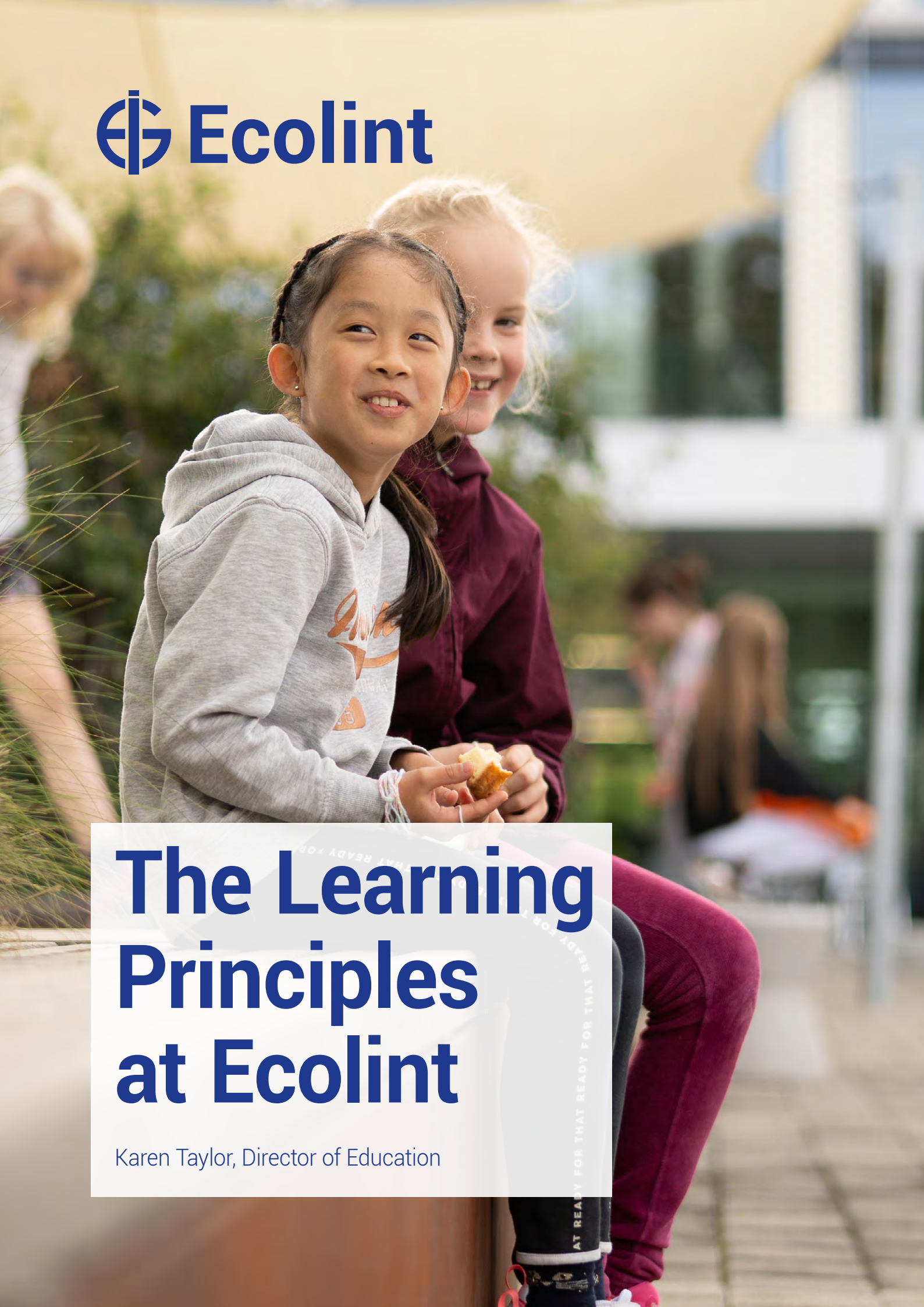

Ecolint

The Learning Principles at Ecolint

Karen Taylor, Director of Education

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Part 1:

What are the Learning Principles and why do we have them?

Part 2:

The Learning Principles One by One

Part 3:

The Principles of Practice

Part 1:
What are the Learning Principles and why do we have them?

At Ecolint we see ourselves as a community of learners encompassing both children and adults and we recognize the capacity of each individual to engage in a meaningful and personally challenging learning journey. We believe that a profound understanding of the conditions necessary for deep learning leads naturally to high quality teaching.

Consequently, our classroom practice is based on ten evidence based principles of learning drawn from a wide range of current research in education, cognitive and social psychology and neurobiology, all of which contribute to deepen our understanding of how human beings acquire and retain knowledge to make meaning of their world.

The Learning Principles are at the heart of all that we do; they inform both pedagogical practices and the relationship between teachers and students regardless of the curriculum framework or the age of the learner. The Learning Principles are about what takes place in the classroom and they inform teaching and learning at every stage of a child's development.

The Learning Principles do not exist independently of one another; they are both interconnected and interrelated. In the end, they come down to **five Ecolint Essentials** or the Ecolint promise: Each student, in each classroom, should be able to say:

My teacher...

Knows me

Checks what I already know and can do

Teaches in lots of different ways

Pauses to see if I understand

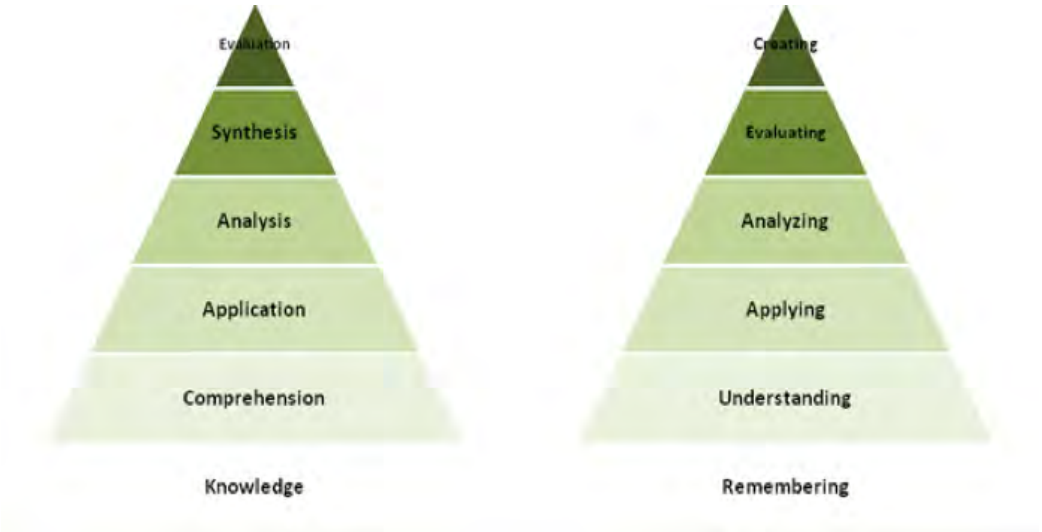
Gives me choices

Part 2:

The Principles one by one

Learning Principle Number 1:
Learning occurs at various levels of complexity

The opening chapter of *Making Thinking Visible* (2011), makes reference to going "Beyond Bloom" (p.6). The pyramid shape of Bloom's taxonomy and its revised version by Anderson and Krathwohl (2001) is familiar to us all and, as is the case with many visual images, it triggers something in our memory. The pyramid reminds us of the **kinds of thinking** that we wish to see and to nurture in our students[1].



We associate knowledge and skills pyramids with **concept-based curricula** like that of the IB and the Universal Learning Programme. However, as much as an image can help us to retrieve information stored in our long-term memory, an image may also play a trick on us. We might forget, for example, that the pyramid suggests sequence and hierarchy although thinking occurs on a dynamic continuum. The elements of knowledge and skills pyramids are as interconnected as our cognitive processes and, as Richhart et al. (2011) remind us, "understanding is not a precursor to application, analysis, evaluating and creating but a result of it" (p. 7).

In grappling with the **complexity of learning** one might say that on the surface level there are facts, information, and simple processes. On a deeper level, we find complex concepts and universal understandings that emerge from the organization of facts and information. You might think here of Jerome Bruner's schema. A fact in and of itself is nothing more than a fact. What matters is where it fits into some larger picture. Bruner's constructivist theory was grounded in a belief that learners develop these schema when processing past knowledge and experience.

[1] https://images.app.goo.gl/i3SosHg7AXiSfLww8

So what does all of this mean for our classrooms and our practice? We may have a vision of the factual information and essential skills and processes that are necessary for our students to develop a grasp of abstract concepts and universal understandings. We plan our lessons in consequence. However, there is yet another layer of complexity that derives from the fact that not all our students have the same **prior knowledge** as we begin that lesson. We need to develop lesson content, learning objectives and assessments that take these differences into account and as Hendrick and Macpherson (2017) suggest, to "choose the proper technique for the relevant expertise level of the learner" (p. 129).

You may tell me that this is wonderful but how does one actually teach in this manner? My example comes from a kindergarten teacher at the International School of Amsterdam named Stephanie Martin whose approach serves as an example of **visible thinking**[2]. She teaches her students to think in terms of four key questions as they seek to understand patterns. In comparing objects or phenomena the children need to consider:

Form: What is it like?
Function: How does it work?
Connection: How is it like something I have seen before?
Reflection: How do you know?

Once children have assimilated this analytical technique, they have already gone a long way towards the habits of mind that will allow them to continue to deepen their understanding and that will remain applicable as they grow in years and in wisdom.

Not every student in our classes will grasp the technique at the same rate. The presence of such differences among our students means that we also need to nurture an important quality in ourselves: **flexibility**. We may have entered the classroom with a lesson plan that is beautifully structured. And it may not work the way we anticipated. We are dealing with human beings, after all. And so we find ourselves in the position of having to alter our approach on the spot. This means being sensitive to what is taking place among our students. How are they responding to the lesson? If they do not understand, how can we shift to a different approach and, perhaps, not one that we had considered in carefully planning our lesson the night before, or over coffee on Sunday afternoon? How can we devise a range of questions that will push them further in their thinking?

Things to consider:

- Do my students engage in more than one kind of thinking in this lesson?
- Can I identify the kinds of thinking they are engaged in (critical, analytical, evaluative, etc.)?
- Can they?
- Do I encourage my students to extend, elaborate and develop their own ideas and/or the ideas of others?
- Do I check for understanding in different ways before moving on to the next level of learning?

[2] https://cis.libguides.com/TK/PYP/resources

Suggested Reading:

Anderson, L. W., & Krathwohl, D. R. (2001). A Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives: Complete Edition. New York: Longman.

Bruner, J. (1966). *Toward a Theory of Instruction*. Cambridge, MA: Harvard University Press.

Ecolint (2019). *Universal Understanding Guide*.
https://sites.google.com/ecolint.ch/ulp/ULP-EN/ulp-pedagogy

Erickson, H. L., Lanning, L. A., & French, R. (2017). *Concept-based curriculum and instruction for the thinking classroom*. Corwin.

Eyre, D. (2016). *High performance learning: How to become a world class school*. Routledge.

Hendrick, C., Macpherson, R., & Caviglioli, O. (2019). What does this look like in the classroom?: *Bridging the gap between research and practice*. John Catt Educational.

IBO (2019). Big Understanding - Melanie Smith.

https://www.ibo.org/contentassets/cc50a80b676741d4878b5828406116b1/big-understanding-melanie-smith-en.pdf

Ritchhart, R., Church, M., & Morrison, K. (2011). *Making thinking visible: How to promote engagement, understanding, and independence for all learners*. Jossey-Bass.

Sherrington, T. (2020). *Rosenshine's Principles in Action*. John Catt Educational.

Learning Principle Number 2:
Solving meaningful problems and transferring knowledge across domains contributes to deep learning.

I remember a long time ago standing in my classroom one evening with a group of 9th grade parents, introducing them to the history course I would be teaching their children that year. I started by asking them what they could remember from their own 9th grade history class and, not surprisingly, it wasn't much. I jokingly said that if I was going to find a reason to get up each morning then I had to believe there was more to my purpose as an educator than teaching children factual information that they would invariably forget. I told the parents that in my class there would be no tests. We would only study primary sources and we would learn together how to read, interpret and analyze them, to draw conclusions based on evidence, and to communicate those conclusions convincingly to others. I told them their children were going to learn how to think and to write. I have to admit that I was nervous when I said this. I thought they might panic when I said "no tests." But they didn't. What I got in return were hopeful smiles.

I did not talk with those parents about increasingly sophisticated levels of cognitive processes, or about distinguishing between quantitative and qualitative thought, nor did I diagram iterative versus linear learning (Stern, Ferraro and Mohnkern, 2017). I simply said what appeared to be common sense. **There is a difference between knowing and understanding**. A list of facts is not going to get you very far in the long run. What matters is what you can do with them for "grasping the structure of a subject is understanding it in a way that permits many other things to be related to it meaningfully" (Bruner, 1977).

The important thing to remember is that **deep learning** takes place when we are required to make use of factual knowledge, to understand it in relation to a discipline, and then to transfer it to other disciplines. This is what lies at the heart of **concept-based learning** and teaching. However, concept-based does not mean content-light. In fact, it should mean precisely the opposite. Rich content knowledge combined with effective pedagogical methods leads to sophisticated, transdisciplinary thinking.

When we say we are teaching for deep learning, it means that we want students to be able to apply what they have learned in new ways. It signifies a shift from factual knowledge to conceptual understanding and this shift is both powerful and empowering. Developing conceptual understanding, learning to make meaningful connections across big ideas, enhances students' **self-efficacy** and their motivation to learn.

Most of us can recall a moment of epiphany from our childhood, the excitement of a breakthrough in understanding, but we can undoubtedly also remember the bumps along the road. Meyer and Land (2006) refer to **threshold concepts** whose assimilation results in a shift in perception but which can be uncomfortable (Meyer & Land, 2006). Grasping a threshold concept may require abandoning past ways of thinking. This is one of the reasons why it is so essential to

- check for understanding among students
- ask different kinds of questions
- approach complex content from multiple perspectives and
- engage with a variety of media.

Our own skills in transdisciplinary thinking and multiliteracy will model what we seek to develop in our students and help us to support them as they pass through the threshold of one level of understanding to the next. Finally, in our **inclusive classrooms** it will be evident that we believe deep learning is attainable for all our students.

Things to consider:

- Do I check for understanding before moving on to the next level of learning?
- What common (or uncommon) misperceptions may block a student in moving from one level of cognitive processing to the next?
- Are my students able to use what they know in new ways?
- Do I design my lessons and units in such a way that they are encouraged to do so?

Useful resources:

- Project Zero: Teaching for Understanding
- Project Zero: Unit Template
- ULP: Universal Understanding Guide

Suggested Reading:

Bandura, A. (1995). *Social foundations of thought and action: A social cognitive theory.* Prentice Hall.

Bruner, J. S. (1977). *The process of education.* Harvard University Press.

Erickson, H. L. (2008). *Concept-based curriculum and instruction: Teaching beyond the facts.* Corwin Press.

Erickson, H. L., & Lanning, L. A. (2014). *Transitioning to concept-based curriculum and instruction: How to bring content and process together.* Corwin.

Leithwood, K. A. (2006). *Teaching for deep understanding: What every educator should know.* Corwin Press.

Meyer, J.H.F., & Land, R. (2006). Threshold concepts and troublesome knowledge : An Introduction. In Meyer, J.H.F., Meyer & R. Land (Eds.), *Overcoming Barriers to student understanding: Threshold concepts and troublesome knowledge* (pp. 3-18). Abingdon & New York, NY: Routledge.

Robin, & Robin. (2014, August 07). Making Math Visible. Retrieved from https://rmankel.wordpress.com/

Stern, J. H., Lauriault, N., & Ferraro, K. F. (*2020). Outils pédagogiques pour l'apprentissage conceptuel: Niveau primaire/élémentaire: Exploiter la curiosité naturelle pour un apprentissage transférable.* Presses de l'Université du Québec.

Stern, J. H., Mohnkern, J., & Ferraro, K. F. (2017). *Tools for teaching conceptual understanding, secondary: Designing lessons and assessments for deep learning.* Corwin, a SAGE Publishing Company.

Wiggins, G. (2005). Understanding by Design. ASCD.

Learning Principle Number 3:
The ability to follow thoughts carefully and control one's attention are prerequisites for learning.

I once had a student, let's call her Daisy, who would sit on the windowsill in the classroom during the lesson and knit. She was a very creative thinker and an excellent knitter; she was not a particularly strong student academically. In faculty meetings, some of her teachers would complain that Daisy was inattentive, even disrespectful. I will put the question of respect aside because I think that has more to do with the individual teacher than with Daisy. The thing is that Daisy could only concentrate on what was going on in a lesson when she knitted. Moreover, she knew this about herself and so she persisted even when she met with resistance from adults. These days we would say that Daisy possessed a degree of metacognitive awareness. And a good dose of strong will.

So what exactly is attention and why is it important?

We often talk about student engagement. Many researchers refer to the importance of active engagement for learning. However, attention and engagement may look different depending on the student. We might even be mistaken in judging student engagement. A student might be looking out the window at a bird in the tree next to the school building (or knitting) and paying attention, while another student who appears to be looking at you and nodding is not. When we think of engagement we should be thinking about **cognitive engagement** (Tokuhama-Espinosa, 2014).

One of the challenges of teaching is to capture students' attention when they enter the classroom and to keep it. Which means being aware of **attention span** and cycles of attention in relation to the rhythm of the lesson. We may think, then, about attention in terms of duration but also in terms of concentration. The aim is to create an environment in which student attention is sustained and focused to enhance learning.

Executive functioning and self-management skills allow our brains to filter information in order to concentrate on what is important and to avoid distractions. As William James wrote as long ago as 1890, attention "implies withdrawal from some things in order to deal effectively with others." As teachers, we can help students by being explicit. We can be careful to set clear learning objectives and set up tasks and

activities so as to avoid cognitive overload. In this way we facilitate our students' capacity to select and classify information, to identify key concepts, to be attentive to what is important and to remember it.

Attention and memory are linked. There are ways in which we can structure our teaching to facilitate the embedding of knowledge in students' long-term memory. Rote memorization is not the purpose of education. At the same time, memorizing information can be important for establishing foundational knowledge that can then be used for higher order thinking and reasoning. When the context and medium of instruction vary, students have more cues to draw from for retrieval (Kang, 2016).

Practice makes perfect as the old adage goes. Not only practice but also the timing and spacing of practice. Practice and repetition help us to assimilate knowledge that we store in our long-term memory. **Spaced repetition** of content and **interleaving** (sequences of content to which one returns in a pattern) promote long-term retention of knowledge and contribute to problem-solving and the transfer of knowledge from one domain to another. (Kang, 2016).

Stanislas Dehaene refers to a helpful and natural cycle in our brains: prediction, feedback, correction, new prediction (Dehaine, 2013). Errors derived from experience are essential to learning as is, perhaps ironically, forgetting. De Bruyckere (2018) reminds us of the Ebbinghaus forgetting curve (1885): "content that has been learnt, forgotten, and then learned again becomes more quickly and more firmly re-established in the memory" (p. 52). The challenge is the long-term planning that facilitates student attention as focus. Concept-based learning in a **spiral curriculum**, whereby key concepts are repeated with deepening layers of complexity in multiple contexts, may provide the means. So, too, does collaboration with teachers in other disciplines so that the repetition of concepts takes place not only in our own classroom but across the curriculum.

Things to consider:

- Do my students demonstrate involvement in their learning (engagement can be intellectual, social and/or physical)?
- Am I aware of cycles of attention and interest in students' thinking?
- Do we use learning opportunities to develop new understanding and opportunities for creative problem-solving?

Suggested Reading:

Bruyckere, P. D. (2018). *The ingredients for great teaching*. SAGE.

Chanquoy, L., Tricot, A., & Sweller, J. (2007). *La charge cognitive: Théorie et applications*. Armand Colin.

Dehaene, S. (2013). *Les quatre piliers de l'apprentissage, ou ce que nous disent les neurosciences. Paris Tech Review*. http://www.paristechreview.com/2013/11/07/apprentissage-neurosciences/.

James, W. (1890). *The principles of psychology*, by William James. Holt.

Kang, S. H. (2016). Spaced Repetition Promotes Efficient and Effective Learning. *Policy Insights from the Behavioral and Brain Sciences,* 3(1), 12-19. doi:10.1177/2372732215624708

Musial, Manuel, et al. (2012) *Comment Concevoir Un Enseignement?* De Boeck.

Sherrington, T. (2020). *Rosenshine's Principles in Action*. John Catt Educational.

Tokuhama-Espinosa, T. (2014). *Making classrooms better: 50 practical applications of mind, brain, and education science*. W.W. Norton & Company.

Tokuhama-Espinosa, T. (2011). *Mind, brain, and education science: A comprehensive guide to the new brain-based teaching*. W.W. Norton.

Learning Principle Number 4:
Making mistakes is a normal, inevitable and even fertile part of learning

You, knowing your errors, will correct your works and where you find mistakes, amend them and remember never to fall into them again. - Leonardo da Vinci, Thoughts on Art and Life

Leonardo da Vinci's views on the significance of understanding and correcting one's mistakes are as relevant today as they were 500 years ago. However, doing so is not always as easy as it looks. The classroom environment is key to creating the conditions for students to view mistakes as learning opportunities.

Fight, Flight or Freeze are all natural physiological responses to stress that can be more or less productive depending on the circumstances. They constitute a survival mechanism that has been part of the human makeup for aeons. In the distant human past, making a mistake could mean life or death so learning from our mistakes was essential. In the classroom, we are hopefully not thinking about a physical threat. Still, the discomfort associated with getting the answer wrong can create a different kind of stress in students and we know that negative stress inhibits learning. Perhaps it's helpful to think in terms of stress (potentially negative) or challenge (potentially positive). Our aim as practitioners is to shape the circumstances for learning in our classrooms such that cognitive processes, the ways in which our brains naturally function, are favourable for student learning.

The idea that making mistakes is a positive and integral part of learning is obviously not new. Da Vinci knew that understanding and correcting one's mistakes based on that understanding is a means to progress. For a long time, though, the culture of schools looked upon mistakes as failure. Giving the wrong answer was a source of shame and embarrassment. It could result in a fight, flight or freeze response. Recent research, however, suggests that we should view making mistakes in a different light.

Why is this important?

In a school where I once taught there was an admissions tour that stopped by one of the maths classrooms for a couple of minutes to watch the students at work. One boy looked up and said "we're the stupid class." Thankfully, he used an ironic tone of voice; he made it sound like a joke. The prospective parents moved on in their tour undaunted but I have never forgotten this incident. This young man's teacher is a sensitive educator whose classroom is inclusive. She is patient and knowledgeable. So the student's statement to the families on the tour was not a reflection of her teaching, rather something else.

We all know that students (anyone really) may respond to challenge in different ways. There are students like the one in the story above who are "failure accepting." These are the students who are likely to give up or not even give it a go in the first place. Others are "failure avoiding" and may come up with excuses as to why they didn't succeed. They may blame failure on procrastination, or pretend not to care, or say that they didn't have time to study. They are concerned with preserving self-image. Finally, there are those whose approach to learning is **"mastery oriented."** These are the students who seek to understand their mistakes and why they made them and who use this information to develop new strategies for learning. They develop metacognitive awareness.

Cognitive processing of error

The fight, flight or freeze response is linked to what we anticipate from the circumstances in which we find ourselves. Our brains are hard-wired to predict future outcomes. Dehaene (2013) refers to a naturally recurring cycle that begins in infancy and involves prediction, feedback, correction and new predictions. Our prefrontal cortex processes information and integrates errors into these new predictions. When we make a mistake, synapses fire in our brain. When we struggle to learn something, neurons make connections that **strengthen neural pathways**. As Jo Boaler says, "mistakes are learning in action." Or at least they should be. Understanding student error is equally beneficial to teachers as areas of difficulty that repeat year upon year can inform teaching practices and improve scaffolding.

As classroom practitioners, we can help students to analyze the source of error, the reasoning behind a mistake and why it was made; we can help our students to deconstruct their mistakes and in so doing not only lead them towards the « right answer » but also nurture their **curiosity**, contribute to increased **self-efficacy**, and develop their **metacognitive awareness**.

If, as some researchers suggest, "all learning is based on the ability to self-correct" (Tokuhama-Espinosa, 2014, p. 236), then we should work to create a classroom environment that encourages trial and error, a space that promotes creative and productive thinking (Newton, 2013). One need only think about developments in the natural sciences. In Failure: Why Science is so Successful, Stuart Firestein (2015) refers to failure as "the portal of the unknown" as it leads scientists to ask new questions. Analyzing why you have failed at something involves **critical thinking**. In the right environment, the human brain grows and develops in response to challenge.

Cognitive conflict (and making mistakes) is brain healthy. **Testing hypotheses**, for example, is a powerful tool for learning (Bruner, 1973). It allows students to refine their knowledge, what Piaget referred to as "accommodation" and the schema theorists as "restructuring" (Marziano, 2007, p. 87). Marziano suggests that this kind of significant change in knowledge structures can be promoted through **problem-based learning**.

One word of caution, though. We want students to learn from their mistakes, not for errors to become ingrained. Hence the importance of checking for understanding and quality feedback. Creating a positive classroom culture that invites intellectual risk-taking and that helps students to view errors and misconceptions as opportunities for learning, will reduce negative stress and encourage self-motivation. It will help us to move students from accepting or avoiding failure to mastery orientation.

Things to consider:

- In my classroom, are student errors or misconceptions used as learning opportunities?
- Does the climate of my classroom encourage intellectual risk-taking?

Suggested Reading:

Astolfi, J. (2011). *L'erreur, un outil pour enseigner.* ESF éditeur.

Boaler, J. (2019) *Limitless Mind: Learn, Lead, and Live Without Barriers*. Harper One.

Baruk, S. (1986). *Échec et maths.* Ed. du Seuil.

Boaler, J. (2016). *Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages, and innovative teaching.* Jossey-Bass & Pfeiffer Imprints.

Bruner, Jerome S. (1973). *The Process of Education.* Harvard University Press.

Chanquoy, L., Tricot, A., & Sweller, J. (2007). *La charge cognitive: Théorie et applications.* Armand Colin.

Dehaene, S. (2013). *Les quatre piliers de l'apprentissage, ou ce que nous disent les neurosciences.* Paris Tech Review. http://www.paristechreview.com/2013/11/07/apprentissage-neurosciences/.

Firestein, S. (2015). *Failure: Why Science is So Successfu*l. Oxford University Press.

Marziano, R. (2007). *The Art and Science of Teaching.* ASCD.

Metcalfe, J. (2017). Learning from Errors. *Annual Review of Psychology*, 68(1), 465-489. doi:10.1146/annurev-psych-010416-044022

Moser, Jason S., et al. "Mind Your Errors." *Psychological Science*, vol. 22, no. 12, 2011, pp. 1484–1489., doi:10.1177/0956797611419520.

Newton, L. D. (2013). *From teaching for creative thinking to teaching for productive thought: An approach for elementary school teachers.* International Centre for Innovation in Education.

Rosier, F. (2018, September 14). "L'erreur est la condition même de l'apprentissage". Retrieved from https://www.letemps.ch/sciences/lerreur-condition-meme-lapprentissage

Tokuhama-Espinosa, T. (2014). *Making classrooms better: 50 practical applications of mind, brain, and education science*. W.W. Norton & Company.

Learning Principle Number 5:
Building understanding is enhanced through a culture of thinking.

A couple of years ago I was visiting a Year 2 class engaged in a spelling lesson that drew from the Lipman method of Philosophy for Children. But this was no ordinary spelling lesson. The children all gathered in a circle around their teacher and collectively decided on the subject of their research for that day: the correct spelling of hippopotamus. The language the students used showed that they had already assimilated the vocabulary and habits of mind that we associate with key skills of 21st-century learning: **collaboration, autonomy, critical thinking and respectful interaction with others**.

The children worked in groups of three or four to come up with several hypotheses on the spelling of hippopotamus. Together they evaluated the merits of each hypothesis, posed questions of each other, and respectfully challenged one another's assumptions. I heard children use the terms "hypothesis", "theory" and "consensus." It was really rather astonishing.

When each group had decided which of their hypotheses had the best potential, they went off into various parts of the school to research and, hopefully, to confirm its validity. Some children used the internet, others went to the library. Still others sought out an adult who they believed might be able to help them arrive at the truth. They were orderly but enthusiastic, purposeful and cooperative in their research. About 15 minutes later, the groups returned to the circle to recount the process and to discuss the results. Obviously, there is only one spelling of hippopotamus and the class arrived at agreement on this matter. What is significant is the fact that students were able to explain how they did this, demonstrating both metacognitive and metalinguistic awareness. This was a class in which there was clearly a **culture of visible thinking**.

Watching this class in action, you couldn't help but realize the potential of thinking routines as pedagogical tools that, by their very nature, promote the development of critical thinking skills. This doesn't happen by accident. Classroom teachers work hard to create an environment in which such powerful learning experiences take place.

Words matter

In Creating Cultures of Thinking, Ron Ritchhart (2015) reflects on the force of language to shape the learning experience as "language that allows for the possibility of interpretation and that opens the door to even a small bit of ambiguity has the power to keep the mind in an open state, avoiding early closure, pursuing possibilities, and listening to information presented by others" (p. 78). The right combination of

- the language of the classroom
- the classroom environment
- the kinds of questions we ask
- the modelling we do to make our own thinking explicit and
- the thinking routines we use

pushes our students towards more **complex thinking and deep understanding**. It also helps build community. The students in the Year 2 class I observed were not just learning about spelling, or even critical thinking. They were learning to live together in a respectful and inclusive **community of inquiry**.

Culture is a way of coping with the world by defining it in detail - Malcolm Bradbury

Personally, I might have chosen to use a different word than "cope." It seems to set the bar rather low. Nonetheless, Bradbury's point about "defining the world" is significant. Words matter because they allow us to process, to assimilate and to find our way in the world around us. Culture is also about socially transmitted behaviour that is in accordance with what we collectively value. When we work together as a community of learners to develop a culture of thinking among children and adults, we do much to **promote the values we share as educators**: student agency, critical thinking, deep understanding and respect. As cognitive psychologist Lera Boroditsky reminds us, "things that are named are the ones most likely to be thought about and to be visible in our consciousness… what isn't named can't be counted. And what can't be counted can't be acted upon (cited in Maron, 2017)." Creating a culture of thinking is about deep understanding that is both cognitive and social. Let's make it count.

Things to consider:

- Do my students have the interactive instructional time and the structures (thinking routines) needed to delve into complex issues?
- Are my students given the opportunity to explain their thought processes?
- Are the processes of thinking and learning captured and documented? Do I collect data on the kinds of thinking I ask students to engage in and on the kinds of questions they ask?

- Do I privilege generative and constructive questions over review and procedural questions?
- Do I model visible thinking by making explicit my own thought processes?
- Do I listen actively to what my students are saying so that they know their thinking is important to me? Do I show them that I am part of this community of learners?

Useful Resources

Project Zero's: Thinking Routines Toolbox

A Teacher's Guide to Visible Thinking Activities

ULP: Universal Understanding Guide

Suggested reading

Brila Projets Jeunesse. (n.d.). Tiré de http://www.brila.org/ppe.html

Galichet, F., & Nancy, J. (2019). *Philosopher à tout âge: Approche interprétative du philosopher.* Vrin.

Hattie, J. (2017). *L'apprentissage visible pour les enseignants: Connaître son impact pour maximiser le rendement des élèves.* Presses de l'Université du Québec.

Maron, D. F. (2017, December 19). Why Words Matter: What Cognitive Science Says about Prohibiting Certain Terms. Tiré de https://www.scientificamerican.com/article/why-words-matter-what-cognitive-science-says-about-prohibiting-certain-terms/

Ritchhart, R. (2015). *Creating cultures of thinking: The 8 forces we must master to truly transform our schools.* Jossey-Bass.

Ritchhart, R., Church, M., & Morrison, K. (2011). *Making thinking visible: How to promote engagement, understanding, and independence for all learners.* Jossey-Bass.

SAPERE P4C: Philosophy for Children. (n.d.). Retrieved from https://www.sapere.org.uk/

Upbility FR. (n.d.). La pensée critique pour les enfants qui présentent des troubles du développement : Une stratégie efficace. Tiré de https://upbility.fr/blogs/news/la-pens-e-critique-pour-les-enfants

Learning Principle Number 6:
Cognitive overload causes inefficient, ineffective learning.

One can hardly open one's email these days without finding at least one unsolicited message about the latest teaching resources. We read about the importance of cognition and metacognition, of surface learning and deep learning, inquiry-based and concept-based learning. It can be challenging to separate the wheat from the chaff. At the same time, most of us want our classroom practice to be grounded in recent and valid educational research.

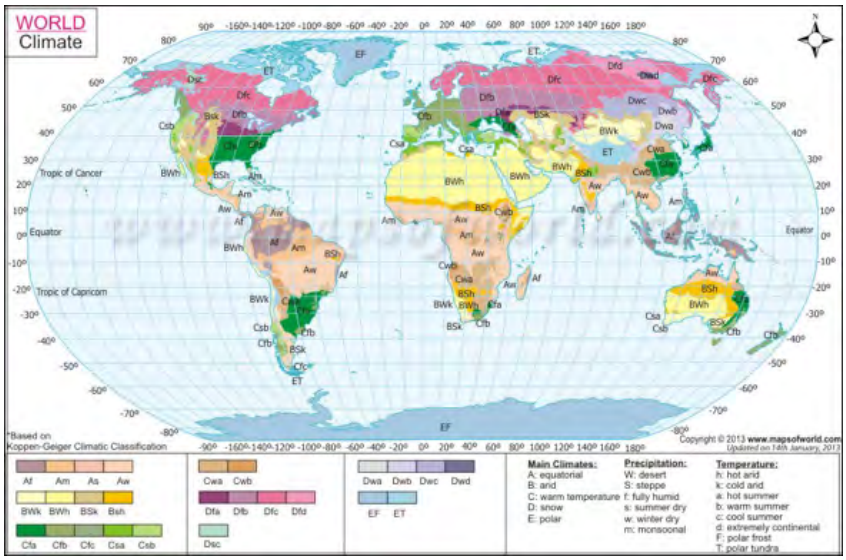
Dylan Wiliam is often quoted for a tweet in which he stated that **cognitive load theory is probably** "the single most important thing for teachers to know" (Wiliam, 2017). Does it really matter to student learning if the teacher takes cognitive load into account when preparing a lesson? This is, of course, a rhetorical question. The whole point of the learning sciences is to use what we know about human cognition in order to create the best possible environment for student learning.

In preparing this article I thought long and hard about how to approach the question of cognitive load theory and the best way to visualize the relationship between theory and classroom practice. I finally decided that, in the end, it really comes down to finding the right **balance between working memory and long-term memory**, hence the image of the out-of-balance scale.

As human beings, we can only process so much new information at one time. Our ability to draw from information embedded in our long-term memory, however, is almost unlimited. Andy Tharby (2019) has a useful metaphor for understanding the difference when he says that our working memory is like a page of notes while long-term memory is more like a filing cabinet. In that cabinet, we have organized information into files or schema. In other words, we can draw from that store of knowledge when we need it and we are able to apply or transfer that knowledge into new domains.

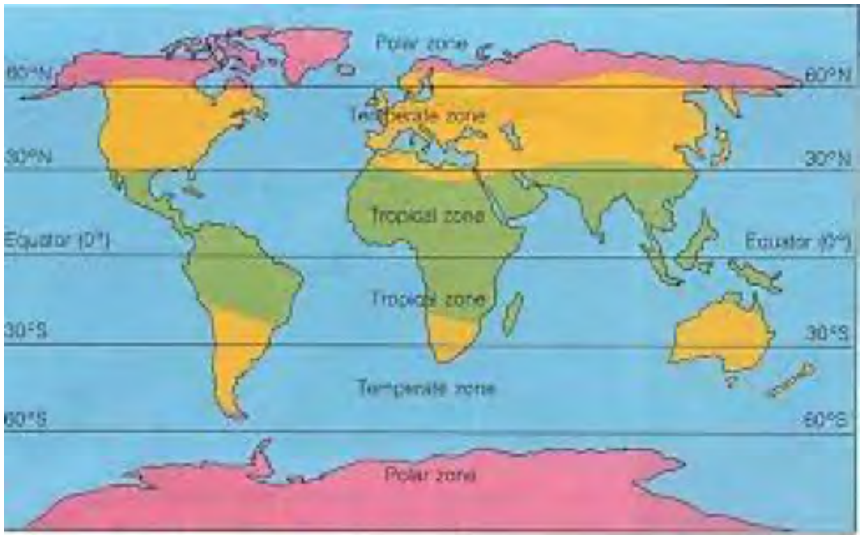
Each time we introduce new material to students we inherently tax both their working memory and their long-term memory. If we place too great a burden on a student's working memory, which is limited in quantity and duration, we impede learning rather than enhance it. This is one of the reasons why it is so important to know our students and to be aware of their **prior knowledge**, the foundation upon which we build new learning. When the information we are introducing is complex, it needs to be broken down. Not so that we oversimplify, but rather to give students the building blocks they need in order to stretch themselves.

Imagine that you are preparing to teach a new unit on global climate types. You might consider using an image such as this:



www.mapsofworld.com/world-maps/world-climate-map.html

On the other hand, you might choose something like this:



https://www.pinterest.ch/nnnewwebmaster/weather

Obviously the age of the students matters but bear with me here. The first image is more sophisticated, more detailed and more complex. It may appear visually more appealing. If the notion of climate types is new to your students, however, much of that detail is potentially distracting. What is the **essential information** on which the students need to focus? They will have to look back and forth between the map and the key and try to decipher the coding. All of this taxes the working memory and can distract students from the point of the lesson which is to understand the difference in climate types.

If you are planning a lesson that takes into account cognitive load theory, it might actually be preferable to choose the second image. What is perhaps most important for a teacher to keep in mind is to be explicit, to make clear what the learning objective is and help students to identify key information in order to attain that objective without being exposed to peripheral information that does not contribute to the learning. This might mean starting with the incremental steps that lead towards a whole; it might mean explaining the essential question or overarching concept first and then breaking it down. The point is that the roadmap is clear to the students.

Another example might be teaching secondary history students how to write an essay. Take this question from a past IB examination: "Economic problems between 1980 and 1991 were the most significant reason for the end of the Cold War." To what extent do you agree with this statement? If you were to take cognitive load theory into account then you would not simply give students the question and let them get on with trying to work out an answer. Do the students have the necessary context and content information they will need to answer the question? You would likely then break down the parts of the essay question. What kinds of economic problems might one refer to? Why the reference to 1980? What other factors besides the economic might have contributed to ending the Cold War? How does one deal with a "to what extent" question?

It goes without saying that we wish to challenge our students and to provide the opportunity for them to stretch themselves. There are ways in which we can facilitate the development of knowledge and skills that take into account the way the human mind works. This involves **keeping the scale of cognitive load in balance**.

Things to consider:

- Have I planned a lesson or unit that takes into account my students' existing knowledge base?
- Are the activities I develop focused on the learning objective?
- Have I removed any distracting or irrelevant information?
- Do I offer students opportunities to become gradually more independent in their problem-solving skills?
- Do I present new and complex information in more than one mode?
- When my students have moved from novice to expert, have I encouraged them to visualize their knowledge of concepts and procedures?
- Have we designed the curriculum so as to promote the development of long-term memory?

Useful Resources

Cognitive load theory in practice; Examples for the classroom

Suggested Reading

Chanquoy, L., Tricot, A., & Sweller, J. (2007). *La charge cognitive: Théorie et applications*. Armand Colin.

An Introduction to Cognitive Load Theory for teachers. (2019, October 09).
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Learning Principle Number 7:
Learning occurs in a space where objectives are just beyond but not too far from the learner.

Source: T. Colin Campbell Center for Nutrition Studies

The implicit reference here is, of course, to Lev Vygotsky's zone of proximal development (*zona blizhaishego razvitiya*). The ZPD is essentially about the difference between what a learner can do without help, and what they can do with support from someone with more knowledge or expertise. This could be a teacher; it could also be a peer. In the discourse on education, the **zone of proximal development** has become almost synonymous with **scaffolding**.

In the photo above, the adult has placed the child on a chair so that he can reach the table and participate in preparing a meal. One can imagine the adult explaining to the child what to do with the wooden spoon as he points to the bowl. In fact, one can easily imagine a whole conversation during which the adult introduces new vocabulary to the child. The image conveys a sense of what we mean by **guided participation**.

The child is young; we might assume that the bottle on the left is his. He looks interested in what they are doing and at ease with his environment. The adult has set things up in such a way that the child can participate in the activity comfortably and we imagine that over time, the child will become more autonomous and independent as he develops and grows. One day he will make a meal on his own.

Whether at home or in a classroom, scaffolding can take many forms:

- Modelling or demonstrating
- Describing concepts in different ways
- Presenting new information in multiple modes
- Anticipating common misperceptions
- Providing prompts and exemplars
- Using checklists or cue cards
- Checking for understanding

The list of strategies one might use to support student learning is almost endless. To scaffold effectively, however, also means taking into consideration the student's prior knowledge and existing skills when presenting new material (Learning Principle 10). It means providing quality, focused feedback (Learning Principle 8).

Scaffolding can also contribute to developing **self-efficacy** in students. When a task has been successfully completed, the student will likely have more confidence in tackling a more complex or challenging problem the next time around. A safe, healthy and nurturing environment equally contributes to the development of confident, independent and autonomous learners. One might think of a kind of **emotional scaffolding**.

I doubt anyone would question the pedagogical value of scaffolding. But let's go back to Vygotsky for a moment. Vygotsky defined the zone of proximal development as "the distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers" (Vygotsky, 1978, p. 86).

Recent analysis of Vygotsky's work suggests that, as important a pedagogical tool as scaffolding may be, we should not oversimplify its relationship to the zone of proximal development. The two concepts are not mutually exclusive, but they are also not synonymous. Scaffolding is about the support one puts in place to guide learners towards the completion of a task or the acquisition of a skill. It is, as Bandura's theory of self-efficacy argues, task-specific. One might also argue that it is unidirectional whereas, ideally, working with students in their zone of proximal development is multidirectional. It is about co-constructing knowledge.

"The concept of scaffolding is generally considered as a teacher-initiated, directive instructional strategy which conflicts with the initial [Vygotskian] understanding of teaching as inter-action of the teacher and students to build new knowledge together.
(Margolis, 2020, p. 20)

Vygotsky was interested in cognitive development within a social and cultural context. Like Jerome Bruner, his approach represents a form of social constructivism. The quality of social interactions, the culture of the classroom, and the overall environment are as important as scaffolded pedagogical strategies in supporting students as they practice new skills. As Dixon-Krauss (1996) put it so well: "From a Vygotskian perspective, the teacher's role is mediating the child's learning activity as they share knowledge through social interaction" (p.18).

Things to consider:

- Are my students simultaneously guided and challenged?
- Do my students demonstrate self-confidence in attempting a new learning goal?

Useful Resources

Ressources pour les enseignants - Ways to scaffold

Six scaffolding strategies to use with your students

Ways to scaffold learning

Suggested Reading

Bandura, A., Carré, P., Lecomte, J., & Bandura, A. (2019). *Auto-efficacité: Comment le sentiment d'efficacité personnelle influence notre qualité de vie*. De Boeck supérieur.

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Learning Principle Number 8:
Learning progresses with effective feedback

In the article on Learning Principle Number 2, I reminisced about a 9th grade history class and how I announced to parents that there would be no tests, only essays, and that we would be focusing on analytical writing based on our reading of primary sources. I was committed to helping my students discover the richness of direct contact with historical sources. I was equally passionate about helping them to develop skills that could be transferable to other domains; they were going to learn to think and to write. As much as I wished they might all become budding historians, I recognized well that this was not likely to be the case!

When I announced that there would be no tests in my class, I also shared a related policy. All students would be able to rewrite their essays, as many times as they wished but within a given time frame, based on my comments - **feedback**. The first questions that always arose from students and their parents were: Will this change my grade? Will the grades be averaged? My answer was that if the student merited a new grade, then that is what they would receive, not an averaged grade. However, they needed to be aware that their grade could also go down.

Feedback vs. grades

The question about grades is significant. Feedback and grades are obviously not the same thing although there is sometimes a tendency to blur the lines. As Alfie Kohn (1994) famously wrote, "Never grade students while they are still learning" (p. 41). Once students see a grade, they tend to ignore any comments so better to separate the two components.

As we know, feedback can be about process or product, it can be offered on formative and summative assessments. What is important is growth and development. In an ideal world, feedback and instruction are intertwined and multidirectional but I will come back to this point.

I wish I could say that my 9th grade class policies were all grounded in research. The truth is that I was a novice teacher of high school students whose training had been in university teaching. The policies were based on what I believed to be common sense. This was a long time ago, well before Hattie and Timperly's seminal article "The Power of Feedback'' (2007). Since then, research on effective feedback has developed considerably. While I stand by my intuition as a novice, I also now know that there are ways in which I could

have improved on the quality of my feedback to students and been more aware of the feedback they could have given me.

What I have learned since is how to make sure that the feedback I offer students is focused specifically on how to improve their work and, perhaps most importantly, in the form of questions rather than instructions. Whether we choose to give feedback in written or oral form is less important than

- breaking down learning into incremental steps and
- giving students the time to improve their work subsequently.

All those years ago I might have written in the margins of a student essay something like "needs more depth" or "weak phrasing". Now I would say "You have described these two sources clearly. Next is to think about how to do a comparative analysis of them. How do the sources differ specifically in perspective? What do they share in common that reflects the historical context? "

In Visible Learning for Teachers, John Hattie (2012) offers a number of useful examples of the kinds of prompts (organizational, elaboration and the monitoring of progress) that may guide students in moving forward in their learning while leaving them the space they need to develop agency over that learning. *The key with all prompts is not only to get the prompt relative to the phase of learning, but also to know when to remove the prompt- that is, when to fade out, or allow the student to take on more responsibility.* (Hattie, 2012, p. 144). Helping students to set challenging mastery goals and to monitor their progress will contribute to their development as autonomous learners.

"Just in time, just for me, just for where I am in the learning process, and just what I need to move forward." (Hattie, 2012, p. 137)

Ideally, as educators we skillfully use questioning to move students into their zone of proximal development, that space that is just beyond but not too far from where the student is in their learning journey (Learning Principle 7). In fact, the idea of moving forward is at the heart of the whole feedback process that seeks to support students' development in relation to these three, key questions:

- Where am I going?
- How am I going there?
- Where to next?

The literature on assessment and feedback also frequently refers to four levels on which the feedback may focus on:

- Task
- Process
- Self-regulation
- Self

The first three levels are about students moving through layers of complexity (see Learning Principle 1) as they develop metacognitive skills and strategies that ultimately contribute to their autonomy and agency as a learner. Interestingly, the fourth element, the self, is in some ways the most problematic.

Sometimes we blur the lines between task-specific feedback and praise, for example, when what we should be aiming for is to distinguish between the work and the person in order to provide "task-involving rather than ego-involving feedback" (William, 2011, p. 110). "Feedback should cause thinking" (p. 127). In other words, what we are looking for is to provide feedback in such a way as to ensure a cognitive response, not an emotional response. At the same time, this is only possible when the classroom culture is one of trust, where each student and the teacher feel secure in acknowledging mistakes and uncertainty (see Learning Principle 4). If we are to collaborate in a learning community composed of both children and adults, then as educators we need to be able to model what we expect from our students. Do we offer students the opportunity to give us feedback?

As I mentioned earlier, ideally instruction and feedback are interwoven and multidimensional. This means considering ongoing assessment as feedback for teachers (Hattie, 2012). It also suggests that we consider how peer-to-peer feedback can be just as important, sometimes even more so, as feedback from teachers. Just as teachers work to hone their skills in asking questions and providing guidance to students, so, too, do students need a framework for providing quality feedback to one another. Well-designed rubrics, giving students the words and the tools to do so, can result in powerful, long-lasting learning experiences.

Quality feedback is specific, focused, timely, actionable, genuine and credible.

Things to consider (adapted from Hattie, 2012, p. 210):

- Do I provide feedback in relation to the three key questions: "Where am I going?"; "How am I going there?"; and "Where to next?"
- Do I consider the levels of feedback: task, process, self-regulation, and self?
- Am I careful to distinguish between praise and feedback?
- Do I seek to understand if students are receptive to the feedback I give?
- Do I check for understanding and modify my teaching in response to feedback from my students?
- Do I recognize the value of peer-to-peer feedback and explicitly teach my students how to engage appropriately in this?

Useful Resources

Project Zero Ladder of Feedback

Making feedback visible

Gan (2011) Graphic organizer for feedback

Dylan Wiliam, Feedback on Learning (video)

ULP Guide to Universal Understanding (Mastery)

Suggested Reading

Brooks, C., Burton, R., Kleij, F. V., Carroll, A., Olave, K., & Hattie, J. (2021). From fixing the work to improving the learner: An initial evaluation of a professional learning intervention using a new student-centred feedback model. *Studies in Educational Evaluation*, 68, 100943. doi:10.1016/j.stueduc.2020.100943

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Kohn, A. (1994). Grading: The issue is not how but why. *Educational Leadership*, 52(2), 38-41.

William, D. (2011). *Embedding Formative Assessment.* Solution Tree Press.

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Learning Principle Number 9:
Affectively and socially healthy environments promote learning

I have a very vivid memory of eating my lunch in the dining hall when a colleague sat down next to me, bubbling over with excitement about the advanced calculus class he had just been teaching.

As Jon told me about his class, he scribbled a formula onto one of the paper napkins on the table. I should say up front that my math skills are minimal and certainly not such that I could understand advanced calculus equations. Still, it was such an amazing conversation that I kept that napkin and I have it somewhere still, more than 15 years later. What I remember most about that conversation are three things: Jon's passion for his subject, the fact that he kept talking about how beautiful and elegant the formula was and, finally, that what made him so excited was being able to share his aesthetic appreciation for the beauty of an equation with his students. Those students were very fortunate to have Jon as a teacher. He is highly knowledgeable, enthusiastic, respectful of the students in his class, and collaborative in his approach to working with them and in guiding them in their work together.

In 2007, Immordino-Yang & Damasio published a great article called "We feel, therefore we learn." Obviously there was a play on the famous line from Descartes, "I think, therefore I am." Their work reveals something profound about the nature of thinking and being, about the interconnectedness between emotion and cognition, and what this might mean for us in terms of our classroom practice. Thanks to developments in neuroscience we now know much more now than we did in the past about **the interplay of emotion and cognition**, feeling and thinking. Still, one needs to be cautious. Neuromyths abound and educators should be careful about the validity of research on which they may base classroom practice.

Pekrun (2014) identifies four types of academic emotions: achievement-driven, epistemic, topic-related and social. There may be negative or positive emotions associated with each. However, it would be too simplistic for me to suggest that negative emotions inhibit learning and positive emotions promote learning when, in fact, the interplay between them is more nuanced and also powerful. Furthermore, the emotions that students experience in class have an effect on a range of cognitive processes: **self-regulation, memory, critical and flexible thinking, self-efficacy and motivation**.

It might be helpful to think about the influence of emotions on cognition in terms of the external and the internal. External influences may be related to teachers, peers, family, even society overall. As teachers, we have a certain amount of control over the role emotions play in our classroom. We can be like Jon whose enthusiasm is contagious. We can base our interactions with students on the delicate balance between high expectations and support. We can use humour and self-disclosure (within reason) to nurture open, trusting relationships in the classroom. We can demonstrate respect for individual differences among our students. All this contributes to an affectively and socially healthy learning environment. This sort of classroom dynamic most likely stimulates the "mirroring" that human beings naturally engage in when they respond to other people's reactions and emotions.

As I mentioned above, this is all a bit more complicated than negative emotions = bad; positive emotions = good. As we know, a certain amount of stress can be motivating; excess stress is debilitating and impedes learning (See Learning Principle #4). Being subdued or even a little sad can contribute to our analytical and methodical thinking (Newton, 2014). On the other hand, positive emotions can free us to engage in more creative thinking because we feel safe and willing to experiment with new ideas or potential solutions (Fredrickson, 1991). It seems that extreme emotions, on either end of the spectrum, are likely to be detrimental to learning or, at the very least, distract attention away from the learning.[3] The **range of emotions** in the middle may be used by teachers deliberately to promote different kinds of thinking and can even be considered in the planning of a lesson if we manage "the stream of affect" effectively (Newton, 2014). Just as Jon's enthusiasm for beautiful calculus equations is infectious, so are all our emotions. We might wish to think about our use of body language, the way our own mood may have an impact on our students and adjust these, as best we can, to suit the lesson or activity.

Finally, although the individual differences in emotion are more varied even than within membership groups, there may be cultural differences that determine which emotions are deemed appropriate to be expressed in public. As we are reminded in Learning Principle #10, **all learning is personal** – but it is also relational. When we create a classroom climate that is respectful of individual students, culturally responsive, engaging and supportive we shape the conditions for creative, purposeful, productive and collaborative learning.

Things to consider

- Is the learning environment of my classroom positive, encouraging and tolerant?
- Do I avoid presenting peripheral information in an emotive way that distracts attention away from learning?
- Do I encourage students in developing greater self-efficacy by focusing on mastery learning and assessment?
- Do I provide appropriate feedback that is supportive and informative?
- Do the activities I design take into account the role of emotion?
- Do I guide students in learning how to self-regulate their emotions? Do I self-regulate my own?
- Do my expectations of student engagement rest on unconscious or unquestioned cultural assumptions about how emotions are manifested?

[3] See Learning Principles #3 on attention and Learning Principle #6 on cognitive load.

Useful Resources

HGSE Social-Emotional Learning

Émotions et apprentissages

ULP Guide to Universal Understanding (Mastery)

Suggested Reading

Christophe, V. 1998. 2. Les processus cognitifs dans l'élaboration de l'émotion.
In *Les Émotions: Tour d'horizon des principales théories*. Villeneuve d'Ascq: Presses universitaires du Septentrion. doi:10.4000/books.septentrion.51003

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Learning Principle Number 10:
All learning is personal

It is this last Learning Principle that encapsulates the essence of all that precedes it and, more importantly, captures what lies at the core of Ecolint's mission and vision.

We respect students' individual and cultural identities, encouraging them to become independent learners eager to carry on learning throughout their lives.[4]

Ecolint's Statement on Inclusion, Diversity and Equity asserts that

We embrace diversity and honour the unique voice and personal experience of all members of our community. We recognize the power of each individual to bring new perspectives and understanding to the learning experience of all. In honouring a multiplicity of voices and demonstrating respect for each individual we sustain meaningful discourse.

We pride ourselves on being an inclusive school which, in our richly diverse context, means engaging in culturally and linguistically responsive pedagogy, a pedagogy that is equally sensitive to neurodiversity.

Inclusion and respect for diversity are thus at the heart of our institutional identity and rest on the fundamental belief in the personal and individualized nature of the learning process.

Our professional stance as educators is one that perceives cultural, linguistic and neurodiversity not as a problem to overcome, but rather as an opportunity for learning that enriches the experience of both students and teachers and the ultimate aim of which is an education for social justice.[5] It is in modelling such a stance that we will succeed in "Educating students to be global citizens with the courage and capacity to create a just and joyful tomorrow together."

[4] https://www.ecolint.ch/overview/our-mission

[5] Akkari, A. & Radhouane, M., 2019, p. 225.

Encouraging students to become independent learners

George Couros offers three reasons why learning is personal:

- Each person has their own experiences and acquired knowledge (past).
- Each person creates their own connections to content based on the reason mentioned above (present).
- What interests each person biases what they are interested in learning moving forward (future).[6]

We often talk about the importance of checking for prior knowledge before delving into a new subject. Doing so allows us to understand where students are in their learning and in consequence to modify our practice to meet their needs. As practitioners, an awareness of the ways in which learning is personal and individual means that we engage in teaching practices that

- promote self-efficacy in learners
- contribute to intrinsic motivation by responding to our students' natural curiosity and passions
- promote student voice and agency and
- provide opportunities for metacognitive thinking, self-reflection and self-assessment.

The Learning Principles serve collectively as reminders of the cognitive processes and environmental and affective factors to which we need to be attentive in order to create the best possible learning environment for children, each of whom we accompany on their own personal learning journey.

Suggested Reading

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Part 3:
Principles of Practice

There is a range of curriculum frameworks in our schools, and that is natural. Each meets the needs of our students in different ways. Some elements, however, are paramount, such as the school's charter, its mission, the global competencies we seek to develop. Learning principles are part of these overarching elements that bind our schools and our offerings together.

Certain key approaches are central to our commitment to high quality learning and teaching: concept-based learning, mastery learning, problem-based learning, transdisciplinary and visible thinking. Together, these approaches enable students to develop the self-management and metacognitive skills that will help them become increasingly autonomous and effective agents of their own learning. Naturally, specific instructional and assessment practices support these approaches. While they may manifest themselves differently depending on the age of the students, their particular learning needs and interests, and the criteria expressed in the curriculum used, these practices all boil down to the five Ecolint Essentials.

My teacher...

Knows me

Checks what I already know and can do

Teaches in lots of different ways

Pauses to see if I understand

Gives me choices

Across the Foundation:
Shared Principles of Learning and Teaching

Learning Principles	In the classroom	Approaches to Teaching/ Approaches to Learning	ULP/ Macro-Competences / Micro-competences (MC) ULP pedagogic approaches (PA) Foundation-wide Global Competences evoked (FGC)
1. Learning occurs at various levels of complexity.	Lessons call for more than one kind of thinking It is possible to identify the different types of thinking students are engaged in (critical, analytical, creative, evaluative, etc.) Students are encouraged to extend, elaborate, and develop their own ideas and/or the ideas of others The teacher checks for understanding before moving on to the next level of learning Examples: Differentiated resources, tiered lessons, collect or access use the data on each student's learning profile	**ATT: Differentiated** to meet the needs of all learners. **ATL:**Thinking skills:Practise visible thinking strategies and techniques **ATL:** Read a variety of sources for information and for pleasure	**PA Universal Understandings** Students articulate their learning in big ideas at the end of units. **PA Knowledge and Skills, Processes and Strategies Pyramids** Students articulate their learning at different levels and articulate different levels of learning (facts, concepts, understandings, etc). **MCs: Critical thinking, reflection, problem solving, how to learn.** **FGC: Multi-literateness, Lifelong Learning**

Learning Principles	In the classroom	Approaches to Teaching/ Approaches to Learning	ULP/ Macro-Competences / Micro-competences (MC) ULP pedagogic approaches (PA) Foundation-wide Global Competences evoked (FGC)
2. Solving meaningful problems and **transferring knowledge** across domains contributes to deep learning.	Learning opportunities are used to develop new understanding and opportunities for creative problem-solving Students **use what they know in new ways**	**ATT:** Focused on **conceptual** understanding **ATL:** Use a variety of media to communicate with a range of audiences **ATL:** Make unexpected or unusual connections between objects and/or ideas **ATL:** Find information for disciplinary and interdisciplinary inquiries, using a variety of media **ATL:** Thinking: Compare conceptual understanding across multiple subject groups and disciplines Make connections between subject groups and disciplines **ATL:** Recognize unstated assumptions and bias **ATL:** Gather and organize relevant information to formulate an argument **ATL:** Practice flexible thinking **ATL:** Apply skills and knowledge in unfamiliar situations **ATL:** Revise understanding based on new information and evidence **ATL:** Transfer current knowledge to learning of new technologies.	**PA Universal questions** Students answer transdisciplinary questions that transfer across different subjects. **PA Concept-based learning** Students learn through concepts and understand the cognitive and epistemic function of concepts in their own learning. **PA Conceptual questions** **MCs:** STEM,data, programing,media, cultural literateness, Interfacing with tools,Global awareness, Teamwork **FGC: transdisciplinarity**
3. The ability to follow thoughts carefully and control one's **attention** are prerequisites for learning.	Students demonstrate involvement in their learning (engagement can be intellectual, social and/or physical) Teachers demonstrate awareness of cycles of **attention** and interest in students' thinking	**ATL: Self-management Skills**: The ability to set goals, manage time and tasks effectively, and manage your state of mind, self-motivation, resilience, and mindfulness. **ATL:** Use a variety of organizers for academic writing tasks **ATL:** Use appropriate strategies for organizing complex information **ATL:** Practise focus and concentration (Mindfulness) **ATL:** Practise strategies to develop mental focus (Mindfulness)	**PA: Mindfulness** **PA: Mastery Learning** involves empowering students with deliberate practice techniques and cycling back on concepts to reinforce understanding. **Mcs (assessed):** initiative, motivation, resilience,responsibility, entrepreneurship, accountability,self management, self-respect. **FGC: Lifelong learning**

Learning Principles	In the classroom	Approaches to Teaching/ Approaches to Learning	ULP/ Macro-Competences / Micro-competences (MC) ULP pedagogic approaches (PA) Foundation-wide Global Competences evoked (FGC)
4. Making **mistakes** is a normal, inevitable and even fertile part of learning. Making mistakes, however, must be recognised by the learner so that those mistakes can be leveraged by the learner to promote new learning. Making mistakes should not be seen negatively as this creates stress, an inhibitor to learning	Student **errors** or misconceptions are used as learning opportunities The climate of the classroom encourages intellectual **risk-taking**	**ATL:** Practise "bouncing back" after adversity, mistakes and failures (Resilience) **ATL:** Emotional management **ATL:** Make guesses, ask "what if" questions and generate testable hypotheses **ATL:** Practise analysing and attributing causes for failure (Self-motivation)	**PA: project-based learning** involving trials, feedback loops and the encouragement of risk-taking. **PA: character** emphasizes the identification of personal goals in emotional, cognitive and social domains. We use the principles of coaching where the notion of a mistake is deconstructed and all decisions are part of a positive voyage of learning to improve and know more. **PA: Passion** emphasizes the positive rapport between teacher and student and between students themselves. **FGC: Self-Agency, Lifelong learning**
5. Building understanding is enhanced through a **culture of thinking**.	Students are asked to make connections to **big ideas** in the subject area Students' **thinking is made visible** through meaningful work, discussion and reflection The processes of thinking and learning are captured and documented	**ATL:** Create novel solutions to authentic problems **ATL:** Evaluate evidence and arguments **ATL:** Recognize and evaluate propositions **ATL:** Draw reasonable conclusions and generalizations **ATL:** Apply existing knowledge to generate new ideas, products or processes **ATL:** Practise flexible thinking - develop multiple opposing, contradictory and complementary arguments	**PAs: Universal questions, Universal Understanding, Knowledge pyramids, skills, processes and strategies pyramids** **PA: P4C** Our Character Project uses the principles of Philosophy for Children.Every year the whole campus engages in reflection and discussion of universal questions that are posted around the campus. **MCs:** Critical thinking, reflection, problem solving, how to learn. **FGC: Lifelong learning, transdisciplinarity, multi-literateness.**
6. **Cognitive overload** causes inefficient, ineffective learning.	Learning objectives and instructions are conveyed clearly Student thinking, work and activities are **focused** on the learning objective and/or intended task	**ATT:** Differentiated to meet the needs of all learners **ATL:** Negotiate ideas and knowledge with peers and teachers **ATL:** Set goals that are challenging and realistic **ATL:** Set goals that are challenging and realistic **ATL:** keep and use a weekly planner	**PA: Concepts-based learning** **PA: Emotional Hooks** Students learn concepts through emotionally stimulating and world relevant notions to make learning grounded, exciting and vivacious. **PA: Deep Understanding** Learning objectives are made as clear as possible.

Learning Principles	In the classroom	Approaches to Teaching/ Approaches to Learning	ULP/ Macro-Competences / Micro-competences (MC) ULP pedagogic approaches (PA) Foundation-wide Global Competences evoked (FGC)
7. Learning occurs in a space where objectives are **just beyond but not too far** from the learner.	Students are **simultaneously guided and challenged** Students demonstrate self-confidence in attempting a new learning goal	ATT: Differentiated to meet the needs of all learners ATL: Set goals that are challenging and realistic	PA: **Threshold.** Threshold concepts, threshold knowledge and threshold skills, both at the level of curriculum and the individual (or group of) learner(s) are identified and woven into planning, teaching and reflection. MCs: Critical thinking, reflection, problem solving, how to learn, initiative, motivation, resilience,responsibility, entrepreneurship, accountability,self management, self-respect. FGC: **Interacting with others, self-agency**
8. Learning progresses more productively with effective **feedback**.	Students receive feedback in the course of each lesson Students demonstrate an ability to self-correct based on feedback Instruction is modified in the course of a lesson based on **feedback** Students are comfortable in giving feedback to the teacher regarding the learning process	ATT: Informed by **assessment** ATL: Communication Skills ATL: Create plans to prepare for summative assessments (examinations and performances)	PA: **Feedback** is influenced by the model of Hattie &Timperly (where am I going, how am I doing? Where to next?) at the levels of task, process, self-regulation and self. The ULP encourages self-assessment and peer assessment. MCS: teamwork, collaboration, leadership, responsibility. FGCs: **Interacting with others, Lifelong learning, self-agency.**

Learning Principles	In the classroom	Approaches to Teaching/ Approaches to Learning	ULP/ Macro-Competences / Micro-competences (MC) ULP pedagogic approaches (PA) Foundation-wide Global Competences evoked (FGC)
9. **Affectively and socially healthy environments** promote learning.	The learning environment is positive,encouraging and tolerant Students learn from one another Group work is purposeful and **collaborative**	**ATT:** Focused on effective **collaboration**; Developed in local and global contexts **ATL: Social Skills:**The ability to participate and **collaborate** with others whilst showing awareness and respect for other cultures, varying points of view, and individual differences **ATL:** Use a variety of speaking techniques to communicate with a variety of audiences **ATL:** How can I share my skills to help peers who need more practice? (Consider ATL skills development) **ATL:** Practise empathy **ATL:** Manage and resolve conflict, and work collaboratively in teams **ATL:** Use social media networks appropriately to build and develop relationships **ATL:** Help others to succeed **ATL:** Listen actively to other perspectives and ideas	**PA: Collaboration** involves multiple iterations of group work such as jigsaw, think pair share, and a collaboration model with a student observer and student chair for each discussion. Students engage in our ULP clubs and in service learning. **PA: Passion** is centered on a positive relationship between all of those involved in learning. The ULP approach to conflict resolution is through restorative practice. **Mcs:** Impactful use of resources, Responsible consumption, Negotiation, Respect for others, Balancing power with Restraint. **FGCs:** Interacting with others; Interacting with the world; Interactively using diverse tools and resources

Learning Principles	In the classroom	Approaches to Teaching/ Approaches to Learning	ULP/ Macro-Competences / Micro-competences (MC) ULP pedagogic approaches (PA) Foundation-wide Global Competences evoked (FGC)
10. **All learning is personal.**	Students are able to assess their own work and share their conclusions with other students and the teacher Students are able to choose among varied means to communicate their learning	ATT: Inquiry-based ATL: Communication Skills: The ability to produce and interpret messages effectively. ATL: Plan strategies and take action to achieve personal and academic goals ATL: Identify strengths and weaknesses of personal learning strategies (self-assessment) ATL: Give and receive meaningful feedback ATL: Help others to succeed ATL: Share ideas with multiple audiences using a variety of digital environments and media ATL: What can I do to become a more efficient and effective learner? (Consider personal learning strategies	PA: Character. The coaching model that informs the ULP approach to planning is based on the learner seeking out her/his/their own pathway while the coach (the teacher) seeks for the importance of goals at the levels of value and identity. Students are hereby empowered to articulate their own learning journeys and they are brought to see the value of their goals intrinsically and at a personal level. MCs: teamwork, collaboration, leadership, Critical thinking, reflexion, problem solving, how to learn, initiative, motivation, resilience, responsibility FGCs: Interacting with others; Interacting with the world; self-agency.

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