

Important background factors

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Motivation

In a nutshell

- Motivation directs students' behaviour and effort in learning situations, positively affecting achievement. Motivation combined with effort is the key to success at school.
- A motivated learner sets goals and is focused on achieving the set goals. Such learners are not pushed by their teachers and parents to engage in reading and writing activities.

- While *intrinsic motivation* involves a learner's thoughts, ability, beliefs, and emotions in learning situations, *extrinsic motivation* often works only if the external reward is available. However, appropriate extrinsic motivation can also be beneficial and support the students' engagement in learning situations.

Motivation directs students' behaviours and efforts in learning situations, positively affecting achievement. Motivation combined with effort is the key to success at school. High interest in reading promotes later reading performance and improvement in reading skills. This module addresses the concept of learner motivation. It explores how a teacher can build learner motivation to acquire reading and writing skills. These strategies include but are not limited to arousing learners' interest in the subjects, maintaining the learners' curiosity, using a diversity of instructional designs, helping learners to set their own goals, encouraging learner autonomy, and valuing learner choices.

What is Motivation?

- The term motivation derives from the Latin word *movere*, which means *to move*. According to Vroom¹ Vroom V.H (1964), *Work and Motivation*. New York: Wiley , motivation is a process governing choice made by persons among alternative forms of voluntary activity. It is what makes us seek something more at one time than another.
- According to the expectancy-value theory of achievement motivation, beliefs and expectancies related to academic situations and subjective task values are central to educational outcomes²Wigfield, A. & Eccles, J.S. (2000). Expectancy–Value Theory of Achievement Motivation, *Contemporary Educational Psychology*, 25, Issue 1,

68-81.. Expectancies and ability beliefs are the students' beliefs in their competence in upcoming tasks. The value aspect of achievement motivation includes three components: attainment value, utility value, and intrinsic or interest value. Young children cannot clearly distinguish between the different dimensions of task values, except interest value, which refers to how much a child likes and enjoys performing tasks related to a particular topic. Besides interest, many other theories and conceptualisations of motivation have also been introduced in the literature, but interest has important developmental ramifications. In the learning context, interest is one of the reasons students interact with learning domains, perform specific tasks, or exhibit a particular learning behaviour³Hidi, S. & Renninger, K.A. (2006) The Four-Phase Model of InterestDevelopment, Educational Psychologist, 41:2, 111-127..

- Motivation is a complex concept associated with why students desire to participate in the learning process and what drives them to continue while others do not⁴Franken R.E, (1982), Human motivation. Brooks/Cole Publishing Company, Monterey, CA.. When a learner is motivated to learn to read, it is not enough that they only start working at learning to read but must be attracted to reading and to the process of learning to read. The interest in learning to read of a learner is seen through the effort, engagement and persistence they show through the difficulties faced in attaining mastery.
- Motivation impacts skills development and learning outcomes. Research in this area has revealed that motivation foretells the quality of engagement in learning situations and the degree to which learners pursue or avoid problems and persist when they face challenges.

What are the signs that a learner is motivated to learn?

- The highly motivated learner is known for their choices and how they make and act towards those choices, the energy they put into achieving the task, the persistence of effort in accomplishing it, the excitement they exhibit about learning and acquiring a skill, and the initiative they take in undertaking the learning task and other relevant things. Such learners are not pushed by their teachers and parents to engage in reading and writing activities.
- A motivated learner sets goals and is fascinated about achieving set goals. A motivated learner believes that accomplishing the tasks they are given in class will realise those goals. They look beyond the simple classroom rewards and recognitions for good performance. Their focus might be on the more significant achievement or far-reaching goals in life.

Intrinsic and extrinsic motivation

While *intrinsic motivation* involves a student's thoughts, ability, beliefs, and emotions in learning situations, *extrinsic motivation* often works only if the external reward is available. However, appropriate extrinsic motivation can also be beneficial and support the students' engagement in learning situations⁵Deci E.L., Ryan R.M. (1985) Cognitive Evaluation Theory. In: Intrinsic Motivation and Self-Determination in Human Behavior. Perspectives in Social Psychology. Springer, Boston.

a. Intrinsic motivation

- This is where a learner is interested in and commits oneself to the task at hand. The motivation to learn is from the learner and the task being performed. The early

grade learner who loves to read is intrinsically motivated. They commit themselves to a reading activity for pleasure, the learning it gives, the knowledge they will acquire and for the inner feeling of achievement. There is something about reading they enjoy, which makes them want to do it even if there is no “reward” for it. “I like to read because I love stories.” “I like to read because I want to know more about animals.”

b. Extrinsic motivation

- While intrinsic learner motivation is a more self-driven and inward joy for learning and accomplishing something, *extrinsic motivation* is interested in earning a reward from an external source. An extrinsically motivated learner will commit to a reading and writing activity to reward the teacher or the parent/caregiver for accomplishing the task. “*I will practice reading because I will get a good grade.*”
- The reward for extrinsically motivated learners is external to the learner and the task, such as praising a teacher/parent for reading well. It has nothing to do with loving or enjoying the task at hand. On the other hand, the reward for intrinsically motivated learners is internal (the pleasure that comes from learning and accomplishing the task).
- Over the years, researchers have found that intrinsically motivated children are more successful learners than those with more extrinsic motivation.
- A teacher should develop intrinsic motivation in learners as it encourages life-long learning. To alleviate or minimise some of the difficulties faced in promoting intrinsic motivation in your learners, some strategies that you will learn about further down are employed.

How can extrinsic motivation be used to foster intrinsic motivation?

- Since it is more critical to build intrinsic motivation over extrinsic motivation in learners, it is also acceptable to consider using extrinsic motivators to teach reading and writing skills. These external motivators can be used when the expected reading levels get more challenging, and the children show disinterest in continuing with the task.
- More so, they can be given when a child has made an effort to perform and recognise their competence.

The external motivators are also critical for triggering interest in the children who generally have zero interest in learning. The external rewards tend to build inward interest to learn eventually.

- Literature has shown that using extrinsic motivators (tokens of praise and recognition of exemplary performance) is acceptable for building intrinsic motivation. For some learners to develop an interest in reading and writing, “a bit of a push” or encouragement is required. The learners might develop long-lasting learning challenges if they depend on external sources of rewards.

How is motivation increased?

A positive learning environment encourages autonomy in learning.

- It has been assumed that children's success in learning the basics of reading has provided them with positive feedback on the learning situation at home and at school, thereby strengthening their motivation in

reading. Studies have demonstrated the important effects of the classroom environment and teaching practices on reading skills⁶Lerkkanen, M.K., Kiuru, N., Pakarinen, E., Poikkeus, A.-M., Rasku-Puttonen, H., Siekkinen, M. & Nurmi, J.-E. (2016). Child-centered versus teacher-directed teaching practices: Associations with the development of academic skills in the first grade at school. *Early Childhood Research Quarterly*, 36, 145-156..

- There are several ways teachers can show that they value the learner's independence in the learning environment. These aspects help boost internal learner motivation. Biancarosa et al.⁷Biancarosa, G., & Snow, C. E. (2004). *Reading next – A vision for action and research in middle and high school literacy: A report to Carnegie Corporation of New York*. Washington, DC: Alliance for Excellent Education., showed that allowing learners to choose the complementary books they want to read and decide which reading and writing activities in which to engage positively impact learner engagement and reading comprehension.
- When a teacher empowers learners to decide on what they would be happy to learn and the types of materials (it could be handcrafted) they are happy to use when learning, this type of teacher may yield good reading and writing outcomes. If a learner chooses a topic or material, they are likely to have more ownership of the lesson, be more actively engaged and accomplish the tasks. Guthrie et al.⁸Guthrie, J. T., & Humenick, N. M. (2004). *Motivating students to read: Evidence for classroom practices that increase reading motivation and achievement*. In P. McCardle & V. Chhabra (Eds.), *The voice of evidence in reading research* (pp. 329–54). Baltimore, MD: Paul H. Brookes Publishing found that empowering students to make decisions about topics, forms of communication, and choice of materials

encourages them to have greater ownership and responsibility for their engagement in learning. In short, the teacher should be more attentive to the learners and show that they respect their views and choices.

- Generally, the teacher has a lesson plan for a given day; this is essential, but the teacher needs to be flexible in their programme and practices. Teachers must listen to the children's needs and pay attention to their motivations so that their lessons can be successfully implemented. A competent teacher knows when the children are enjoying the lesson. For example, if a child suggests resourcefully creating cardboard materials and not using the chalkboard, the teacher should be happy to teach that way.
- Children are happier and more motivated to learn when teachers honour their perspectives. An effective teacher-child relationship is essential. The teacher should not always be with the thoughts of "I always know what is good for you to understand." The learner may lose the motivation to learn if they do not have any role in decision making about their own learning or the teacher is not interested in their problems or does not pay attention to their needs.

Interdisciplinary approach to learning: Make the literacy practices more relevant to learner interests and everyday life

- As a teacher, develop a habit of knowing the learners' names, performance, and interests. Engage yourself in the learners' lives to build an interdisciplinary instructional method that is in tandem with learner interests and everyday life and events. Search for opportunities that would aid as a conduit/link between outside and the inside classroom activities. Guthrie et al.⁹Guthrie, J. T., Wigfield, A., & VonSecker, C. (2000).

Effects of integrated instruction on motivation and strategy use in reading. *Journal of Educational Psychology*, 92(2), 331–41. says tune into the lives of learners to find out what they think is relevant and why; then use this information to design instruction and learning opportunities that will be more relevant to them.

- Construct an approach to learning that pulls together a literacy lesson and a real-world happening based on the interests of children. For example, if some of your learners are overly curious and enjoy exploring and manipulating the environment, you may link that to a given subject matter such as science. So, to build their inward motivation to learn to read, you may need to apply what they like (science) into a reading lesson. If the learner shows more interest in symbolic play (where children express feelings and ideas using language, painting, drawing, numbers, music, dance), employ these features in your instructional approach to literacy. If some children engage most in fantasy and socio-dramatic play ('pretend' play where children build social skills by taking on a role, acting and speaking in character) that usually involve such characters as a doctor, a lawyer, journalism and so forth, design your literacy instruction accordingly to build inner learner motivation in reading, writing, and comprehension skills.
- Teaching and learning must be connected across developmental domains and subject areas such as maths, language and literacy, and science to trigger interest in learners. Such connections across curricula and teaching are best made through approaches that are not just "integrated" (which often means making connections that are shallow and do not serve learning goals) but "interdisciplinary"—making rich connections among domains and subject areas but allowing each to retain its core conceptual, procedural, and epistemological

structures. This implies that you can link literacy and science to increase learners' motivation as a teacher, especially if some like one over the other. For a winning result, you must delve deep into both subjects by making rich and relevant connections, but simultaneously show that the learning in two subjects is independent.

Build in certain instructional conditions, such as learner goal-setting, self-directed learning, and collaborative learning, to increase reading engagement¹⁰Guthrie, J. T., Anderson, E., Alao, S., & Rinehart, J. (1999). Influences of concept- oriented reading instruction on strategy use and conceptual learning from text. *Elementary School Journal*, 99(4), 343–66.

- Self-directed learning is about the mind and the continuous growth of intelligence. It mainly looks at four critical stages of independent learning: a) being ready to learn, b) setting learning goals, c) engaging in the learning process, and d) evaluating learning.
- The importance of developing self-directed learners in a classroom is for the teacher to have learners with the right tools to stand by themselves and use if and when they cannot solve a problem or figure out an answer. It is the role of the teacher to equip learners with such tools. The teacher can provide learners with such tools by:
- Instilling an “I can” attitude helps learners know that even if they fail or are disappointed, they can pull through; they can do anything. All they need to do is focus on the bigger picture.
- Instil learners with the knowledge that failing is okay but encourage them to pick themselves up and repeatedly try until they have a breakthrough. The process of failing and picking oneself leads to new discoveries and

development in a learner.

- Through examples of role models, tell your learners the importance of perseverance.
 - Help learners believe in their abilities. Present yourself as a significant other in their lives and tell them you believe in them. This will help them believe in themselves.
 - Teach learners to pull themselves out of the negative thoughts; show them that the negative thoughts in their minds might be holding them back.
 - Offer students current and frequent individual feedback during lessons and other activities.
 - Teach learners to set and manage their learning goals. You can begin by helping students set small, achievable goals that can be achieved relatively quickly. This will help them understand the process of setting and achieving goals. With younger learners, start in a small but practical way. For example, a teacher could assist a learner set such a goal. By break time today, I will know where letter /a/ is in the classroom. Once a learner grasps the concept of setting goals, they can set more long-term goals.
 - Learn something new together with your learners so that they can benefit from your knowledge. Learning techniques are sometimes acquired through collaborative learning. To build more independent knowledge in learners, collaborative learning plays a part.
 - Create a classroom environment that allows participation and expression of views. Each learner's voice should be listened to so that a learner can feel valued. This will develop their self-worth, self-esteem and feeling of autonomy.
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- **Learner goal-setting** means learners establish achievement targets and take responsibility for their learning.

Positive teacher-student relationships can contribute to a warm classroom environment that facilitates successful adaptation in school and thereby increases learners' motivation to learn. As a teacher, you must build a good relationship with your learners. A school is a new environment for an emergent learner. As the significant other in a student's life, you have the responsibility to make the learner comfortable so that learning can be encouraged.

- When children enter school or transition to the next level, they encounter a variety of new challenges, such as creating positive relationships with peer groups and adults in the school environment and learning to meet the demands of a wide range of cognitive, social, and academic task ¹¹Baker, J. A. (2006). Contributions of teacher-child relationships to positive school adjustment during elementary school. *Journal of School Psychology*, 44, 211-229..
- Teacher-child relationships play a prominent role in developing preschool and early school competencies¹²Hamre, B. K., &Pianta, R. C. (2001). Early teacher-child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, 72(2),625-638.. Teachers may function as social agents, and they can affect learners' cognitive and socio-emotional experiences by creating a classroom setting that stimulates learner motivation and learning.

More practical tips for reading motivation

- **Give time for reading:** Set aside 15 minutes daily for reading in the classroom; children can read independently or in pairs as their skill level allows.
- **Read aloud as daily practice:** Children can fall in love with written stories before reading independently.

- **Make reading fun for all:** Use games, songs, arts and crafts activities, theatre, or discussion related to the text.
- **Choose the optimal level of texts:** Encourage the child to read books or stories at their optimal independent reading level; their reading skills will grow steadily.
- **Personalise goals for reading:** Grade-level goals may not be appropriate for all students. Set personalised goals around the factors proven to increase achievement gains: time spent reading, appropriate text and comprehension level.
- **Give positive feedback:** While you monitor students' reading progress, encourage them with positive, meaningful and actionable feedback.
- **Encourage reading at home:** Involve parents by sharing insights about the importance of reading to encourage their children to read during free time and for fun.
- **Believe that every child can learn to read:** Believing that every child can become a reader is one of the most powerful motivators for the child.

Research briefs

[The Relative Importance of Intelligence and Motivation as Predictors of School Achievement: A Meta-analysis](#)

[I Can Do This! The Development and Calibration of Children's Expectations for Success and Competence Beliefs](#)

[The Development of Academic Coping in Children and Youth: A Comprehensive Review and Critique](#)

[The Role of Academic Buoyancy and Emotions in Students' Learning Related Expectations and Behaviour in Primary School](#)

Read more

[Good teaching practices](#)

[Child-centered Reading Practices](#)

Additional reading

[Attention and Deafness](#)

Attention

In a nutshell

- Attention is often compared to a beam of light. It helps us select from the rich field of stimuli in our environment and from the memories, images, and thoughts that our mind is processing.
- Attention can be directed to these stimuli either voluntarily or involuntarily.
- For instruction and learning, it is important to study how we can support and develop voluntary attention and what kind of teaching practices and environments support this development.

Attention is often compared to a beam of light. It helps us select from the rich field of stimuli in our environment and from the memories, images and thoughts that our mind is processing. Attention can be directed to these stimuli either voluntarily or involuntarily. Attention is based on *arousal*, which is needed for directing and maintaining attention. It is common for our observations to deteriorate because of fatigue

and the decline in arousal or alertness, making us that much less able to listen to, for example, lessons. This phenomenon is referred to as *involuntary attention* or *orienting*, where changes in our perceptual field or the novelty of a stimulus awaken our attention and raise our arousal level. It may also rise due to inner stimuli, as when we suddenly remember something we have forgotten¹³Luria. A.R. (1973). The working brain. An introduction to neuropsychology. Middlesex: Penguin Books..

Voluntary and selective attention

Since teaching and learning processes in the classroom cannot be based solely on involuntary attention or orienting that depends on the novelty and power of stimuli, it is important to understand how the third attention mechanism – *voluntary attention* – develops and works. The ability to focus on the task at hand and ignore distractions, also called *selective attention*, appears to have reverberating effects on several domains important to academic foundations, including language, literacy and maths.

Development of voluntary attention

In his theories of child development, Lev Vygotsky connected the development of voluntary attention to verbal interactions between children and adults. He suggested that the most important mechanism in the development of voluntary attention is the way the adult verbally guides the child and how the child's inner speech develops based on interaction and the child's own external speech¹⁴Luria. A.R. (1973). The working brain. An introduction to neuropsychology. Middlesex: Penguin Books..

How does this happen?

The adult often guides the child's attention by pointing at objects in the environment and naming these objects (e.g.,

“Look, there is a lamp.” “This is a red ball.”) Researchers call this *joint attention* because both the child and the adult are focusing their attention on the same target (the lamp or ball) and the target is also very often named by the adult. Eventually, we may notice that the child begins to point at targets in the environment and waits for the adult to name them (e.g., “Yes, it is a lamp.”) Quite similarly, when we observe the child’s behaviour, we may notice that she or he may start to imitate the adult by speaking aloud the instructions and orders (e.g., “Don’t touch. Hot.”) In the first phase, the child’s own instructions do not, unfortunately, control behaviour, and the child may touch something that is too hot. But when that happens, the child is already approaching the developmental milestone of using his or her own means of speech to begin regulating attention and behaviour and to behave according to his or her own instructions.

Inner

speech

The developmental phase in which children speak aloud to themselves is often quite short. This kind of speech gradually starts to turn into the child’s own private or inner speech. Inner speech is not identical to thinking, because thinking and problem solving proceed not only by using words but also mental images and fast jumps. But we all may recognize situations where we “discuss with ourselves” by using silent inner speech or, in some situations, also by speaking aloud.

Attention and learning

Based on these findings, it is easy to understand that attention is closely connected to self-regulation and executive functions. Moreover, voluntary attention, selective attention, and learning are very close-knit. We can, with good reason, suppose that learning is most effective when we direct

our voluntary attention to the material we are studying. Because we know that our attentional capacity is limited (like the beam of light) and can't be directed to everything in our environment, it is vital to understanding that attention contains different subprocesses or skills that are important in learning¹⁵Stevens, C Bavelier, D. (2012). The role of selective attention on academic functions: a cognitive neuroscience perspective. Developmental Cognitive Neuroscience, 25, 530-548..

According to Mirsky et al.¹⁶Mirsky, A.F., Anthony, B.J., Duncan, C.C. et al. (1991). Analysis of elements of attention: a neuropsychological approach. Neuropsychological Review, 2: 109-145., the most important subprocesses are:

1. *Focusing attention* (the ability to focus our attention on the most important things)
2. *Sustaining attention* (the ability to maintain attention long enough so that learning new things is possible)
3. *Dividing attention* (the ability to attend to separate things at the same time)
4. *Shifting attention* (the ability to move attention fluidly to a new target)
5. *Inhibition or impulse control* (the ability to attend to the target despite disruptive stimuli or activity incentives)¹⁷Mirsky, A.F., Anthony, B.J., Duncan, C.C. et al. (1991). Analysis of elements of attention: a neuropsychological approach. Neuropsychological Review, 2: 109-145..

Children's abilities are individual. In addition to psychological testing, the teacher's observations in the classroom are very beneficial and important when trying to understand what kind of attention problems a child may have that hinder learning in the classroom.

Attention and the brain

Because voluntary and selective attention contain many different subprocesses, it is understandable that these functions also require an extensive neural network that includes parts from the lower brain structures and also different cortical structures, especially in the frontal and parietal lobes. These attentional mechanisms are supposed to amplify and sharpen the visual and auditory perceptions we are focusing our attention on and to inhibit those that are outside of our focus. Based on the requirements of the tasks and attention, these functional neural systems in our brain carry out different functions that vary according to time and will make our voluntary activity (e.g., learning new information and skills in the classroom) possible¹⁸Petersen, S.E., & Posner, M.I. (2012). The attention system of the human brain: 20 years after. *Annual Review of Neuroscience*, 35, 73-89..

To summarize

For instruction and learning, it is important to study how we can support and develop voluntary attention and what kind of teaching practices and environments support this development. We also have to learn more about how attentional problems may affect, for example, learning to read or learning basic math skills. It is possible that attentional demand may vary depending on the nature of the skills children are learning.

How can you get learners to pay attention

Be clear in your expectations. At the outset of class, clearly communicate your expectations. If you have specific directions you would like to convey to your learners for a project or activity, be sure to express them in a way that's easy to understand and doesn't cause confusion.

Be patient. Sometimes simply waiting quietly for your learners

to refocus their attention on the lesson, and on you, is a great way to express just how important it is for your learners to pay attention to their teacher.

Keep in control. Anticipation is important, so keep scanning the room and making eye contact with all learners. You will catch those who are starting to fidget, looking out of the window, or chatting to their classmates. Then you can react accordingly before the noise level has distracted everyone and created a situation.

Keep in tune with the class. Don't just glide along with the best learners. One learner answering your questions is not proof that all the others are following the discussion. Aim for responses from as wide a sample as possible. Don't just accept answers from the three or four class leaders, or you will leave the rest behind.

Teach at the appropriate difficulty level. Material that is too easy or too difficult can result in learner inattention. Check for understanding or boredom at the beginning of each activity. Then tailor the material to the class.

Keep checking understanding. Try not to use close-ended questions such as "Do you understand?" or "Has everyone got that?" Learners are notoriously wary of admitting they haven't understood, especially if their peers are feigning comprehension! Instead, check understanding with open-ended questions to see if they have understood the concepts.

Keep demonstrating. Attention wanders when learners don't know what to do and are too afraid to admit it. Keep your instructions to a minimum, and demonstrate what to do rather than giving lengthy or detailed explanations. Call on pairs who are doing the task successfully to demonstrate their work as an example for the others.

Call and response. If you say, "Alright, stop," and all your learners respond, "Collaborate and listen!" then you know

you've regained their eyes and ears. Attention-grabbers like these are great at focusing learners' attention.

Try the 10:2 method. Allow learners two minutes to process and respond for every ten minutes of instruction. Try strategies such as having them ask a question or discussing the content with a fellow learner.

Incorporate movement and physical activity into your lessons. How about having learners stand as they ask a question or demonstrate a problem on the whiteboard? Simple movements like these can be refreshing and stimulating. You can also have them do jumping jacks, knee bends, twists, stretches, or your favourite yoga poses – anything that makes the heart rate spike will do.

Provide frequent (as often as possible) and effective (precise) feedback. Proper feedback is an essential part of learning and assessment. When done in an empowering and constructive way, it keeps learners motivated to progress and succeed. Giving feedback frequently empowers them to move forward.

Allow learners five-to-seven seconds of thinking time when asking a question. Make sure learners have time to consider options and respond to questions. Some will be quicker than others, so use your best judgement as to what are reasonable wait times.

Have learners use the 3-2-1 method of summarizing at the end of a lesson. This is a great, quick tool that works amazingly well. Have learners write down three things they learned, two interesting things, and one question they have. Next, they can share these reflections as a class or in smaller groups.

Periodically pause mid-sentence. This gives learners a chance to absorb and process what you've said. Additionally, it gives them a chance to come forward with any questions they have.

Change the pitch and tone of your voice. Often just changing the pitch and tone of your voice by lowering it or raising it will signal to the learners that it's time to pay attention.

Use storytelling. Storytelling is a powerful way to introduce lessons. Nothing captures attention as effectively. The inherent mystery in stories draws learners into whatever world you create for them and keeps them there as they transform your descriptions into moving mental pictures.

Engage curiosity. This strategy uses curiosity, which all learners have in abundance, to entice them into following along. The use of curiosity starts with a promise. The teacher asks learners to pay close attention, to mentally engage throughout the early stages of the lesson, because if they do, there will be a payoff at the end. For example, the teacher might say, "Stick with me through these first couple of steps and I'll show you something really cool." (Or, "We're going to do something really cool," – or amazing, scary, hilarious, beautiful, fascinating, easy, fun, or any other number of possibilities.) By holding back the part of the lesson that is most interesting or attractive to learners and dangling it like a carrot, you provide them a compelling reason to pay attention. When you pause and look around the room before revealing the one thing they've been waiting for, you'll see the anticipation on their faces. And their recall of everything leading up to that moment? Spot on. You can use this strategy several times a day, and it will never lose its attention-attracting lustre.

Use humour. Using humour related to the content is another attention-getter. Learners appreciate teachers who know how to appropriately use humour related to the material.

Research briefs

[The Role of Selective Attention on Academic Foundations: A Cognitive Neuroscience Perspective](#)

Executive function

In a nutshell

- Executive functions refer to the set of self-regulatory skills involved in the conscious, goal-directed modulation of thought, emotion, and action. Children are not born with the skills that enable them to control their impulses, make plans, and stay focused. But children are born with the potential to develop these capacities.
- Executive functions are a quite complicated issue, but it is also one of the “Hot topics” in the educational and psychological fields.

Executive function (or functions) refers to a group of skills that helps us to focus on multiple streams of information at the same time, monitor errors, make decisions in light of available information, revise plans as necessary, and resist the urge to let frustration lead to hasty actions. We could also say that executive functions refer to the set of self-regulatory skills involved in the conscious, goal-directed modulation of thought, emotion, and action.

Children are not born with the skills that enable them to control their impulses, make plans, and stay focused. But

children are born with the potential to develop these capacities. How these skills develop during infancy, childhood, and adolescence depends on the child's experiences. These skills, called *executive function* (EF), develop through practice and are strengthened by the experiences through which they are applied and honed.

Executive function refers to a group of skills that helps us to focus on multiple streams of information at the same time, monitor errors, make decisions in light of available information, revise plans as necessary, and resist the urge to let frustration lead to hasty actions. We could also say that executive functions refer to the set of self-regulatory skills involved in the conscious, goal-directed modulation of thought, emotion, and action.

Acquiring the early building blocks of these skills is one of the most important and challenging tasks of the early childhood years, and the opportunity to build further on these rudimentary capacities are critical to healthy development throughout middle childhood and adolescence.

Interest in executive function and its development during childhood is based in large part on evidence that individual differences in these skills predict a wide range of important developmental outcomes, including school readiness, school performance and social competence in adolescence, and better physical health, higher socioeconomic status (SES), and fewer drug-related problems and criminal convictions in adulthood. The predictive power of EF is often greater than that of the intelligence quotient (IQ), and long-term predictions are seen even when controlling for IQ and childhood SES.

We know now that EF skills provide an important foundation for learning and adaptation across a wide range of contexts, and children who arrive at school with well-practised EF skills may find it easier to sit still, pay attention, remember and follow rules, and flexibly adopt new perspectives.

As neurocognitive skills, EF skills are attentional skills, or ways of using attention, that depend on specific neural circuits in our brain, in this case involving regions in the prefrontal cortex and other areas. These attentional skills serve to modulate attention in the service of a goal – flexibly, over time, and selectively – and consequently, they serve to control our behaviour in corresponding ways¹⁹Goldstein, S., & Naglieri, J., A. eds. (2014). Handbook of executive Functioning. Springer: New York.²⁰Center on the Developing Child at Harvard University (2011). Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function: Working Paper No. 11. http://www.developing_child.harvard.edu.²¹Fiske, A., & Holmboe, K. (2019). Neural substrates of early executive function development. *Developmental Review*, 52, 42-62. .

What are the executive functions?

Three processes of executive functions are most often highlighted: *working memory*, *inhibitory control*, and *cognitive or mental flexibility*²²Goldstein, S., & Naglieri, J., A. eds. (2014). Handbook of executive Functioning. Springer: New York.²³Center on the Developing Child at Harvard University (2011). Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function: Working Paper No. 11. http://www.developing_child.harvard.edu..

Working memory is the capacity to hold and manipulate information in our heads over short periods of time. It provides a mental surface on which we can place important information so that it is ready to use in the course of our everyday life. It enables children to remember and connect information from one paragraph to the next, to perform an arithmetic problem with several steps, to keep track of the moves and make a logical next step in a game of checkers, and

to follow multistep instructions without reminders (“Go to your cubbies, put away your storybooks, bring back your arithmetic books, and open them to page 30.”) It also helps children with social interactions, such as taking turns in group activities or easily rejoining a game after stepping away to get a drink.

Common manifestations of weak working memory in children are, for example:

- Difficulties in following multistep directions
- Forgetting to bring materials to and from school
- Forgetting to hand in homework
- Forgetting to do chores
- Forgetting when assignments are due

Read more about working memory [here](#).

Inhibitory control is the skill we use to master and filter our thoughts and impulses so that we can resist temptations, distractions, and habits, and to pause and think before we act. Inhibitory control involves deliberately suppressing attention (or other responses) to something (e.g., ignoring a distraction or stopping an impulsive utterance). It makes possible selective, focused, and sustained attention, prioritization, and action. This capacity keeps us from acting as completely impulsive creatures who do whatever comes into our minds. It is the skill we call on to push aside daydreams about what we would rather be doing so we can focus on important tasks. It is the skill we rely on to help us “bite our tongue” and say something nice, and to control our emotions at the same time, even when we are angry, rushed, or frustrated. Children rely on this skill to wait until they are called on when they know the answer, to be good at games like Simon says and red light □green light, to stop themselves from yelling at or hitting a child who has inadvertently bumped into them, and to ignore distractions and stay on task in

school.

Common manifestations of weak inhibitory control in children are, for example:

- Acting without thinking
- Interrupting others
- Blurting out comments or answers to questions in class
- Talking or playing too loudly
- Acting wild or out of control

Cognitive or mental flexibility is the capacity to nimbly switch gears and adjust to changed demands, priorities, or perspectives. It is what enables us to apply different rules in different settings. Cognitive flexibility involves thinking about something in multiple ways – for example, task switching or considering someone else’s perspective on a situation. If a friend asks if we like her new haircut and we don’t, we are able to flexibly shift to the social convention that governs not hurting people’s feelings. Likewise, we teach our children about “outside voices” and “inside voices” and the different situations in which they should use each. As the author of *The Executive Brain*, Elkhonon Goldberg, notes, “the ability to stay on track is an asset, but being ‘dead in the track’ is not.” Stated differently, self-control and persistence are assets; rigidity is not. Cognitive flexibility enables us to catch mistakes and fix them, to revise ways of doing things in light of new information, to consider something from a fresh perspective, and to think outside the box. Children deploy this skill to learn exceptions to rules of grammar, to approach a science experiment in different ways until they get it to work, or to try different strategies when they are working out a conflict with another child²⁴Goldstein, S., & Naglieri, J., A. eds. (2014). *Handbook of executive Functioning*. Springer: New York..

Common manifestations of weak cognitive or mental flexibility in children are, for example:

- Being upset by changes in plan
- Resistance to change or routine
- Getting stuck on one topic or activity
- Not being able to come up with more than one solution to a problem
- Difficulty in handling open-ended tasks

“Hot” and “cool” executive functions

We know that it can be a lot harder to think things through in the heat of the moment or when we're frustrated or angry. But why is that? What's happening in our brain? To understand why children – and adults – make decisions differently depending on whether the stakes are high or low, it helps to learn about “hot” and “cool” executive functions²⁵ Zelazo, P., D. (2015). Executive function: Reflection, iterative reprocessing, complexity, and the developing brain, *Developmental Review* (2015), doi: 10.1016/j.dr.2015.07.001. .

Hot executive functions refer to the self-management skills we use in situations where emotions run high. *Cool (or cold) executive functions* refer to the skills we use when emotions aren't really a factor.

Cool EF, assessed in relatively arbitrary or decontextualized tasks (e.g., measures of cognitive flexibility, working memory, and inhibitory control), rely more on neural networks involving lateral parts of the prefrontal cortex. For example, a widely used test of working memory asks children to remember a list of numbers and then say them in reverse order, from last to first. This test is challenging, to be sure. But it's not overly emotional.

Hot EF refer to those aspects of EF that are needed in

situations that are motivationally significant. Hot EF are typically assessed in tasks that require the flexible reappraisal of whether to approach or avoid a salient stimulus. One example is the delay of gratification (which involves avoiding a more salient immediate reward and approaching a less salient one). Hot EF are also involved in deliberate emotion regulation. Hot executive functioning skills allow us to think more objectively about our own meaningful decisions. These skills can help us resist temptation for the sake of a more important goal.

Hot and cool EF, which typically work together in solving real-world problems, are both forms of deliberate, effortful, top-down, self-regulatory processing that depend on the prefrontal cortex but vary in the extent to which they require the management of motivation and emotion, including the goal-directed modulation of basic approach and avoidance motivations.

Development of executive function

Children are not born with the skills that enable them to control impulses, make plans, and stay focused. But children are born with the potential to develop these capacities. How these skills develop during infancy, childhood, and adolescence depends on the child's experiences.

Children's capacities to retain and use new information, focus attention, control impulses, and make plans are acquired during early childhood, but the full range of executive function skills continues to develop into the adolescent years²⁶Goldstein, S., & Naglieri, J., A. eds. (2014). Handbook of executive Functioning. Springer: New York.²⁷Center on the Developing Child at Harvard University (2011). Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function: Working Paper No. 11. http://www.developing_child.harvard.edu.²⁸Zelazo, P., D.

(2015). Executive function: Reflection, iterative reprocessing, complexity, and the developing brain, *Developmental Review* (2015), doi: 10.1016/j.dr.2015.07.001.

²⁹Akshoomoff, N., Timothy T., Brown, T., T., Bakeman, R., & Hagler, D. J. Jr. (2018). Developmental Differentiation of Executive Functions on the NIH Toolbox Cognition Battery. *Neuropsychology*, 7, 777-783..

The first signs of these capacities emerge toward the end of the *first year of life*. Children begin to display gains in selective attention with external distraction being less predominant.

At the age of two, children become more capable of problem-solving with the acquisition of language. They begin to use language to regulate behaviour. At two, children are also able to follow verbal rules, requests, and directives. They are beginning to keep verbal rules in mind and use them to guide their behaviour. Gains in rule and language use continue to grow and impact learning.

At the age of three, the child is no longer impulsively responding to stimuli in a rigid stereotyped way but rather acting deliberately and flexibly in light of a conscious plan. At three, most children can organize themselves to complete tasks that involve following two rules (e.g., "If it's red, put it here, but if it's blue, put it there."), thus showing that they can direct and redirect their attention to make deliberate choices (mental flexibility), maintain focus in the face of distractions (inhibitory control), and keep rules in mind as they figure things out (working memory). While we can see clear evidence that these capacities are developing in three-year-olds, they remain relatively limited.

Between the ages of three and five, children demonstrate significant gain in performance on tasks involving inhibition and working memory. They are beginning to reflect on their own actions. Cognitive flexibility, goal-directed behaviour, and

planning gains are noted. They are developing complex sets of rules to guide and regulate their behaviour. They begin to think about the intention or the act of doing rather than simply responding to the environment.

The five-year-old mind, by contrast, is remarkably complex. Preschoolers can verbalize their knowledge of what is the right thing to do but often are not able to actually follow through on it. The need for immediate gratification overrides planning and reasoning capabilities. Furthermore, their ability to successfully implement strategies to limit impulsive responses are not yet developed, though they are emerging. Older preschoolers are capable of conscious problem-solving that involves the ability to shift their attention from one rule to another that is incompatible with the first, and then back again (e.g., "If it's the colour game, put the red square here, but if it's the shape game, put the red square there.") They also have the capacity to inhibit responses that are inappropriate even if highly desired (e.g., "I want to eat the candy right now, but I'll wait because I will get more candy later if I do.") or habitual (e.g., "I've been sorting by colour for five minutes, but now I need to shift to the shape rule.") and to execute multistep, deliberate plans (e.g., "To stack these balls in the right order with just three moves, I need to start here, do this next, and then do that.") A more familiar demonstration of this remarkable development can be seen in the growing proficiency with which young children play games such as Simon says and red light □ green light. At age five, these skills are just emerging and still require considerable practice. They are also heavily dependent on the situation and a child's experience with it, and there are large individual differences in children's capacity to deploy these evolving skills.

By the age of seven, some of the capabilities and brain circuits underlying executive function skills are remarkably similar to those found in adults.

By the age of fifteen, working memory, inhibitory control, and the ability to sustain and appropriately shift attention are close to adult levels and remain relatively stable, with some small increases noted into adulthood. Though teens function at or near adult levels, their self-monitoring and self-reflective abilities are not fully mature. Furthermore, when placed in highly complex situations or a situation in which they are required to integrate numerous pieces of information to make an informed decision, teens will show shortcomings. They tend to base decisions on the advantages of a given situation while underplaying the disadvantages.

Once these foundational capacities for directing attention, keeping rules in mind, controlling impulses, and enacting plans are in place, the subsequent developmental tasks of refining them and learning to deploy them more efficiently can proceed into the adolescent and early adult years as tasks grow increasingly complicated and challenging. Developmental studies also support the hypothesis that executive functions become increasingly differentiated from other cognitive functions with development as the functional specialization of neural systems progresses throughout childhood and young adulthood. Executive functions in younger children tend to be less differentiated from other cognitive abilities because of the substantial development of frontal lobe structure and function that occurs throughout childhood and adolescence and into early adulthood.

Because of the long maturation process of executive function skills, children are acutely sensitive to early experiences that can either hinder or boost their abilities. Stress, for instance, can be so damaging to a young child's executive functions that it can lead to a misdiagnosis of attention deficit hyperactivity disorder. On the other hand, enhancing experiences, such as a positive parent-child relationship, can protect children against the negative effect of stressful circumstances, such as living in poor economic conditions;

consequently, they can improve executive functioning. Responsive parents who use gentle rather than harsh discipline and who are supportive of their child's autonomy also tend to raise children with better executive function skills.

Executive function in schools

Children who arrive at school with well-practiced executive function skills may find it easier to sit still, pay attention, remember and follow rules, and flexibly adopt new perspectives; they may also learn more easily. Evidence shows that strong executive function skills serve as a protective factor helping children in extreme poverty overcome the risk of poor academic achievement.

The role of EF in school readiness and success

From an educational perspective, there is a need to prioritise EF due to the role of executive function skills in school readiness and academic success, as well as social interaction. When children begin formal schooling, they rely on the EF system to meet novel academic and social challenges³⁰ Diamond, A., & Ling, D.S. (2016). Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not. *Developmental Cognitive Neuroscience*, 34-48.³¹ Diamond A., Ling, D.S. (2020). Review of the evidence on, and fundamental questions about, efforts to improve executive functions, including working memory. In J.M. Novick, M.F. Bunting, M.R. Dougherty, & D.R. Engle, Eds (2020). *Cognitive and working memory training. Perspectives from psychology, neuroscience and human development.* (pp 143-431). Oxford University Press: Oxford.³² Keenan, L., Conroy, S., O'Sullivan, A., & Downes, M. (2019). Executive functioning in the classroom: Primary school teachers' experiences of neuropsychological issues and reports. *Teaching and Teacher Education*, 102912. :

- Successful learning often requires children to complete tasks while retaining verbal instructions and selectively ignoring distractions. This means that core components of EF are required for various learning activities that take place in the classroom. Working memory, for example, allows a child to follow verbal instructions and retain information, and is also an essential building block in the acquisition of early literacy skills and successful reading comprehension.
- There has been a recent focus on the relation between EF proficiency and measures of school readiness and academic achievement. Research shows that EF measures, such as working memory and inhibitory control, can be a better predictor of later academic achievement in numeracy and literacy than measures of intelligence. Good EF skills in the preschool years may therefore allow for a smooth transition into formal schooling, with EF appearing to be the main predictor of both academic and socio-emotional school readiness.

Executive function and school

A range of factors influences the development of executive functions³³ Keenan, L., Conroy, S., O'Sullivan, A., & Downes, M. (2019). Executive functioning in the classroom: Primary school teachers' experiences of neuropsychological issues and reports. *Teaching and Teacher Education*, 102912. . For a young child at the primary school stage, this can include biologically determined neurodevelopmental trajectories, home and family factors, classroom environments, and teacher behaviour. Children who arrive at school with well-practised executive function skills may find it easier to sit still, pay attention, remember and follow rules, and flexibly adopt new perspectives. They may learn more easily and, as a consequence, feel more optimistic about school and get along

better with teachers and peers. Research shows that by targeting executive skills, teachers can help children improve their academic outcomes. Evidence shows that strong executive skills serve as a protective factor helping children in extreme poverty overcome the risk of poor academic achievement.

Depending on the country, children typically enter formal schooling between the ages of three and seven. From the development of executive functions, we know that this is also a period of rapid EF development, and it means that these functions are also particularly malleable in these years. Thus, school-related factors can influence developmental trajectories at this crucial stage of executive function skill development. Structured classroom environments with consistent rules and scheduling, for example, can facilitate executive function development, allowing children with developmental delays the opportunity to target the same milestones as their peers.

In school, children use their “cool” executive functions to direct their attention and their behaviour selectively and flexibly, and difficulties in these “cool” executive functions can adversely impact learning. Similarly, difficulties in “hot” executive functions may appear as difficulties in emotional regulation and have adverse effects on the child and his or her peers in the classroom. In early educational settings like kindergarten, many teachers report that the ability to sit still, follow rules, and pay attention are even more important for classroom success than literacy and numeracy.

It is very important for us to know that children’s EF development can also be influenced by pedagogical practices and teacher behaviour. Autonomy-supportive teaching styles that allow children to actively pursue intrinsic goals, for example, can encourage EF skill development. This can result in increased motivation and improved EF skills in children.

Teacher-child relations can also influence EF skill development. Longitudinal research has found that the development of working memory is best fostered through positive teacher-child interactions free from conflict. And, conversely, recent research suggests that teachers who mislabel young children's executive dysfunction as behavioural problems or "bad behaviour" may unintentionally create negative learning experiences for these children.

Helping children to improve executive functions

One way to help young children practice executive function is by reducing the demands placed on their executive functions so that the task is challenging but not too challenging. Training new skills always in the same context (e.g., in the classroom) is not so easily generalized to other contexts. Variable training, where children are continually presented with novel situations in which to practice a new skill, leads to better long-term performance than constant or blocked training with the same materials.

Helping children improve "hot" and "cool" executive functioning skills

It can be helpful if teachers/educators develop strategies ahead of time. Roleplay can help children prepare for stressful situations. Practising what to do or say might make it easier for them to make good decisions ³⁴Diamond, A., & Ling, D.S. (2016). Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not. *Developmental Cognitive Neuroscience*, 34-48. ³⁵Diamond A., Ling, D.S. (2020). Review of the evidence on, and fundamental questions about, efforts to improve executive functions, including working memory. In J.M. Novick, M.F. Bunting, M.R. Dougherty, & D.R. Engle, Eds (2020). *Cognitive and working memory training. Perspectives from psychology, neuroscience*

and human development. (pp 143-431). Oxford University Press: Oxford.³⁶ Keenan, L., Conroy, S., O'Sullivan, A., & Downes, M. (2019). Executive functioning in the classroom: Primary school teachers' experiences of neuropsychological issues and reports. *Teaching and Teacher Education*, 102912. .

Indeed, both "hot" and "cool" executive functioning skills can be improved through practice. One way to help young children practice executive functions is by reducing the demands placed on their executive functions so that the task is challenging but not too challenging. This can be as simple as giving one direction at a time or removing "hot," desirable distractions so that they don't have to work so hard to stay focused.

Parents can give children chances to exercise and grow their executive functioning skills in situations that children can manage. This allows them to practice their skills successfully.

Since a child's executive functioning skills become better through practice, the challenge can be regularly increased. In this way, parents can help children acquire deliberate self-regulation skills. These "hot" and "cool" skills will help them solve a wide range of problems, from doing well in school to making smart choices as a teenager.

How to most effectively improve executive functions

Diamond and Ling³⁷ Diamond, A., & Ling, D.S. (2016). Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not. *Developmental Cognitive Neuroscience*, 34-48.³⁸ Melzer, L. ed. (2018). *Executive function in education. From theory to practice*. Second edition. Guilford: New York. have stated that activities will most successfully improve executive functions if they include the following elements:

1. *They will tax executive functions, challenging children in new and different ways.* Real-world activities train diverse executive function skills in diverse situations. Training new skills always in the same context (e.g., in the classroom) is not so easily generalized to other contexts. Variable training, where children are continually presented with novel situations in which to practice a new skill, leads to better long-term performance than constant or blocked training with the same materials (e.g., as in computer games). School programs that embed training in, and challenges to, executive skills in diverse activities, such as reading, math, and play, capitalize on this principle.

▪ *They will be personally meaningful and relevant, inspiring on the part of the participants a deep commitment and emotional investment to the activity and perhaps also to one another.* Whether participants are emotionally invested in an activity that requires executive functions may be the key to whether that activity improves these functions. Emotional investment matters because if children are deeply committed to an activity and doing something they enjoy, work feels like play. If that activity happens to train and challenge executive functions, then sizeable improvements in these functions should be seen. Letting children have a say in how an activity is organized or conducted increases their commitment to it. When children have a say, they experience more ownership of the activity. Having input (even about something as trivial as the order in which things are done) has been consistently shown to produce more engagement in the activity and more improvement, even when participants were instructed to do exactly what they would have chosen to do anyway. It is also empowering for them to feel that their opinion and ideas count.

- *They will have a mentor or guide who firmly believes in the efficacy of the activity and is supportive (i.e., sincerely cares about and believes steadfastly in the individual participants).* A deeply caring relationship between the teacher or trainer and the children produces the best outcomes. After reviewing copious amounts of data from all over the world Melhuis et al. (2015) concluded that what matters most for early childhood education outcomes is not the adult to child ratio, class size, instructional style, or quality of materials. What matters most is the adult-child relationship. It is relationships, not programs, that change children. A great program simply creates the environment for healthy relationships to form between adults and children. Young people thrive when adults care about them, and when they also have a sense of belonging to a caring community. Humans are fundamentally social. We need to feel liked and accepted. We need to feel we're not alone. Feeling socially excluded is not only painful subjectively, it also activates the same brain network used for self-control and reasoning. Even anticipating being alone in the future has shown to impair logical reasoning (a higher-order executive function), although not simple memorization (which does not need executive function).
- *They will provide joy, reduce feelings of stress and loneliness, and inspire self-confidence and pride.* Many studies show that learning environments, classrooms, and programs that reduce stress will be more effective in improving executive functions. It is an important principle that one negative act, such as humiliating someone, can override the benefit of scores of positive ones. Already in the late nineteenth century the Italian physician and educator Maria Montessori (1870–1952) was adamant that one should never embarrass a child.

Teachers and mentors need to create an environment where children in the classroom feel safe to take risks and try new things; in this way, they will feel it is okay to make mistakes. Treating errors and failed attempts as learning opportunities or simply as a natural occurrence when you venture beyond what you are already confident of has been demonstrated to be important for improving diverse skills, including executive functions. Neurological research indicates that even mild stress (and the stress hormone cortisol) affects the prefrontal cortex (which is very sensitive to the increase of cortisol). The prefrontal cortex is the most important brain structure for executive functions. Mild stress increases the amount of dopamine and norepinephrine (neurotransmitters) in the prefrontal cortex, and these areas do not function properly as a result. Higher levels of dopamine during stressful periods correlate with a degree of executive function impairment.

According to Diamond and Ling, real-world activities are most likely to have these four elements. Good examples are music, communal dance forms, sports, and other physical activities, as well as everyday activities such as caring for an animal.

Diamond and Ling have very concretely described why sports may enhance executive functions:

Most sports place demands on each of the EFs. Participants need to remember complex movement sequences, mentally work with lots of information, processing in real-time cues such as people's positions and where they will likely go next (for ball sports, cues about the ball's location and trajectory), mentally compare the present situation with past ones, and use that to predict what is likely to happen next or down the line (i.e., they must use WM (Working Memory)). Participants need to inhibit attending to distractions and keep their attention focused; they must inhibit a planned action when that is

suddenly no longer a good idea and inhibit what might be their first inclination, such as the temptation to try to score oneself rather than passing (i.e., they must use inhibitory control). And, they must use cognitive flexibility: The situation is constantly changing. Participants must quickly and accurately evaluate and respond to those changes, flexibly switching plans in real time, adjusting to the unexpected, adapting to complex and rapidly changing conditions. The situation they are faced with at any moment is often different from anything they have faced before. They can never know for sure what someone else will do; at best they can only predict. Some of this can become automatized and no longer require top-down control, but (a) that is less true for people relatively new to a sport and (b) typically the difficulty of what one is facing keeps increasing. As other players or opponents get better at the sport, the inherent difficulty of what one is faced with increases, providing a constant challenge³⁹Diamond, A., & Ling, D.S. (2016). Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not. *Developmental Cognitive Neuroscience*, 34-48.⁴⁰Novick, J.M., Bunting, M.F., Dougherty, M.R. & Engle, D.R. Eds (2020). *Cognitive and working memory training. Perspectives from psychology, neuroscience and human development*. Oxford University Press: Oxford..

Research briefs

[Work Habits and Self-Regulated Learning: Helping Students to Find a “Will” from a “Way”](#)

[The Motivational Role of Adaptive Help Seeking in Self-Regulated Learning](#)

[Understanding and Promoting Autonomous Self-Regulation: A Self-Determination Theory Perspective](#)

Conclusions about interventions, programs, and approaches for improving executive functions that appear justified and those that, despite much hype, do not

Learning skills

In a nutshell

- Learning skills are general skills that help learners master the content taught in school. These skills are often called the 4 C's: critical thinking, creative thinking and problem solving, communicating (including digital literacy), and collaborating and citizenship.

Learning skills are general skills that help learners master the content taught in school. Currently, learning skills also include the so-called 21st-century learning skills. These skills are often called the 4 C's: critical thinking, creative thinking and problem solving, communicating (including digital literacy), and collaborating and citizenship. Learning skills help students learn, and are therefore vital to success in school and beyond in modern society. This article focuses on the learning skills needed to master subjects taught in school.

In this article, we will discuss the acquisition of learning skills from a practical teacher–student view. Academic competence is associated with the knowledge and application of effective study skills, also called executive function

strategies. Capable students at all grade levels may experience difficulty in school, not because they lack ability but because they lack good study skills, such as paying attention, organising, planning, prioritising, shifting (looking for cues), starting a task and staying focused to the end, understanding different points of view, regulating emotions, self-monitoring progress and flexible thinking. Although some students develop study skills independently, average-achieving students may go through school without having acquired effective approaches for studying. Implementing study-skills instruction relies on an understanding of the theoretical foundation for teaching and using study skills, as well as knowledge of current research on the effectiveness of study strategies. It is very important to identify evidence-based strategies that are effective in helping students to study. Study skills are viewed as academic enablers; they function as critical tools for learning. Students who learn various study skills and are able to apply executive function strategies, which helps them to feel important and valued members of the class community where they can share and learn from one another ⁴¹Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. *School Psychology Review*, 350-365. ⁴²Melzer, L. (2018) eds. *Executive function in education*. New York: Guilfford. ⁴³Meltzer, L., & Basho, S. (2010). Promoting executive function in the classroom. In L. Melzer. *Promoting executive function in classroom*. Chapter 2. New York: Guilford..

What is meant by studying?

Studying, or the application of study skills, can be distinguished from other forms of school learning that occur under more prescribed conditions (such as teacher-led classroom instruction). Teachers need to teach strategies systematically and consistently as part of the classroom and

subject curriculum to enhance conceptual understanding, transfer knowledge creatively, and reflect on learning processes so that learners can become process-based rather than outcomes-based learners⁴⁴Meltzer, L., & Basho, S. (2010). Promoting executive function in the classroom. In L. Melzer. Promoting executive function in classroom. Chapter 2. New York: Guilford..

Studying is not about *remembering* all content; rather, it is about *applying the skills and knowledge* that you have gained and *understanding* the content.

1. Studying requires **training and practice** in specific techniques that help a learner acquire, organise, retain, and use information. Teachers typically devote little time to providing explicit instruction in such skills⁴⁵(Dunlosky et al., 2013)<https://dev.taleafrica.com/2021/03/29/improving-students-learning-with-effective-learning-techniques-promising-directions-from-cognitive-and-educational-psychology/>.
2. Studying is **intentional**. Effective studying requires not only the knowledge and application of skills but also personal choice⁴⁶(Corno et al., 2008)<https://dev.taleafrica.com/2021/03/29/work-habits-and-self-regulated-learning-helping-students-to-find-a-way/>. Studying differs from incidental learning because it is purposeful and requires a deliberate and conscious effort on the part of the student.
3. Studying is highly **personal and individualised**. While classroom learning occurs within a social context through interaction and guidance from others (e.g., peers, teachers), studying is often an individual activity.
4. Studying involves a **self-regulatory** aspect. Self-

regulation (such as initiative, persistence and goal setting) is an important aspect of studying, not only during the initial development of study skills but also during the application of skills outside of formal learning contexts.

Why is the teaching and learning of study skills important?

- Students understand their own learning profiles (**students** vary in how they prefer to deal with content, process, and product).
 - Students are taught how to learn.
 - Students are empowered to take control of their learning.
 - It promotes motivation, focused effort and hard work.
 - It increases self-confidence and encourages independence⁴⁷
- Meltzer, L., & Basho, S. (2010). Promoting executive function in the classroom. In L. Melzer. Promoting executive function in classroom. Chapter 2. New York: Guilford..

What is the difference between a study tactic and a study strategy?

Research briefs

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[Executive Function](#)

<p>A study tactic is a sequence of steps or a specific procedure, such as underlining or highlighting keywords, summarising or taking notes^(Dunlosky et al., 2013)https://dev.taleafrica.com/2021/03/29/improving-students-learning-with-effective-learning-techniques-promising-directions-from-cognitive-and-educational-psychology/. A study tactic may be taught through explicit instruction, for example, as a sequence of observable, isolated behaviours. A good study tactic is to use keywords and simple, personally familiar words rather than sentences or phrases that make a page cluttered.</p>	<p>A strategy is an individual's thorough approach to a task; how a person thinks and acts when planning and valuing their study behaviour^(Nesman et al., 2008)https://dev.taleafrica.com/2021/03/29/the-motivational-role-of-adaptive-help-seeking-in-self-regulated-learning/. A strategy consists of selecting the best tactics and making decisions about their use so that they are both effective (the strategy is learned) and efficient (it is learned to an optimal level with minimal effort).</p> <p>The main focus in strategy instruction is that the student <i>knows</i> how to study, can make decisions about the use of study tactics, and takes responsibility for their own learning. The student knows how to use a variety of goal-specific tactics, to execute them in a planned sequence, and to monitor their use. Effectively used key study strategies are: (a) overviewing before reading; (b) looking for important information and paying greater attention to it (which often requires jumping forward or backward to process information); (c) relating important points to one another; (d) activating and using prior knowledge; (e) changing strategies when understanding is not good; and (f) monitoring understanding and taking action to correct or 'fix up' inaccuracies in comprehension.</p> <p>Students with <i>low academic achievement</i> often demonstrate ineffective study skills, such as assuming a passive role in learning and relying on others (e.g., teachers or parents) to regulate their studying. They demonstrate several cognitive and behavioural characteristics; for example, they often <i>do not monitor</i> their understanding of content; may not be aware of the <i>purpose of studying</i>; and they show little evidence of looking back or employing 'fix-up' strategies to remedy comprehension problems. Students who struggle with learning new information seem to be unaware that they must apply extra effort beyond simply reading the content to understand and retain it. Children with mild disabilities, such as learning disabilities (LD), rarely demonstrate a determination and successful level of thinking to plan and evaluate their studying, which may be haphazard and disorganised, as well as also demonstrating challenges with personal organisation. They often have difficulty keeping track of study materials and assignments, following directions, and completing work on time.</p>									
<p>Summarising:</p> <p>Benefits: When students summarise work to be learnt, they organise information in a way that helps them to remember. They integrate information from various sources of information. They learn to identify keywords and structure their own sentences based on understanding. Thus, summaries are short and contain the basic facts.</p> <p>Example: Teacher A teaches sixth-grade Social Studies. As they teach the content, they and the students identify keywords or key phrases. They then model summary writing as a guide for students to learn how to do it later with new content. They may require summaries to be made for homework based on the work done in class and discusses students' summaries with them, especially in the first part of the year to establish the skill. They use questions as guiding cues, e.g. Do you think that your summary is capturing the main ideas? Which key words did you identify? Your summary contains the main ideas. Well done. How did you manage to do that?</p> <p>Important point: For a summary to be meaningful, the learner's own words and experiences are used to construct significant icons/phrases that make connections among key concepts and relate new information to prior knowledge. When learners use their own words to formulate questions or summarise, connections between new material and existing knowledge are automatically constructed, because those words are associated with information already stored in the learner's memory. Expressive summarisation has been used successfully as a study strategy for learning material from both written text and oral presentations.</p> <p>Symbols and images to make key words memorable.</p>	<p>Planning</p> <p>Benefits: Students feel in control of the study material and can work independently most of the time. They have developed a way of planning and studying that fits their personality and can apply various tactics that suit the type of work to learn.</p> <p>Example: A good student-centred teacher may expect students in the senior primary phase to write 'research' reports in which wider reading on one topic from a short list that captures their interest is expected. Beside an essay-type component, a creative component can be expected (such as a piece of art, a poster, or a song) as long as it demonstrates a deeper understanding of the selected topic.</p> <p>It is good practice to teach the study skills of planning and organising the development of the topic and its outcomes. Such a forward-thinking teacher will look at the outline of students' plans before they start working on their papers. The teacher provides feedback and support as they learn how to plan their learning.</p>									
<p>Note-Taking</p> <p>Benefits: Note-taking helps students to focus on the content of a presentation (such as watching a video on a relevant topic in their subject content). This helps them to identify key aspects when they can focus.</p> <p>Example: One outline that is useful for students to use for note-taking is Cornell Notes. Students divide their page into three sections. (See the example below)</p> <div><p>Text box: learning skills</p><table><tr><th>Topic</th><th>Date</th><th>Type of presentation</th></tr><tr><td>Main ideas or key words are written here afterwards, based on the notes made in the right-hand wider column.</td><td>Information on the content is written here e.g., key ideas, important dates, places, people, information that was stressed or written on the board, diagrams/pictures/ information from the textbook or story or metaphors given.</td><td></td></tr><tr><td>Summary made of notes using key words written in own words.</td><td></td><td></td></tr></table><p>Notes</p></div>	Topic	Date	Type of presentation	Main ideas or key words are written here afterwards, based on the notes made in the right-hand wider column.	Information on the content is written here e.g., key ideas, important dates, places, people, information that was stressed or written on the board, diagrams/pictures/ information from the textbook or story or metaphors given.		Summary made of notes using key words written in own words.			
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Summary made of notes using key words written in own words.										

What are the key principles of teaching learning strategies?

- Teach strategies in a purposeful and systematic way.
- The strategy should be in line with curriculum expectations.
- Devote time for direct and explicit explanation of key concepts and vocabulary.
- Model the steps in the specific strategy and create opportunities to practice, extend and generalise it.
- The goal/purpose/value of the given strategy should be clear.
- Do 'think-alouds'.
- Create metacognition of strengths, weaknesses, awareness of preferred learning styles and motivation.
- Organise information in 'chunks' to be easier to assimilate.
- Provide background information to make new concepts more understandable.
- Track the success rate of strategy implementation.
- Students should gain experience of approximately five consistently-used strategies, which should include planning, organising, remembering, self-checking, prioritising, shifting or amending, being flexible in how they use the strategy.

- Students should practice the strategy.
- Checklists can be given for the key elements for the writing process.
- Poster with strategies can be displayed in class

⁵⁰Melzer, L. (2018) eds. Executive function in education. New York: Guilfford.⁵¹Meltzer, L., & Basho, S. (2010). Promoting executive function in the classroom. In L. Melzer. Promoting executive function in classroom. Chapter 2. New York: Guilford..

The four clusters of study skills

Based on research, four clusters of study skills have been identified⁵²Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. School Psychology Review, 350-365. :

- (a) repetition- or rehearsal-based strategies;
- (b) procedural or organisation-based strategies;
- (c) cognitive-based strategies; and
- (d) metacognitive-based strategies.

(a) Repetition- or rehearsal-based study skills

Benefits:

The most basic study strategies involve *repetition, rereading, or rehearing information*; for example, when storing small bits of information for the short term. This study skill is also effective when the content being studied is used frequently, such as when students are required to study 15 words for a weekly spelling test or learn multiplication facts that are used daily in the classroom. Rehearsal strategies are easy to learn and use; therefore, they are among the first study skills taught to young children. In the early grades, teachers may rely on repetition strategies to help children acquire basic reading and maths skills. For example, flash card sets are frequently used to help children learn spelling,

vocabulary, sight words, and mathematical facts.

Examples:

1. Teacher-created flash cards

the	an	big	and	it	is	On
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2. Digital flash cards

Besides traditional flash cards, *digital* equivalents (such as Quizlet.com, the Chegg app., and StudyBlue) enable students to create flash cards with text, pictures and audio.

3. Flash cards of key concepts and images

Students have to learn about different landforms (peninsula, island, canyon etc.). By creating flash cards with pictures, the content becomes memorable. By practicing the words by using the flashcards in conversation with peers they continue to think about the content they are expected to master.

4. Small post-it notes can alert the student to key passages or information in the textbook.

5. Mnemonic devices

When teachers show students how to use *mnemonic devices*, repetition-based study strategies are enhanced, especially if mental imagery is involved.

Note: mnemonics: Using the first letters of a sequence of key words to remember; making a *silly sentence or crazy phrase using the first letters of the key words* in the same order.

Example of the Mnemonics:

A teacher in the elementary grades may be teaching the vowels. Knowing the vowels is important, because we use 'an" before a word starting with a vowel, and vowels appear in all words.

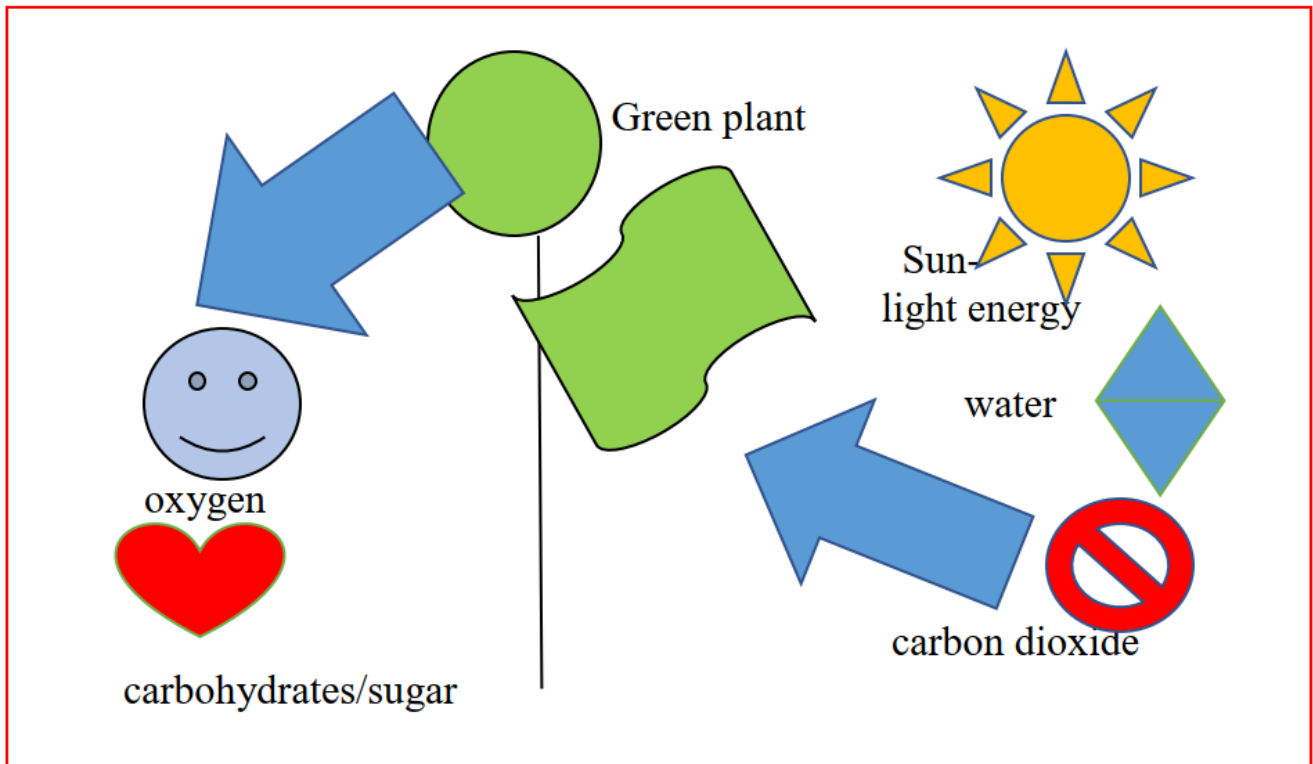
The teacher uses the vowels in sequence of the alphabet and makes up a silly mnemonic sentence to help the students remember the different vowels: A E I O U becomes: Angry Elephant Is On Us. The teacher asks the students to come with their own silly sentence that depicts the vowels in the correct order. This rehearsal ingrains the identification of the vowels.

6. Acronyms

Students *create a single word* from the initial letters words relating to the concept under focus; for example, 'face' represents the musical notes positioned on the spaces between the lines on the treble clef.

7. Funny cartoon pictures

The students draw a funny cartoon picture that depicts the facts to be remembered; for example, the process of photosynthesis:



8. Discuss or explain with each other

Explain what has been learnt to a parent or friend or soft toy.

(b) Procedural or organisation-based study skills

Benefits:

Although students may demonstrate an understanding of organisational skills, many low-achieving students fail to use them consistently and effectively. Procedural study skills involve the behaviours or habits that allow students to *maximise the benefits of their study time*. The development of procedural study skills includes *time management*, *organisation of what needs to be learned*, and development of a personalised *study plan (or consistent study routine)* and to be able to adapt their schedules to provide sufficient time for studying and work completion developed by the student for themselves.

Students in elementary grades can be helped by teachers or parents to organise their personalised study time. As people are productive at different times of the day, students need to find the times when their efforts will be most effective⁵³Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. School Psychology Review, 350-365. .

Some practical hints:

- Complete difficult work at times when you are most alert and least distracted.
- Divide long assignments into shorter, manageable units.
- Vary the type of study tasks (e.g., intersperse reading with writing activities).
- Be flexible in planning breaks and replanning study time if conflicts arise.

1. *Strategy cards with key words on one side and definitions on the reverse*

Use the cards to test memory, for example:

<p>One branch of government (<i>Namibia example</i>)</p> <p>Executive Branch</p>	<p>The president and cabinet carry out and enforce laws. Sworn to uphold, protect and defend the constitution of Namibia</p> <p>Consists of president, vice president, prime minister and all ministers and deputy ministers</p>
---	--

Say 'executive branch' and then flip the card over and say what is written on the reverse side. The student does this over and over until they can repeat the clarification without looking at it. After the student has learned all the cards, they start with the definitions and try to remember the word before turning over the flash card. Speak out loud! Move around! Students will learn faster if they hear the words out loud and get their body involved. When the student thinks they

know all the words and definitions, they ask someone else to test them, and if necessary, go back and memorise any missed information. This is repeated until they know every word.

2. Triple Note Tote

Students create a sheet of paper with three columns.

The headings of each column may differ depending on the content for example:

Topic	Details	Mnemonic/Pictures
Question	Answer/definition	Strategy
Question	Answer	Example (Mnemonic) (<i>Mnemonic means to use a strategy to assist information retention for retrieval, e.g. create a nonsense sentence using the beginning letters of the words to be remembered.</i>)
How does the process of synthesis occur?	A green plant transports water using light to create sugar or carbohydrates	We -- water Love – light Cone — carbohydrate/sugars Treats — transported to leaves

▪ 3. Prioritising

This organisational skill may be applied when taking a test or when doing homework; for example:

- During a test: Say: 1, 2, 3 Blastoff...to relax and read carefully what the question expects.
- Make a red flag or mark at a test question that is too hard to answer right away and go back to it later.
- Find the meaning of a word by looking for clues in surrounding words.
- Rephrase and use clues to interpret questions.
- Select the questions that are easiest to answer first,

and those counting most marks.

- Review the written test by changing the focus; for example, see if you can derive the question from the answer written.

4. *Checking*

Create a personal checklist of (for example) mistakes usually made.

(c) Cognitive-based study skills

Benefits:

The goal of cognitive-based study strategies is to guide students to engage in *appropriate thinking (information processing)* about information they are required to learn. The more knowledge students have about content, the more likely they are to think about, understand, and remember it. Thus, new material needs to be meaningful to learners *and integrated with their existing knowledge*. In addition, information that is stored as a network of connected facts and concepts (called *schemata*) is more easily learned and retained⁵⁴ Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. *School Psychology Review*, 350-365. .

Therefore good studying requires students to:

- activate and assemble background knowledge prior to studying a topic,
- connect new ideas, information, or concepts to what they already know, and
- develop new schemata, when necessary, to integrate content to be learned.

Examples:

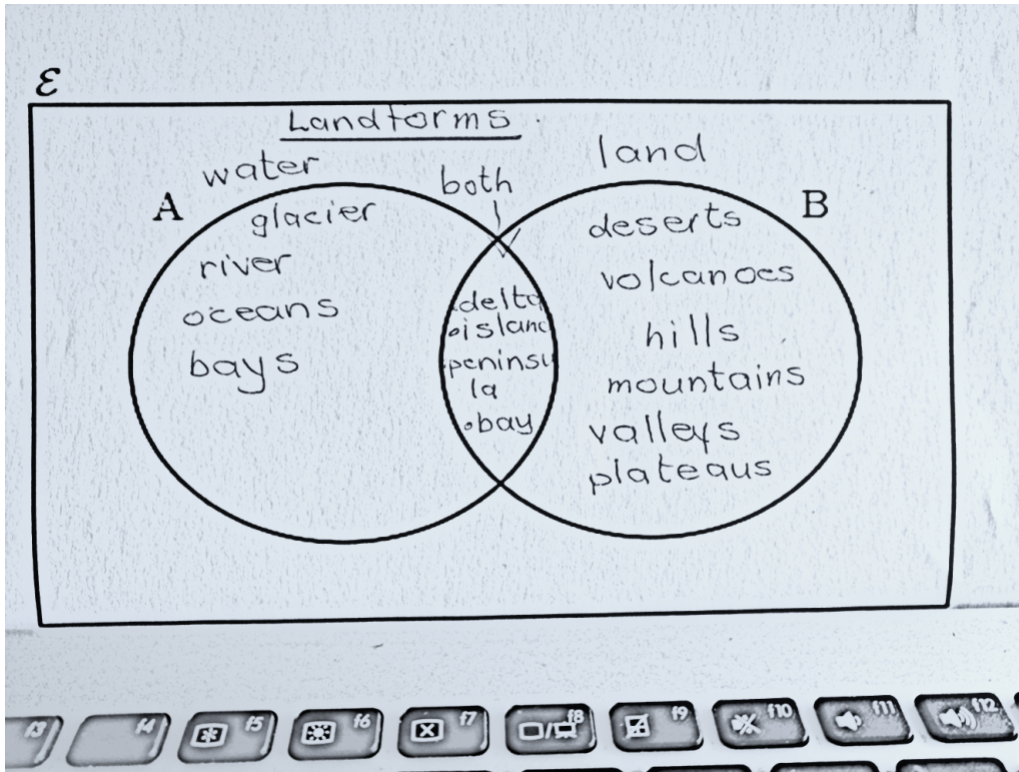
Cognitive-based study skills are designed to achieve these goals. **Cognitive organisers** are effective tools to assist students in *activating prior knowledge about a topic*,

organising information during learning and using schemata to establish connections among key concepts. Cognitive organisers, also referred to as *cognitive or semantic maps*, are *visual representations of the interrelatedness of ideas*. With cognitive maps, students arrange textual ideas and details visually so that implicit relationships between ideas and details are made explicit. Such a map may contain a *hierarchical diagram or arrangement* of concepts, ideas, and facts about a topic to be studied (*often written on individual cards*). This enables students to manipulate information cards and describe the relationship among or between content. Low-ability students gain the most from map instruction because they are less likely to activate prior knowledge and connect new concepts spontaneously. Other effective evidence-based, cognitive study strategies that activate and help make connections with prior knowledge are their own *question generation* and *summarisation*. Another helpful, visually organised, cognitive-based method is *drawings* that depict key facts to support the remembering of facts; for example, drawing a figure with a heart and blood vessels to explain how the blood circulates from the heart through the body.

Examples of graphic/cognitive organisers:

If students see information that is to be learned represented visually, they are more likely to see connections between the relevant aspects. A graphic organiser represents information that focuses on key aspects instead of the teacher providing the information to be copied. The teacher can provide blank graphic organisers related to the topic under discussion or guide students to develop personalised graphic organisers.

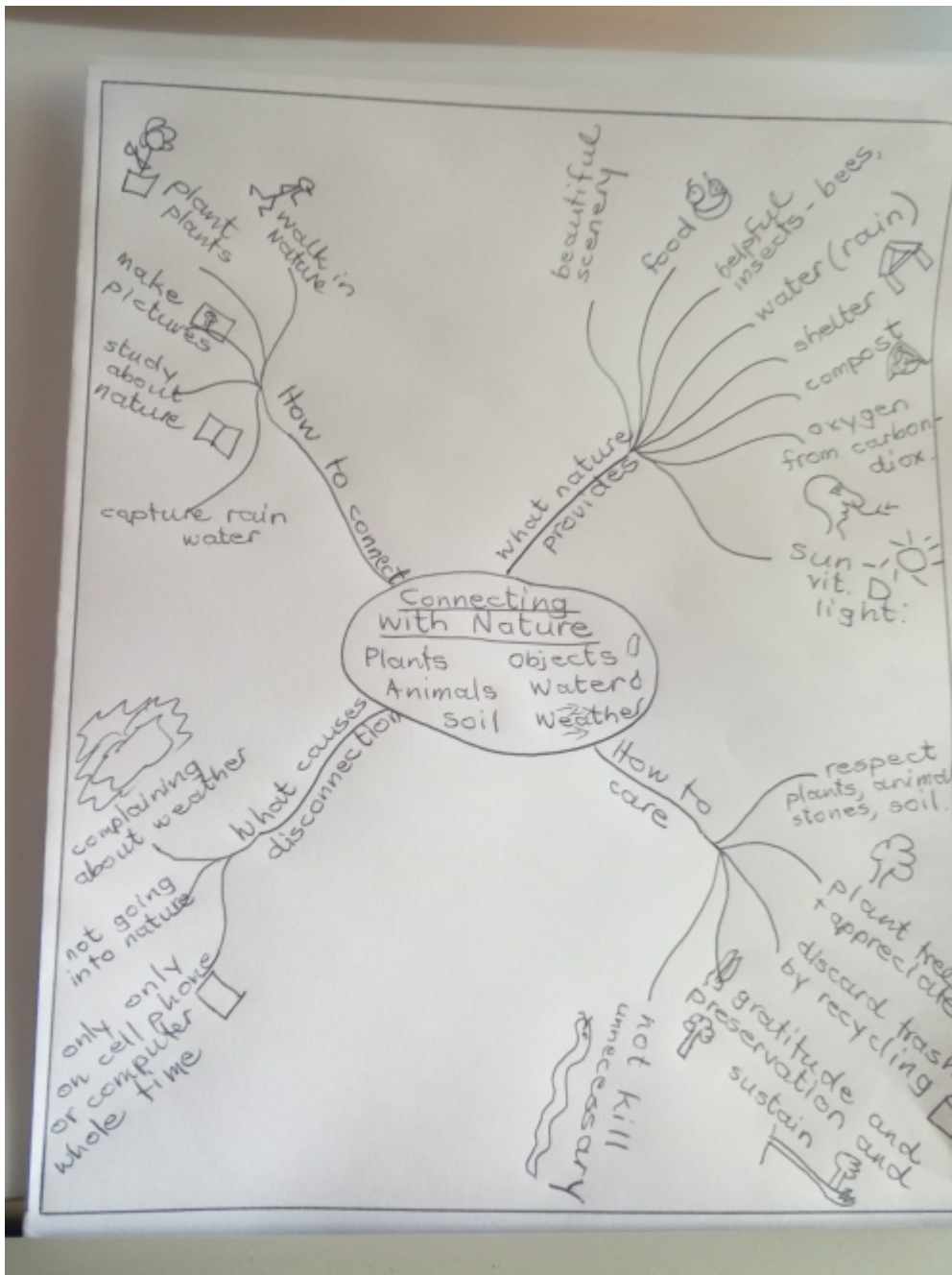
1. Venn diagram



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2. Mind map or web

It is helpful to use different coloured pens when creating a mind map or web for related concepts.



3. Reciprocal teaching

Although teacher-led, cognitive-based strategy training has been the focus of most experimental studies, there is a growing interest in *students' interactions with other students*. For example, in *reciprocal teaching*, there has been a gradual movement from teacher-led to peer-led discussion⁵⁵Palincsar, A. S., & Klenk, L. (1992). Fostering literacy learning in supportive context. *Journal of Learning Disabilities*, 25, 211-225, 229.⁵⁶Palincsar, A. S., & Klenk, L. (1994). Third invited response: Broader visions encompassing

literacy, learners, and contexts. Remedial and Special Education, 14(2), 19-25.. In reciprocal teaching, the teacher invites students to act as the teacher; for example, in small group reading sessions or when subject content information is discussed. Teachers model and then guide students to lead group discussions using **four strategies: summarising, question generating, clarifying, and predicting.** https://www.readingrockets.org/strategies/reciprocal_teaching

4. *Peer-assisted learning approaches*, including *tutoring, mentoring, and cooperative learning*, have acquired a critical role in the development of study skills and have a good success rate. Research has demonstrated the effectiveness of peer-assisted learning strategies (PALS). These are a class-wide, peer-tutoring programme *involving partner reading, summarisation, prediction, and other study strategies* that enhance academic performance, and have demonstrated great improvement in student achievement.

(d) Metacognitive-based study skills

Benefits

The extent to which students apply study skills when the need arises depends largely on their metacognitive capabilities (i.e., *their ability to assess the need for studying, and to plan, implement, monitor, and evaluate their study approaches*). Cognitive-based study strategies relate to how learners process information, while metacognitive strategies relate to how metacognitive-able students select, monitor, and use strategies they are familiar with and that work for them. Metacognitive ability enables learners to adjust their studying according to varying task demands so that they can study effectively; they understand which study strategies to use, monitor their studying, and distribute study time wisely. They are familiar with the cognitive strategies that help them study and adjust their use of such strategies. Students with learning difficulties lack the metacognitive skills necessary

to become successful, independent learners as they are usually disorganised and lack understanding of what to do or how to proceed with studying. Training in metacognitive strategies can enhance students' metacognitive abilities, especially students with learning problems⁵⁷ Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. School Psychology Review, 350-365. .

Examples of metacognitive training that improve performance and academic achievement.

1. Students are given explicit instruction in *self-questioning strategies*. For example, students are taught to ask themselves questions⁵⁸ Lucangeli, D., Coi, G., & Bosco, P. (1998). Metacognitive awareness in good and poor math problem solvers. Learning Disabilities Research & Practice, 12, 219-244., such as 'Why am I studying this passage?' 'Do I understand the material I am studying?' 'Should I reread or revise my study strategy?' 'What strategies are necessary for solving this problem?' or 'Have I solved the problem correctly?'

2. *Reading for understanding* The SQW3R (Survey, Question, Write, Read, Recall, Recite/Review) Method. This study method was created in 1946 by Francis. P. Robinson. It is important for students to understand what they are reading, and this process help learners to make sense of difficult texts.

The following text comes from the Formal Assessment Booklet for Pupils⁵⁹ Notification Prep School Academic Formal Assessment Booklet for Pupils. June (2017). pdf. Redhill School, Johannesburg, South Africa. that clearly explains to students how the SQW3R method works:

S = Survey Before you start to read, survey the material to gain an overview of the contents. Look through the whole reading/chapter to preview it. Approach it by scanning: • title(s) • subheadings • visual materials (pictures, charts,

graphs or tables) and their captions.

Q = Question Your reading will be more memorable if you question the material. 1. Ask yourself: a. What is this chapter/article about? b. What do I already know about this subject? 2. Devise questions that will guide your reading: a. Think about specific questions for which you need to, or would like to, find answers. b. Turn the title, headings and subheadings into questions. 3. Make a list of your questions for consideration. You will use them during review to help you remember what you have read.

R1 = Read Be prepared to READ material twice. First, read without making notes: 1. Decrease your pace and read actively. Active reading requires concentration, so take your time and find a quiet place where you can read and focus. 2. As you read, look for answers to the questions you noted down earlier. 3. Compare diagrams and illustrations with the written text. Often, you will understand more from them. 4. Make sure you understand what you are reading. Reduce your reading speed for difficult passages. Stop and reread parts that are not clear. 5. Look up difficult words in the dictionary and reread. If the meaning of a word or passage still evades you, leave it and read on. Perhaps after more reading you will find the meaning will become clear.

W (Read) + Write On your second reading, begin to take notes: 1. Take notes from the text, but write information in your own words. 2. Read one section at a time (a section might be divided up by headings or subheadings). 3. After you read a section, try to sum up the main point in one sentence. 4. Examples and illustrations can further your understanding and be good cues for memory. Look for crucial details. 5. In your notes, underline or highlight the important points. This will be useful for later review. 6. Refer to the list of questions you made earlier and try to answer them.

R2 = Recall RECALL straight after you finish taking notes. You

should have an outline of the reading in note form. You should now try to recall and write your thinking about what you have read. 1. Close the book and cover your notes. 2. Make notes of what you remember about the main points of the reading. 3. Check their accuracy against the notes you made during your reading. 4. Return to the reading. Read one section at a time and try to recall what you have read. If you were unable to recall one of the major points, then reread that section of the reading to clarify it further. 5. It can also be helpful to RECITE ideas aloud to help you remember. Sum up the main points verbally—reciting can help you put ideas into your own words.

R3 = Review Now REVIEW what you have read. Check the accuracy of your notes against the original material (if you have underlined the main points, this should be simple). This is an important part of the process because it can really help you clarify and remember what you have read. 11 The next day: 1. Read through your notes to reacquaint yourself with the key points. 2. Now read through the questions you noted down and try to answer them from memory. 3. Try doing the same thing after a few days. The more you review, the less you will need to cram during exam study periods.

How to teach effective study skills

Effective strategy proceeds from *social modelling to gradually increasing levels of self-directed functioning*. Such a model is consistent with a social-cognitive perspective of self-regulation and academic competence, which suggests that academic competence develops initially from social sources (teachers, peers) and eventually shifts to internal sources (self)⁶⁰Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. *School Psychology Review*, 350-365. .

Within a social-cognitive perspective, four phases of development have been identified.

(1) During the first phase, called **modelling**, students acquire study strategies through social modelling, task structuring, and social praise. This begins with simplifying the strategy by breaking it down into basic steps, followed by explicit instruction and frequent modelling of strategy use by the teacher. Research emphasises the importance of showing students, not just telling them, how to use a study strategy. During modelling, the teacher should provide a rationale for using the strategy, when it can be used, and why it is likely to be effective. The teacher demonstrates the use of a strategy while also 'thinking aloud' to show the reasoning that accompanies its use. Students observe the strategy in action, as well as the thinking that is involved in selecting and applying it. Students who understand the potential benefit of a study skill (and have practiced it) have shown a marked increase in strategy use.

(2) The second stage of effective study skills development is called the **imitative level**. The student applies the strategy in a way that approximates the teacher's example. Teachers need to provide multiple and varied opportunities for students to practice strategies and to provide feedback and support in the form of scaffolding. (*Scaffolding involves providing help to students on an as-needed basis, such that the student continues to make progress in applying a strategy*). During the scaffolding process, the teacher's guidance is gradually reduced over practice trials, and students assume increasing responsibility for strategy use (known as cognitive coaching). The teacher continues to provide assistance in the form of scaffolding (for example, cues, prompts) guiding questions and then gradually withdrawing supporting scaffolds until students are able to use the strategy on their own. This process enables students to apply strategies in appropriate situations, on their own and without external prompting⁶¹ Schunk, D. H., & Zimmerman, B. (Eds.). (1994). Self-regulation of learning and performance: Issues and educational applications. Hillsdale, NJ: Erlbaum. . The locus or

responsibility gradually shifts to the individual student in the latter two phases.

(3) In the third phase of development, called ***self-control***, learners use the strategy independently while performing transfer tasks; thus, the student can now apply strategies that have become internalised. During training, students are prompted to look for authentic situations to apply the strategies they have learned, such as the student's actual classroom instruction and curriculum, where teachers create opportunities for students to practice the use of study skills in daily assignments.

(4) The fourth phase of development, ***self-regulation***, is evident when students are able to adapt their learning strategies to different situations systematically. The student initiates the use of a study strategy on their own and makes adjustments in the strategy based on the specific learning situation. The gradual movement from teacher-guidance to self-dependence in a specific strategy enables students to discover its value so that they may implement it in flexible ways, as one particular strategy may not be appropriate for all students or be effective in all cases.

Classroom applications of study skills

Some students develop effective ways to study on their own, while others will need systematic instruction and repeated practice. It may be impractical to expect teachers to have one-on-one sessions or use content teaching time to teach study skills. One way to address this concern is for teachers to merge the teaching of specific content with the teaching of study strategies that aid students in learning the content. However, some students may need more practice and may still not be able to apply the specific strategy.

In a study by Bulgren et al.⁶² Bulgren, J. A., Schumaker, J. B., & Deshler, D. D. (1997). Use of a recall enhancement routine

and strategies in inclusive secondary classes. Learning Disabilities Research & Practice, 12, 198-208., teachers only modelled appropriate study strategies as they presented them within the context of classroom instruction. The authors were interested in evaluating the extent to which teachers could use strategy-based instruction (i.e., presenting mnemonic devices) as an ongoing part of the curriculum, and whether students would be able to create their own mnemonic strategies by observing teachers. In this instance, teachers had high levels of implementation of the strategy training (more than 90% of targeted behaviours), and the majority of students, although not all, were able to apply the strategy. Thus, for strategy instruction to be implemented with integrity in a classroom context, it is necessary to adapt training to match teachers' available time and teaching style⁶³Gettinger, M., & Seibert, J.K. (2002). Contributions of study skills to academic competence. School Psychology Review, 350-365.
⁶⁴Melzer, L. (2018) eds. Executive function in education. New York: Guilfford..

Research has revealed the following key principles for study skills training:

1. First, *students must recognise the need for varied approaches to studying*. Not all strategies are appropriate for all study tasks. Any single study tactic will likely require some modification and personalisation on the part of students themselves. By developing awareness of different strategies, students should be encouraged to explain the appropriateness of a particular study strategy for different tasks.
2. Second, the key to effective study-strategy training is to *help students guide their own thinking, organising, and study behaviours*. The most effective study-strategy instruction helps children to develop strategies that work for them. Therefore, students should be actively involved in developing their own, personalised study strategies instead of being

taught a scripted set of steps to enhance perseverance and generalisation to other study situations.

References

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