Catherine McAuley College exists to ensure all learners are impelled to thrive and serve.

It is the goal of the college for all learners to engage in deep learning that is transferable and contributes to the greater good of society and the development of the whole person with specific attention to Mercy values. It is our belief that our students and staff contributions positively impact our community and beyond.

What is deep learning?

"When engaged in deeper learning, students think critically and communicate and work with others effectively across all subjects. Students learn to self-direct their own education and to adopt what is known as 'academic mindsets' and they learn to be lifelong learners."

"Deeper learning is the process of learning for transfer, meaning it allows a student to take what's learned in one situation and apply it to another." https://www.opencolleges.edu.au/informed/features/deep-learning/

	Deep Learning	**Surface Learning**
Definition	Examining new facts and ideas critically, and tying them into existing cognitive structures and making numerous links between ideas.	Accepting new facts and ideas uncritically and attempting to store them as isolated, unconnected, items.
Characteristics	Looking for meaning. Focusing on the central argument or concepts needed to solve a problem. Interacting actively. Distinguishing between argument and evidence. Making connections between different modules. Relating new and previous knowledge. Linking course content to real life.	Relying on rote learning. Focussing on outwards signs and the formulae needed to solve a problem. Receiving information passively. Failing to distinguish principles from examples. Treating parts of modules and programs as separate. Not recognising new material as building on previous work. Seeing course content simply as material to be learnt for the exam.
Encouraged by students	Being intrinsically curious about the subject. Being determined to do well and mentally engaging when doing academic work. Having the appropriate background knowledge for a sound foundation. Having time to pursue interests, through good time management. Positive experience of education leading to confidence in ability to understand and succeed.	Studying a degree for the qualification and not being interested in the subject. Not focussing on academic areas, but emphasising others (e.g. social, sport). Lacking background knowledge and understanding necessary to understand material. Not enough time / too high a workload. Cynical view of education, believing that factual recall is what is required. High anxiety.
Encouraged by teachers	Showing personal interest in the subject. Bringing out the structure of the subject. Concentrating on and ensuring plenty of time for key concepts. Confronting students' misconceptions. Engaging students in active learning. Using assessments that require thought, and requires ideas to be used together. Relating new material to what students already know and understand. Allowing students to make mistakes without penalty and rewarding effort. Being consistent and fair in assessing declared intended learning outcomes, and hence establishing trust	Conveying disinterest or even a negative attitude to the material. Presenting material so that it can be perceived as a series of unrelated facts and ideas. Allowing students to be passive. Assessing for independent facts (short answer questions). Rushing to cover too much material. Emphasising coverage at the expense of depth. Creating undue anxiety or low expectations of success by discouraging statements or excessive workload. Having a short assessment cycle.

Learning involves ongoing, active processes of inquiry, engagement and participation in the world around us (Bransford, Brown, & Cocking, 2000). We do it from the moment we're born and it takes place in schools, beyond those walls and throughout our lives. Regardless of ability or background, everyone has the potential to learn. Learning experiences literally shape the brain. So, it's important to know our abilities are not fixed, but continuously developing (Hinton, Fischer, & Glennon, 2012, p. 4). Lifelong learning should be seen as the foundation of an effective school, an active community, and a fulfilled and meaningful life.

Researchers, teachers, policy makers and parents have typically judged the success of learning in terms of how much knowledge a student had acquired. Today, it's understood the quality of knowledge is just as important as the amount one can possess (De Corte, 2010; Linn, 2005).

There was also a time when learning was understood as a linear process, a progression through different ages and stages. Today, researchers and educators view growth, development and learning as a more dynamic system (Fischer & Heikkinen, 2010, p. 260). It's influenced by neurology, psychology, social and cultural factors. Learning is adaptive – we build new knowledge and skills on the basis of what we already know (De Corte, 2010). Research has also shown the changes that underlie learning in the brain do not occur when learning experiences are not active (Hinton, Fischer, & Glennon, 2012, p. 5). We learn best by acting on, thinking and actually participating in the world.

Learning solely through the direct transfer of information, then, needs to be replaced with a focus on the active construction of knowledge (Fischer & Heikkinen, 2010, p. 253). This involves work that is meaningful, has a necessary depth of study, and assesses students' deep understanding rather than factual memory (Bransford et al., 2000). The task has an authenticity and a sense that what's being accomplished in the classroom is real work that "reflects the living realities of the discipline being taught" (Friesen & Jardine, 2011). When students and teachers pose guiding questions, problems, or tasks that professionals in the field would recognize as important, they can work and learn from experts towards responses and performances of learning that are meaningful, sophisticated, and powerful.

Students must be able to work creatively to generate new ideas, theories, products, and knowledge. They must gain the competencies required to fully participate in and make meaningful contributions locally, provincially, nationally, and globally – not for someday in the future, but now (Bransford et al., 2000, p. 5).

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Investing time and effort in practicing problem-solving and extending knowledge are among the most important factors influencing the success of learning (Ericsson, Krampe, & Tesch-Römer, 1993). But achievement is more than a function of ability (Dweck, 2006). Other drivers of achievement include motivation (the will to learn), metacognition (understanding how to learn) and resilience (the stamina for lifelong learning). An understanding of how these factors develop is useful for all learners (Hinton, 2005).

There are many theories and so-called success stories on how learning should be conducted in the classroom. Some self-proclaimed experts say students can become competent without investing serious time and effort if only the teaching was more fun, more brain-adequate, more computer-based, or if it occurred earlier in life. None of these claims is justified by the results of empirical research (research based on direct observation and experience) (Schneider & Stern, 2010). What we do know is that knowledge is multi-faceted. There is knowledge about abstract concepts, about how to efficiently solve routine problems, knowledge about how to master complex and dynamic problem situations, knowledge about learning strategies, knowledge about how to regulate one's own emotions, and so forth. All these factor in contributing to a person's overall competence (De Corte, 2010).

Environment is everything:

Creating environments that support brain development is a complex task. Experts in the fields of neurology and education agree, however that a child's physical and mental development should be considered as integrated factors when building an environment suitable for learning (Hinton, 2005). A powerful learning environment is characterized by a good balance, on one hand, between discovery and personal exploration, and on the other, systematic instruction and guidance. All this needs to take place in a setting that is sensitive to individual differences in abilities, needs and motivations among learners (Schneider & Stern, 2010). Nurturing is crucial to the learning process. Many of the environmental factors conducive to brain functioning are everyday matters – the quality of the social environment and interactions, nutrition, exercise and sleep – which may seem quite obvious, but they are easily overlooked in its impact on education. By conditioning our minds and bodies correctly, it is possible to take advantage of the brain's potential for plasticity and to facilitate the learning process (OECD, 2007).

Emotional experiences are built into the architecture of the developing brain. Emotion and cognition (the brain's ability to process information and apply knowledge), work together to guide the learning process. The emotions students feel during an experience become silent labels that steer future learning and decision-making (Hinton et al., 2012). What is interesting, is that we can learn to regulate emotional reactions – it's something children and adolescents aren't naturally good at, but with help, learning to harness negative emotions for more positive thought processes does improve the quality of learning. Effective emotional regulation strategies include reinterpretation (reframing a situation in a more positive way) and depersonalization (considering a situation objectively, rather than taking it personally) (Fischer & Hinton, 2010).

The human brain is essentially hardwired for social interaction, which allows us to connect to the experiences of others. Positive relationships facilitate learning, and so learning environments should be community-oriented (Fischer & Hinton, 2010). As children and adolescents interact with members of their family and others in their school and community, they internalize many of its beliefs and values. Their experiences (and therefore, their brains) are carved from the meaning and understandings they gain from their surroundings. Language, for example, has properties specific to one's culture, which influence young people greatly. It's important then, to be aware of this process and become attuned to one's cultural biases. Gaining this perspective is key to understanding the culture and surroundings of others. This kind of sensitivity is crucial in a world that is increasingly globalized (Fischer & Hinton, 2010).

Everyone learns differently. Genetics and life experience are the main reasons a classroom is made up of students with varying strengths and limitations. This is why a one size fits all approach to learning only results in success for some, with others falling behind and discouragement leading to the lack of motivation to learn.

Facilitating learning by using multiple means of representation, assessment and engagement helps accommodate students' differing learning pathways (Rose & Meyer, 2002). Understanding these differences – and the science behind the reasons why – is important to recognize if educators are to prepare students for a 21st Century, knowledge-based world.

Cognitive Sciences and Learning:

Educators have long known that new knowledge is built in different ways based on previous learning, and neuroscientists recognize this as a fundamental principle of how the brain learns (OECD, 2007; Schwartz & Fischer, 2003; Tobin & Tippins, 1993). The brain is also highly adaptive, a property called plasticity (Singer, 1994; Squire & Kandel, 2008). As we experience different things throughout life, there is creation and strengthening of the brain's neuronal connections and the weakening or elimination of others. Our brains continuously adapt to its environment, with previous experience having a powerful impact on the brain's readiness to learn (Hinton, 2005). Gradually, these experiences sculpt the architecture of the brain.

Learning experiences are translated into electrical and chemical signals that gradually modify connections among neurons in certain areas of the brain. Over time, these changes contribute to the reorganization of brain areas involved in certain types of learning. When a student has a learning experience, neurons are activated and there is a cascading effect in many areas of the brain. Over time, connections that are most active relative to other inputs are strengthened, while relatively less active connections are weakened or eliminated. This is what's referred to as the 'use it or lose it' rule. The more a student learns in a particular area, the more intelligent the brain becomes in that area (Hinton et al., 2012).

Learning: What is understood today

Many experts agree the goal of learning and instruction ultimately lies in what is called adaptive expertise (Bransford et al., 2006; Hatano et al., 1986). Adaptive expertise is the ability to apply meaningfully learned knowledge and skills flexibly and creatively in different situations. This concept is the opposite of routine expertise, which is the ability to complete typical school tasks quickly and accurately, but without understanding (De Corte, 2010).

How can teachers build adaptive competence? Several things come into play. Students must gain:

- Knowledge about facts, symbols, concepts and rules of the subject field in question.
- The know-how to problem solve, including the ability to decompose a problem into sub-goals and find a solution through a systematic approach to the task.
- Knowledge about their own cognitive functioning. This means students should be aware of how their attitude and motivation towards learning will affect the outcome. Recognizing a fear of failing at math, for example, or the belief their potential can be developed through learning and effort, are thoughts that need to be recognized for learning to succeed.

- Self-regulatory skills. These include the ability to plan and monitor one's own problem solving, and maintaining attention and motivation to find a solution.
- Positive beliefs about themselves as a learner.

Adaptive competence is important, but it isn't reflected in the traditional form of schooling – where the teacher makes all the decisions relevant to learning strategies, determining goals, and feedback. On the other hand, the ability to self-regulate one's own learning and thinking is an important part of adaptive competence. So, there should be a balance: Structure and guidance needs to be provided by the teacher where and when needed, but there should also be opportunity for self-regulated and self-determined student learning. It should also leave room for what Eisner (2001) calls "expressive outcomes", which are unanticipated results from learning in a variety of situations, such as a forest or a museum (De Corte, 2010).

The main message is this: **School learning needs to be more ambitious. It should be active and constructive, cumulative and more self-directed. It should also be more collaborative, and permit individually different processes of meaning construction and knowledge building (De Corte, 2007, 1995).**

Reconciling Research and Practice:

For educators, the main message of all this research is the brain is powerfully shaped by experience. This fact is good news because it means that a good educational experience can dramatically improve children and adolescents' brain development. However, it also underscores a great responsibility for society because a bad educational experience can threaten the physical integrity of children and adolescents' brains.

Mind, brain and education research does not support the simplistic notion that each student is either intelligent or not; rather, it points to a more nuanced perspective that recognizes that each student has a complex profile of strengths and limitations (Hinton et al., 2012).

Research on learning in education has undergone tremendous changes over the past two decades. Educators have gained greater insight into teaching methods, guidelines for effective teaching environments and assessment tools. Areas where neurobiology research has clear implications for education include maternal education, daycare program content, and the appropriate timing of social transition periods from home to school, school to university and beyond (Hinton, 2005). Research on mathematics learning, in particular, has yielded better understanding into the knowledge and skills required for problem solving, namely the benefit of learning by understanding strategy, as opposed to drills (Hinton, 2005).