Strategies for promoting executive function in secondary school

Student's capacity for executive function involves both cognitive and behavioural aspects that are crucial for managing learning and for realising personal goals and aspirations[1]. When students have strong executive function skills, they can be more effectively organized in their work[2][3], more productive[4], and more emotionally regulated. Specifically executive function skills comprise:

- **attention and inhibition**: the ability to focus and concentrate, to ignore distractions, and to control impulses and instead choose appropriate behaviours[5]

- **working memory:** the ability to hold several pieces of information in mind at the same time, in order to think about them, reason and make decisions[6]

- **cognitive flexibility**: the ability to think flexibly, to switch gear and adapt to changing circumstances or demands when necessary, and to switch between different rules or behaviours at will[7][8].

In adolescence, there are large demands on students' executive function skills. Students are required to complete more complex projects, and manage school assignments alongside other extra-curricular commitments, work and social activity[9][10][11]. Executive function skills help students to pay attention to an assignment, even if they find it boring, and to ignore distractions[12], as well as to plan, set goals and monitor progress[13] when faced with larger projects, assignments and exam revision. Difficulties with executive function are related to issues with disruptive behaviour, and a range of learning difficulties and conditions[14], including anxiety[15].

Students with strong executive function skills will be able to make better decisions and be more effective in a range of situations throughout life[16], and are more likely to enjoy long-term physical and mental health[17]. Research has found executive function skills to be more predictive of academic achievement than IQ[18], and to be related to higher achievement in areas such as reading, maths, and spelling[19][20][21]. However, it is important to note that although executive function is correlated with higher achievement, there is no research that demonstrates a causal relation[22]. Other characteristics of students, such as high socioeconomic status or high levels of parental education, are closely linked to high levels of executive function, and could be alternative explanations for higher achievement[23].

Students growing up in poverty are more likely to have poorer executive function skills, although research shows that students who have good executive function skills are protected from the risk of academic failure associated with a poorer socioeconomic context[24], and that they can make faster progress and catch up with peers even if they are initially behind[25].

How to support the development of executive function skills

Rapid development in executive function skill occurs in the transition to adolescence[26], potentially making this period one in which a focus on the development of executive function skills might be particularly fruitful. Teachers can play an important role in helping students to understand and build their executive function skills, as well as teaching and modeling skills and strategies for self-management[27].

Teaching students about executive function

Learning about executive function helps students to understand the role of executive function skills for self-control and for managing their study better, and to recognise the impact of managing emotions, resisting temptations, and planning and executing complex projects. They may come to understand that executive function can become depleted, which explains why they sometimes struggle to persist with tasks or why they are sometimes less effective in their work.

- Students can be taught that **executive function can be improved with exercise**, like a muscle. Repetitively using a strategy that exercises executive function, such as prioritising tasks, will enhance their executive function skills.

- You might invite students to **discuss their experiences** of urgent tasks: did they put off starting because of anxiety, confusion, or poor planning? How does having a task become urgent make them feel, and what practical consequences does this entail? What might help them to act earlier next time? Developing executive function skills, such as those involved in planning and prioritising, can help students avoid reactive responses to the demands of tasks once they become urgent and stressful.

- To support students to understand how to manage their attention and understanding, you can periodically **stop during a lesson to ask students reflective questions** such as: 'If you have stopped paying attention, what distracted you? How might you refocus? If you don't understand, what might be the problem? What help can you seek?' This can be a useful strategy that students might use at other times when they want to monitor their progress or performance, such as when writing assignments, before handing in an assignment, or simply when leaving home for school each day.

- Students can apply an **understanding of the limitations of working memory** to improve their study techniques. For example, trying to remember schedules and assignment details overloads working memory and may lead to important information being forgotten, as well as leaving less capacity for more higher-order thinking such as planning the structure of an essay. It is also important for students to understand that they need to actively work with important new learning over time in order to transfer it to long-term memory.

- Students may benefit from the opportunity to **reflect on their executive function skills** and determine for themselves how to become better at self-management. You might encourage students to identify unhelpful thinking and ineffective strategies and to brainstorm alternatives (itself an exercise in cognitive flexibility).

Supporting planning, goal-setting and self-monitoring

Students require strong executive function skills to regulate their progress towards any goal-directed activity. They need to be able to identify goals, plan ways to achieve them, monitor progress and adjust their behaviour as required. While teaching students about strategies and tools for better self-management is important, these will have little effect unless students are motivated to use them. Practising and improving executive function skills such as long-term planning and goal-setting should be presented as important for student autonomy and self-realisation.

- To **practice goal-setting**, students should be encouraged to create personal goals that are simple and achievable, with longer goals broken into short-term steps. Students can think about the skills they need to learn and practice in order to meet their goals, as well as the problems or difficulties they might have and how they might handle them.

- **Long-term planning using tools**, such as an online calendar, can be made an integral part of your curriculum, to show how planning ahead and thinking about how to fit everything in is an important habit for success. For example, regular reference to a class calendar with the due dates of all assignments, tests and exams can be modelled. It is also important also to teach students how to use digital learning management systems so that they know how to view, submit, and read feedback from assignments.

- Students can **list their responsibilities and tasks**, to provide them with a concrete reference which they can process in a more rational (and less impulsive or emotionally-based) way, and engage in more effective decision-making. Students can analyse their list, dividing tasks into categories according to their due date (one day, two days or later, or one day, one week, or one month). Students will find it easier to plan for shorter periods of time at first before progressing to longer stretches.

- To support a deeper level of processing and understanding about an important assignment, you might create periods of time for students to determine (individually or in groups) how to **break down an assignment into smaller steps**, such as 'write an outline', or 'collect resources'. From there they can write priority lists, thinking about both urgent and important action steps, perhaps colour-coding each step and setting alerts for each step on a digital calendar. You can remind students to recognise and celebrate when they have achieved each part of a task.

- Rather than tick off completed tasks, it can be helpful to have students write **two or three words of evaluation** for each part of a task in order to reflect upon successes, difficulties and potential alternative strategies, as well as ways of ensuring these supports are in place for subsequent projects. You might provide students with a template and ask them to try it for three weeks, then encourage them to devise their own planning approach that is flexible and meets their needs.

- To encourage students to **monitor their behaviour and progress** towards a goal, you can offer some reflective questions such as: 'Are these the things you planned to do? If not, why aren't you doing them? Has something changed?' Questions like these help students to identify counter-productive actions and habitual or impulsive actions, and to develop more conscious control.

- **Journaling** can help students develop insights into the effectiveness of their study strategies and management of academic work, and lead them to set new goals around these. Students might write, draw, sketch, scribble, paint or collage with pictures, photos, and newspaper clippings. Bullet journaling is another form in which students write bullet points (such as a list of goals, or a list of tasks and appointments), and can use their imagination and creativity with the presentation of their lists.

Supporting emotional regulation

Executive function skills help students to regulate their emotions and can also help them to manage stimulus and cope with stress, including the stress and anxiety generated by the need to learn new and complex tasks and material[28].

- **Generating new and positive narratives** around academic stress can support students with greater emotional regulation. For example, they might reinterpret anxiety about an exam as providing resources (such as heightened adrenaline) that can benefit their performance. One study found that asking students to regulate their worries and take a positive perspective on the usefulness of anxiety before tests was found to considerably improve exam performance and results[29].

- Another useful practice is to invite students to **engage in expressive writing or journaling** about their worries and concerns, which can help them identify coping strategies and feel more in control of

stressful situations. This can support them to offload their worry, enabling them to direct more time and energy to the task or activity. Journaling provides an opportunity for creative self-expression too, and students can use their imagination and communication skills in diverse ways.

• Students can also be encouraged to pause periodically and work through a mental narrative of what is happening, which might help them work through the steps of a difficult activity or manage strong and negative emotions. Help students to **focus on positive self-talk** that emphasises growth and learning from events. For example, students can view a failure as an opportunity to reflect upon what went wrong and on what they might do to improve.

• **Self-distancing strategies** can support students to step outside their personal perspective and develop more positive views on the challenge and stress associated with learning. For example, students might try imagining what their closest friend would advise them.

• **Writing activities based on reflection, self-belief and self-encouragement** can build students' social and emotional resilience. You might offer writing prompts or offer students accounts of previous students who were able to overcome their anxiety and self-doubt. This can normalise students' own emotional experiences and help them to view the challenges that they face in navigating their academic work more positively.

Promoting self-control and good decision-making

Self-talk is an important strategy for achieving self-control throughout life. Students can be encouraged to talk themselves through all kinds of study challenges, including study habits, academic projects and exams, and sporting or other performances.

• **Planning and practising scripts for inner speech** can support students to approach difficult tasks and academic stresses calmly and productively. An increasing body of research shows that scheduling time for students to talk themselves through challenges improves outcomes[30]. Similarly, taking five minutes before a test or other performance task, to speak words of encouragement to themselves is found to lead to higher test scores[31].

• **Giving advice to others** and advocating for specific actions to promote better study can enhance students' own study habits, leading to students coming to believe in what they promote. One study reported higher achievement outcomes when students were asked to give motivational advice to other students[32] about how to improve their study habits. You might ask students to break into groups to discuss preparation strategies for an upcoming test or assignment, or ask them to write emails to peers about how to manage their academic work schedules.

• Students can develop their **awareness of interruptions**, and the impact that it has on their study. Evidence suggests that multi-tasking, although it might be enjoyable, decreases attention and leads to poorer performance. You might ask students to identify ways to minimise distractions such as noise or electronics, or when they feel their attention being divided by two or more activities, help them decide how to prioritise and sequence tasks.

Games and activities that support executive function skills

There are many activities and games that encourage students to expand their growing capacity for focused and selective attention, working memory, and adaptive responses. Listed below are a range of activities that are likely to enable students to practice their executive function skills.

• **Board games** can support students to develop executive function skills, especially those that require complex thinking, planning and inhibition control. Games such as *Taboo*, *Apples to Apples* and

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Risk are good examples, as well as classic games like chess. Students might also like *Lumosity*, a computer-based programme training working memory, cognitive flexibility and inhibition.

• **Engaging in competitive sports** encourages students to practise focused attention as well as quick and flexible decision-making. Research suggests that aerobic activity also helps improve executive function.

• Students may find **yoga, meditation, and mindfulness** activities support them to improve their focused attention, as well as help to reduce stress and encourage more considered action and decision-making.

• Developing skills in **playing a musical instrument** challenges students' working memory, selective attention, inhibition and cognitive flexibility.

• **Participating in any kind of performance** also requires students to manage their behaviour, attend to their role in the performance (whether on-stage or off-stage) and to their timing. Actors and dancers alike will need high levels of attention and working memory to learn their lines or choreography.

• **Video games** in which students navigate complex imaginary worlds, as well as games that require fast responses and constant monitoring of the screen environment, also promote executive function development.

Endnotes

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