use and maintenance costs, are key factors in choosing building materials. The durability, inexpensiveness, and flexibility of concrete make it a popular choice in school design. Sustainability is also a factor. Valuing materials that use fewer natural resources and result in less energy consumption. Well-chosen materials and colour choice can inspire students' imagination and intellect, and can even improve the learning environment. Materials that absorb sound, for example, can make for quieter classrooms that are more conducive to learning.



5 / Spatial Organization

Consider both the organization of individual classrooms and overall school layout. Rooms should allow for flexible seating arrangements to facilitate class discussion as well as quiet study and group work, ideally leaving about 10 square feet of space per student, plus circulation space. High ceilings ensure the diffusion of noise and light and reduce distractions. The teacher's desk should offer a clear view of the class and displays. School layout should encourage interaction with areas that relate to one another creating logical transitions between spaces. Research indicates that good spatial design can improve student behaviour and concentration, encourage productive class discussion, and make for more efficient and effective teaching.

6 / Biophilia

Biophilia hypothesizes that humans have an innate affinity for the natural world. Indoor plants can decrease the severity of symptoms of illness, improve air quality by filtering pollutants, and enhance mood. In the classroom, even a small assemblage of plant life can improve students' concentration, attention to detail, and overall performance. Indoor plants can also reduce fatigue, resulting in more engaged and effective teaching and learning. Equally important is observation of and interaction with the natural world outside of the classroom. For example, rooftop space and school grounds can be fitted with structures that attract birds and butterflies. The school site should include trees and other plant life.

7 / Thermal Conditions

Temperature, measured in Celsius (C) or Fahrenheit (F), and humidity, expressed as a percentage, are the most important elements comprising a classroom's thermal conditions. A classroom's temperature should be moderate and relatively constant – ideally ranging from 20–23C (68–74F) – and its humidity should range between 40 and 70 per cent. In these conditions, students thrive, performing tasks more quickly and with greater accuracy than when thermal conditions fall outside the given ranges. Research has also shown that teachers feel they perform better when they have some measure of control over their thermal environment.

8 / Context

Architectural context can be considered in three ways: the relationship of a building to its natural surroundings, to its built and cultural surroundings, and to its contents. A well-designed building exists in harmony with its setting, neither blighting or unduly altering the natural landscape, nor differing too greatly in height, size, or style from the buildings that surround it. Contextually aware buildings include design elements that symbolize their function and cultural backdrop. A school building that works within its context allows students to appreciate their place in their built, natural, and cultural environment, while providing them with a distinct sense of purpose within that environment.

9 / Site and Scale

Site and scale describe the way a building fits into its surroundings from a physical and technical, rather than aesthetic or cultural, point of view. Considerations may include the positioning of windows based on the views they offer and the type of lighting they provide, existing infrastructure (the proximity to highways, major arterial routes and public transit, pedestrian accessibility, etc.), and the environmental impact of construction. An accessibly sited school, for example, may improve attendance and reduce student and teacher fatigue by shortening commutes. An appropriately scaled building, meanwhile, can help to instill in students the importance of environmental responsibility.

Conclusion: The Built Environment Strategy

Given what leading educators value (An Educator's Roundtable pages 6-13), Catapult asked five architecture firms how they would optimize a school. Each firm tackled a specific objective, featuring a recent school project to highlight the many ways that a school environment can be a tool for success. Learn more at www.CatapultSchools.ca

Physical Health

Pages
20-23

“We have to look for other opportunities to engage students physically.”

– Warren Hoshizaki, Director of Education and Senior Management Team, *District School Board of Niagara*

ZAS Architects
Promoting Healthy Living and an Active Lifestyle

– Paul Stevens, Senior Principal

Relating to Others

Pages
24-27

“We want an environment that establishes and promotes a symbiotic relationship between teachers, students, and families.”

– Marguerite Jackson, former CEO, *Education Quality and Accountability Office*

LGA Architectural Partners
Building Successful Connections

– Brock James, Partner
– Greg Latimer, Partner

Emotional Strength

Pages
28-31

“This happy sense of well-being and anticipation comes from the sense that you will be physically and emotionally safe.”

– Sue Pfeffer, Superintendent, *Toronto District School Board*

+VG Architects
Building the Whole Child

– Terry White, Partner
– Tom Wilson, Associate Partner

Relating to Others

Pages
32-35

“We have to facilitate [students'] ability to have good relationships so they can relate well to people and people relate well to them.”

– Gerri Gershon, Trustee, *Toronto District School Board*

Snyder Architects Inc.
Enhancing Social Relationships

– Avinash Garde, Principal
– Doug Snyder, Principal

Emotional Strength

Pages
36-39

“We want them to *feel* success, even more than getting 90%, to come to and go home from school feeling happy”

– Shelley Laskin, Trustee, *Toronto District School Board*

Bortolotto
Inspiring Calm and Emotional Well-Being

– Tania Bortolotto, Founder and President



How
school design
can impact

student
success

Part 2

/ZAS Architects
/LGA Architectural
Partners
/+VG Architects
/Snyder Architects Inc.
/Bortolotto
/High Performance
School Design



+VG Architects

Building the Whole Child

+VG Architects

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Notable K-12 Projects:

1. Granite Ridge Education Centre
2. St Michael Catholic Elementary School
3. St Peter Catholic Elementary School
4. Warwick Academy, Bermuda

Learn More:
www.plusvg.com

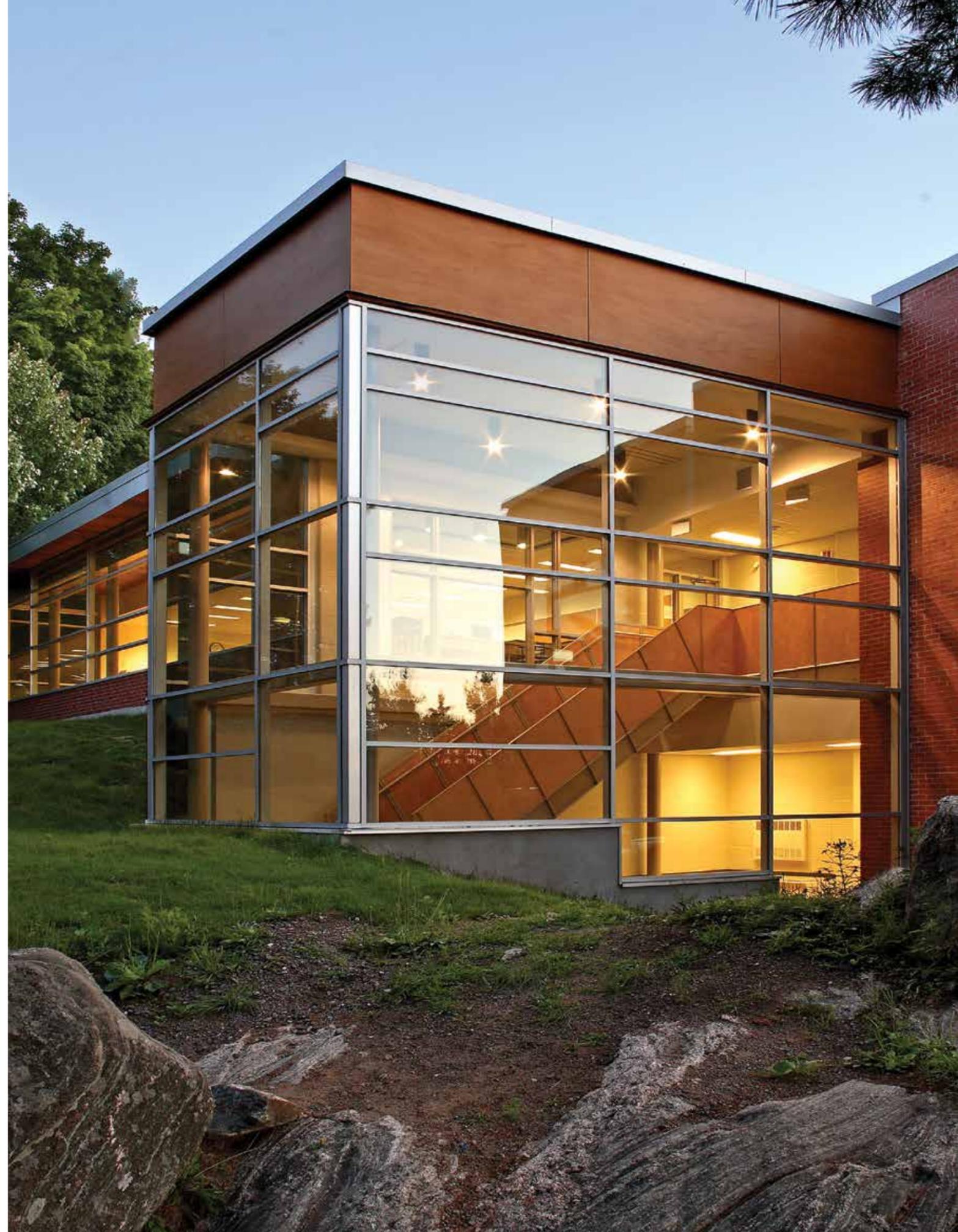
+VG Architects is a leading K-12 school design firm in Ontario. With offices in Toronto and Brantford, +VG is a full-service architectural firm with 41 years' experience in designing educational facilities across Ontario and abroad. They have successfully completed hundreds of elementary school projects and over twenty secondary schools.

AT UNIVERSITY, TERRY TOOK A COURSE called "Children and the Built Environment" and one of the most interesting things he learned from it was that as much as we design schools for children, it's the children that interpret school environments in their own ways. Architecture anticipates human response but it doesn't dictate it. You really feel this when you design K-12 environments. The built environment becomes a playground for them and we intentionally create elements in the school that can be experienced in a number of ways. For example, the height of a window sill; for a child it becomes a place to play or to rest and observe.

The fundamental objective of the physical school is to help support students' academic performance. We do that by creating a school environment that considers the physical, emotional, and even spiritual health of students and teachers in an holistic way and provides them with the energy to give their best every day. We all know that school is a very dynamic environment and frankly it can be too dynamic, too stressful, so we want the school environment to enable people to relax, to take moments through the day to breathe and look far into the distance and to understand the bigger picture. We want to create an environment that positively reinforces the work being done—that teaching and learning are important, that the community supports teachers and students, and that their experiences matter.

Muskoka Falls Public School, near Bracebridge, Ontario, and part of the Trillium Lakelands District School Board, is a good example of this ethos. There is a social aspect to the school environment that enhances learning; we call this the "public realm" of the school. When you look at the layout of Muskoka Falls, the front door opens to a "piazza". In Canada we are inside for most of the school year but we still wanted that open public space. The corridor tapers further down to the principal stairwell at the east end of the building, and the termination is actually a blast of daylight—it's built entirely of glass and provides a wonderful view of the granite outcropping and, of course, the Muskoka River that flows by the school. Everyone in the school benefits from this view. The experience of the staircase is about being in the landscape as it pushes out into the site. The amount of glass and the pattern of the windows references the pine trees that surround the site. To make the most of the space, at the base of the stairwell is a bench that allows for a gathering spot. The students walking down the stairs are doing what we thought they would; walking and chatting and taking their time. They look like they're having fun, which is such an important, and often overlooked, quality in a school environment.

Learning is best supported in the classroom by enhancing health and we do that by ensuring great air quality, providing windows





ABOVE: Views of the landscape and other classmates, offer an invitation to play as students descend the main stair on their way to recess breaks.
LEFT: Composition of framed window views and a material palette, used in both the interior and exterior, bring the daycare closer to the outdoors.



that teachers can open for fresh air and temperature control, and increasing the amount of daylight. It's about improving the quality of physical health, so that staff and students actually feel better being in the space. To alleviate distractions we focus on acoustics and ensure that the colour of walls is vibrant and unique yet not too stimulating. The amount of daylight during the school year was an issue for us, something all Canadian schools should consider. Our winters are long and keeping people happy and energized is one of the objectives we want to deliver. It's well documented that daylight makes people feel good and energized—a useful tool in an academic setting. We factor that in when orienting the school's layout, in determining where the entrance is, and of course the classrooms, libraries, and gyms, and ensure we get maximum daylight to enhance this healthy environment.

We think of the school in its entirety as being organic. The classrooms may be defined by walls but the actual "school experience" extends beyond the walls to the outside, the



LEFT: Overlooking the Muskoka River, the library offers students a space for quiet contemplation, away from formal learning spaces.

“School design is critical because education is critical. The built environment affects who we are, how we behave, how we experience and enjoy our lives.”

— Terry White, +VG Architects

“Great schools provide a space for every student to be who they are and to learn in their own way”

— Tom Wilson, +VG Architects

forest, river, the granite outcropping. The outside is analogous to the inside and our material choices reflect this. We wanted to use wood and stone as much as possible to highlight the natural beauty of the site.

Despite being very conscious of budgets, we were able to create a wonderful library space. The library is connected to the main staircase so it maintains that same vision, giving everyone a tremendous view. It is an important place and we wanted the space to command a view of equal value. We showcased the school's steel frame by painting rather than hiding it, allowing you to see how the building works. We hung a curtain wall of glass along the east and south wall, which effects a sort of spatial explosion of the interior to the outdoor—it's thrilling! Continuing our efforts to use natural materials, we used red cedar on the soffit, allowing you to see the wood ceiling in the library extend to the outside. It gives the appearance that the steel beams are supporting the roof.

In the kindergarten, the bay windowsill is only about 14" off the finished floor. It was designed specifically for a JK/SK student—a place for students to sit or read. The floor is carpeted for acoustics and is soft and comfortable for the kids to kneel on. It's a simple, economic, yet effective space that fits the Ministry's guidelines. We pared down the building to its essentials and used the savings to make special places with some special design features.

The classrooms facing north have nice large windows for indirect daylight; the ambient light is a good quality for learning. We could have just done a brick wall but we wanted to use wood, which references the natural environment. The design thinking behind it communicates that what goes on inside is important. So without adding cost we did something special, varying the materials between the first and second floors—the masonry speaks to the earth, the coloured blocks emphasize the windows, helping to exaggerate their size, and then the wood cladding system references the trees.

We've been immensely pleased by the response to the school. The Board leadership and staff are proud of the school and are eager to come to work. They were impressed with how the school engages and uplifts children and most importantly, the students absolutely love it and are very happy to be there. 📍



Terry White (BArch, OAA, MRAIC), is a Partner at +VG and specializes in the design of schools, civic centres and other institutional facilities.

Tom Wilson (BArch, OAA, MRAIC), Associate Partner, has worked extensively on K-12 projects over the last 12 years with a focus on solutions tailored to the specific needs of Boards and school communities.

High Performance School Design

Building high performance schools requires collaboration between educators, the facilities team, and board stakeholders. Exceptional school design isn't about higher budgets—it's about innovative thinking. Hollis Hopkins interviews Steve Parker, Facilities Manager at Simcoe County District School Board, about their approach to great schools.



Steve Parker,
Facilities Manager,
Simcoe County District
School Board

Hollis Hopkins:

How do you strive to optimize the learning and working environments at your Board?

Steve Parker: We work closely with superintendents and other support staff to make sure our spaces support an updated curriculum. For example, we call our full day kindergarten the Institute of Play and it is another step beyond the standard. There is no teacher at the front telling everyone what to do; instead there are stations of activities and an outdoor classroom in development. We no longer have the little pens they used to prevent kindergartners from running around. Now they play with grade ones as friends or siblings. As far as I know this is unique in the province. Superintendents have rewritten the curriculum to reflect this newer thinking.

HH:

What design standards are you working to establish?

SP: In the last twenty years, the most important aspect of classroom design has been daylighting. The amount of window space was substantial in the 1950s–60s, then for some reason they decreased the size to just a sliver. One argument was about reducing distractions due to kids looking outside but it was actually counter-effective and increased activity in the learning environment. Now we have gone back to large openings so that we bring in as much natural light as possible.

Energy efficiency is another main trend and is at the forefront of every decision we make. Mundy's Bay Public School is *the* top performing energy efficient school in North America. Because of that

high standard, we have replicated this design thinking in two new elementary schools. We also have an energy monitoring device in the main foyer of the schools so students can look at how their and other schools are performing and can compete for energy efficiency.

HH:

How are you able to plan a high performance school within the same constraints as other boards?

SP: All our schools are on budget and on time. Mundy's Bay is gold certified for LEED construction. We couldn't afford to continue building energy efficient buildings at the price they were coming in at so we had to find a way to do so within the Ministry budget. We chose not to go the LEED route with other schools because there is a lot of additional consulting that is specific to the certification; instead we mimicked the thinking of that LEED school in our other schools.

Some boards also repeat the design for each school so all are on budget and on time but they all look the same. Schools are for the students and when they travel for sports or other activities, they see that every school is identical. They don't care about where they are learning or take ownership of the building because it is just like every other school around the county. There is no sense of trying to build a community school if they all have cookie cutter designs. We try to create a space that is standardized but is also unique.

We are building for the occupancy of the building and therefore trying to develop a standard well above the status quo. There is no other point to why we are here but to prepare these kids the best way we can. We are hoping we have found a way to keep these exceptional buildings going and inspire confidence that our kids are learning in the best environments possible. 

Take the lead. Get involved. Learn more. CatapultSchools.ca



Thank you for reading.

Your insights and experience are critical to making better schools throughout Ontario. Because educators advocate for student success, they understand that performance depends on an optimized environment. At CatapultSchools.ca we offer the tools to support you as you lead the discussion on the future of Ontario's schools.

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/

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Understand the tools and principles that inform architects' design thinking.

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What are you building?