Developing the components of executive function in the primary school classroom

School resources

Research has provided a wealth of evidence over the last decade that executive functions are crucial for student learning in the early years as well as for long term academic success[1]. This guide is designed to equip primary school teachers with an understanding about executive functioning in the classroom and an awareness of how students may use these skills in the context of the classroom. It will describe practical support and strategies that are applicable for all students, and when to intervene with additional support for students who may have specific challenges related to executive function skills.

Researchers describe executive functions as the cognitive management system of the brain or the brain's 'air traffic control' system[2]. They direct focus, control, planning, flexibility, and management of daily life activities. These crucial skills lay a foundation for learning in the pre-school years that then mature into skills that regulate emotions, behaviour, and cognition to allow academic learning to take place[3]. The consensus is that there are three core domains for executive functioning: working memory, cognitive flexibility, and inhibition[4]. From these core skills, higher order executive functions such as reasoning, problem solving, organisation, goal-directed persistence, and planning emerge and continue to develop well into the teenage years. All the skills work with one another by providing an individual with the ability to attend, remember, revise, and execute an academic task and be successful.

The three core aspects of executive function together encompass nine areas of thinking (cognition) and doing (behaviour) skills under the executive functioning umbrella[5]: working memory, planning/ prioritisation, organisation, time management, response inhibition, emotional control, sustained attention, task initiation, and flexibility.

Development + Environment = Growth

Although we are born with the capacity to develop executive functioning, we lack the immediate skills to execute functions like self-monitoring, making plans, and staying focused. These skills emerge, develop, and consolidate over a period of time based on external and internal factors. The development of executive functioning for any individual involves time and a nurturing environment including explicit support to develop specific skills, as well as genetics and individual factors[6]. The home is an important facilitator of executive functioning in terms of the household structure, family environments, routines, stress, socio-economic situation, parent-child relationships, and scaffolding, all of which contribute to the way these skills develop[7]. Other factors also affect the development of executive functioning skills, such as foetal alcohol spectrum disorder or a family history of ADHD, autism spectrum disorder, and mental health issues[8].

Executive functioning expectations in the classroom

In the classroom, understanding what is expected or typical at any given age is helpful in terms of matching teaching to students' ability. This means that students who are having difficulty can be better identified and understood. Just as we would not expect a five-year-old to plan and prepare lunch without support, we would not expect an eight-year-old to write a two or three step book report without a scaffold. The following lists represent the kinds of tasks that are generally appropriate to the executive functioning levels of students in lower and upper primary school. It is important to take into

consideration developmental and environmental factors when looking at the skill lists in relation to students. Remembering the principle of scaffolding, students will be emerging, developing, or mastering these areas[9].

Lower Primary (Age 5-8):

- Follow 2-3 step instructions
- Tidy desk
- Perform chores/self-help tasks
- Bring items such as reading books to and from school
- Complete homework assignments (maximum 20 minutes)
- Inhibit behaviours and follow rules, for example, using responsible language, raising their hand in discussion, keeping their hands to themselves

Upper Primary (Age 9-10)

- Run errands
- Bring books, papers, assignments home and take back to school
- Keep track of belongings when away from home
- Complete independent work in the classroom for up to 45 minutes
- Plan a simple school project such as a book report
- Keep track of a daily schedule including different activities like sport or going to the library
- Inhibit and regulate behaviour, such as behaving when the teacher is out of the classroom, refraining from poor behaviour

Strategies for addressing specific breakdowns in executive functioning skills

For primary school students, there are nine cognitive processes that are relatable to possible breakdowns in executive functioning. This list is not designed to be exhaustive of every domain and possible feature, but as a general guide for teachers in the primary school setting.

Inhibition or impulse control involves students pausing, monitoring, or stopping their behaviour (thoughts and actions) at the appropriate time. A breakdown in functioning in this area may appear in the classroom in terms of behaviours such as **calling out**, **touching things or others**, **restlessness**, or **over-active behaviours**. Students may also display an **inability to follow age-appropriate instructions** and **inconsistent performance in tests**. Strategies to support students struggling with inhibition or impulse control in the classroom include:

- asking the student to pause before responding (providing them time to process and think before speaking)
- setting explicit rules and clear classroom expectations, and providing reminders
- asking the student to verbalise his or her plan for a task (goals and time)
- facilitating a seating plan that promotes good behaviour (next to a responsible peer or the teacher)
- reinforcing to the child when they are demonstrating positive behaviours.

Flexibility or shifting involves students moving freely between situations or activities, and using problem-solving to respond to a situation. A breakdown in functioning in this area may involve students experiencing **difficulty transitioning between tasks** or **being unprepared for the next activity**. Students may display a **lack of participation** or a tendency to **zone out in an activity**. Strategies to support students with flexibility in the classroom include:

- giving reminders and notice when transitions are about to occur
- allowing downtime or 'white space' between activities
- being consistent with expectations
- using a visual timer to promote time management
- allowing time for Q&A to clarify students' understanding of what is required
- using visual organisers, planners, and calendars to support adaptability to change and routine.

Emotional control or emotional regulation involves students managing their emotional responses in an appropriate way based on the situation. A breakdown in functioning in emotional regulation may appear in the classroom in behaviours like **calling out in class without considering others**. Students may **lack emotional regulation**, as shown in emotional impulsivity, frustration levels, and mood swings, **display emotional responses that are unpredictable** based on the situation, and experience **difficulty with redirecting or refocusing** when there is a lack of emotional control. Strategies to support students to develop their emotion regulation in the classroom include:

- using external resources such as rating scales or zones to promote problem solving and evaluation, such as the 5 Point scale or Zones of Regulation
- being aware of creating stressful situations (such as calling on a student to speak publicly)
- fostering empathy among peers
- grouping students into small groups for positive participation and productivity (while being aware of students with IEPs and involvement of other specialists).

Sustained attention involves students being able to remain attentive and maintain that focus to complete a task in a certain amount of time. A breakdown in functioning may appear in the classroom as students being **easily distractible or zoning out**. Students may have **difficulty being consistent with attention and learning**, **maintaining attention until a task is completed**, and **filtering information to distinguish relevant from irrelevant.** Strategies to support students to develop sustained attention in the classroom include:

- structuring the classroom with clear rules and expectations
- actively supervising transitions and breaks
- simplifying instructions and breaking tasks into smaller steps
- providing graphic organisers for academic work
- highlighting the main idea or key points at the beginning and end of a lesson
- using multi-sensory cuing to support learning, especially visual cues.

Organisation of materials involves students organising their workspaces and learning materials, including their desk, locker, bedroom table, school bag, files, and books. A breakdown in functioning may appear in the classroom like the **lack of a system**, an **inefficient use of space**, and a **disorganised desk**

or messy locker. Students may also often be **missing core materials for learning** such as pencils, books, scissors. Strategies to support students with organisation of materials in the classroom include:

- providing checklists of materials they need to review daily
- modelling organisation strategies out loud
- modelling behaviour and routines
- describing the goal of organising spaces like desks, book corners, materials shelf
- allowing time for a student to reorganise a space at the beginning and end of a lesson
- colour-coding subject books or folders.

Initiation, also known as getting started, involves students being able to begin a task or activity with the independence to generate ideas and monitor responses and strategies. A breakdown in functioning in this area may appear in the classroom in behaviours like **not getting started on tasks** independently, or **avoiding tasks** and masking this with behaviours. Students may often require **support for starting writing tasks**, and consistently **offer excuses for lack of work**. Strategies to support students with initiation in the classroom include:

- outlining how to begin and the steps needed to get started and continue
- providing cuing cards that show a to-do list of what is expected to be done for a task
- keeping a list of core steps for regular activities that a student can access at any time
- setting time limits for completing work
- encouraging core habits, such as writing name, date, and subject on papers, to reinforce work structure
- allowing the student to verbalise back the task expectation, and allowing questions.

Working memory involves students being able to hold information in their mind for a period of time in order to follow through on instructions and complete tasks. A breakdown in functioning in the area of working memory may appear in the classroom as **poor attention** or **poor comprehension**. Students may experience **difficulty with mentally solving problems**, particularly inferencing tasks and maths, and **find sequential information, or holding all the facts in order, difficult**. They may **struggle with 'information overload'** and will often **gain only partial segments of what is taught**. Strategies to support students with working memory in the classroom include:

- pre-teaching and previewing information where possible to reinforce new vocabulary and important points
- adjusting the presentation of information by slowing down to allow for processing
- encouraging and demonstrating the use of memory aids such as wall charts, rehearsal, and mnemonics
- reinforcing the use of visual strategies in the classroom
- breaking down tasks into manageable steps
- including spaced practice rather than only massed practice (which means students can practice a skill multiple times a day rather than in one chunk)
- developing a student's ability to manage working memory demands, like note-taking, using post-its or reminders, or asking for help.

Planning and organisation involve students managing current and future-orientated task demands, also known as prioritising. A breakdown in functioning in planning and organisation may appear in the classroom as an **inability to meet deadlines** such as homework or assignments, or an **inability to meet demands within set tasks** like long-term projects. Strategies to support students with planning and organisation in the classroom include:

- giving students a guide of steps to plan an assignment or long-term task
- asking the student to verbalise and write down the plan in their own book (rather than reading the assignment paper)
- teaching students how to develop timelines for completing age-appropriate tasks
- utilising and modelling how to use a home organiser or diary.

Self-monitoring or self-management involves students monitoring their own performance and measuring it against the general standard of what is expected. A breakdown in functioning in this area may appear in the classroom as a **lack of awareness of how behaviours impact their own learning** and others in their environment. Students may **make careless mistakes often** and be unable to recognise them, **make errors in task requirements and understanding instructions**, or **rush over their work**, often leaving partially incomplete work. Strategies to support students with self-monitoring in the classroom include:

- using student and teacher rating tools such as a rubric or scale to incorporate the individual's goals, measure time and effort expectations, and provide feedback
- encouraging self-talk, in which students talk themselves through a task to monitor performance and stay on track
- helping students facilitate strategies that promote reasonable and timely progress to monitor long term assignments.

When to intervene with specific executive functioning support

A student's road to academic success is complex and rewarding at the same time. When significant weaknesses continue in executive functioning skills and teacher support is not sufficient on its own, a team approach needs to be actioned. Involving family members helps to share responsibility for identifying the underlying problem(s) that may be contributing to poor executive functioning[10]. Helping to define the problem, find alternative solutions, and develop an action plan actively involving the student in the process can lead to positive results. If between home and school the student's improvement is minimal, a formal assessment may be warranted, especially when there are additional learning difficulties, severe behaviour concerns, mental health issues, or a history of delays in language and other milestones. Seeking professional assessment by a psychologist or paediatrician can start the process towards supported intervention by someone experienced in executive functioning, such as an educational psychologist, speech language therapist, counsellor, or occupational therapist[11].

All adults in a child's sphere of development have an important role in scaffolding executive functioning skills from emergence to mastery with the right adjustments, framework, and expectations. Children can thrive within an environment of support and succeed in learning, even when they initially present with difficulties paying attention, completing tasks, verbally communicating needs, and managing impulses.

Endnotes

1 Dawson, P., & Guare, R. (2009). Smart but scattered: The revolutionary "executive skills" approach to helping kids reach their potential. Guilford Press; Cortés Pascual, A., Moyano Muñoz, N., & Quílez Robres, A. (2019). The relationship between executive functions and academic performance in primary education: Review and meta-analysis. Frontiers in Psychology, 10, 1582. https://doi.org/10.3389/fpsyg.2019.01582

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3 Cortés Pascual et al., 2019.

4 Diamond, A. (2013). Executive functions. Annual Review of Psychology, 64,135–68. https://www.annualreviews.org/doi/abs/10.1146/annurev-psych-113011-143750; Cortés Pascual et al., 2019.

5 Dawson & Guare, 2009.

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8 Cortés Pascual et al., 2019.

9 Dawson & Guare, 2009.

10 Diamond, 2013; Dawson & Guare, 2009.

11 Dawson & Guare, 2009.

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