How I have set up my Spring 2026 classes to be more EF Friendly
Main elements:
(a) Daily Opening Quiz to icebreak an idea and get students in the right mindframe for the day's topic.
(b) Asking that they answer each quiz question from what their intuition tells them
(c) Regular use of organizational diagrams as road maps of the class day and of topics, and the encouragement of their use.
(d) I do videos for major concepts and processes, as well as for the introduction and use of notations.
(e) Frequent exams (weekly for 4 & 5 hour courses and biweekly for 3 hour courses).
(f) Create routines.
(g) Keep my introductions lean and concrete; weave in detail and concepts after examples have made the main ideas clear. (varies by topic).
(h) For topics with new notation and concepts, alongside a procedure, I am careful not to unpack them all at once.
(i) I have long made suggestions for monitoring how they are understanding things, on scheduling their time, and on managing themselves. (I probably go too far in that regard)

Cognitive Load: the effort used in working memory to manipulate information.

There are many pieces of information that I would have said during class that were not relevant at the time, but they would add depth for the person who already knows something of the topic. I now try to limit what I say to that which is directly on task.

I try to lead with examples more than in the past and then after a few examples point out the concept that exists around the examples. If one leads with the concept, and then the notation, and then adds examples, there is too much information floating around at once for students to process. Also, their attention is fleeting anyway, and by the time you finish the conceptual aspect and get to the examples, they might have already tuned out. When I introduce something truly new, then I might close one class day familiarizing them a bit with the notation for it and what it means. The next day I can do some examples with greater ease because the notation will already be somewhat in their head.

Moving information to diagrams and visuals is a little like moving some of the work from the CPU to the GPU; it reduces cognitive load by not having to process as much language.

Use of videos for viewing outside of class is helpful. Information which you convey through the spoken word in class is temporal. If they missed it, it is gone. Giving the students notes will solve this, but then the students have to read it. This requires a substantial cognitive load because of language processing and it is also something that many students will bypass. Having (short) videos available will allow the student to catch the explanation of concepts and main ideas after they have been spoken and can be replayed again and again.

Early in the course, break down the complex ideas more than you would have previously, but time gradually expect the students to process more complexity.

Routines will also reduce cognitive load.

Lessening Cognitive Load will help with 4 of the 6 components of Executive Function:
Focus (distraction by information that is not perfectly relevant and trying to find relevance)
Effort (lesser likelihood of wearing the student out or tempting them to procrastinate)
Emotional Regulation (lesser likelihodd of frustration and episodal burnout)
Working Memory (leaves more capacity to hold ideas; also WM is a limited resource)

Activation: Organization, prioritizing, and geting started

I have an Opening Quiz for the first 5 minutes each day which breaks the ice on a new topic or begins the closing discussions of a previously discussed topic. In the case of a new topic, it is meant to get them to think about some aspect of a topic before you actually introduce it to them.
In the case of closing a previous topic, it can hit one of the most difficult aspects of that topic, perhaps where students were going to make the most mistakes, and makes them face it right there in class just as it is going to be discussed.

Advantages of an Opening Quiz.

- One would like for the students to have completed some reading or to watch some video before coming to class; but this is not too likely to happen. The opening quiz is intended to replace these by getting the students to think about or experience some of hair-pin curves of topic before the topic is discussed.
- It is likely to get them to class on time and it also takes attendance.
- It kick-starts the day into action as you already have their attention for what you plan to do first.
- Having a routine is good for many kinds of students and for cognitive load.

I encourage the students to always write down what their intution tells them, not what they *think* they are supposed to do because they *think* that they remember some teacher having said so. In this way

- the feedback they get hones their intuition by reinforcing or fixing what they have already internalized;
- in testing situations the suggestions from their intuition are going to come up anyway, and rather than vascilating between several alternatives and getting stressed out, by test time they'll hopefully have fixed their intuition.
- it gets them used to having an automatic starting point for any task.

In my class they do not have to get the quiz problem right to get the full 5/5; they just have to have given it thought. I think that outing their intuition is very important and many won't do so if they think some points are going to be lost because of it. Also, students who take exams and quizzes in the testing center won't have to start the class at the testing center.

I also try to create organizational diagrams when it is appropriate, sometimes to see where were going next and sometimes to show how items are related.

While the Opening Quiz costs 5 minutes, I think that it accelerates the introductory part of the topic of the day by giving putting the students in the campaign before you begin.

Focus: Remaining on task for a period of time (while it is being discussed, or while you've set aside time to work on it).

I try to follow a routine as much as possible

- Opening-quiz to create a focus leading into the first topic
- Working the quiz and noting its characteristics that lead to the day's topic
- When relevant, draw out a short diagram of the full day's work, and "you are here" sort of point where the quiz puts us
- Quickly illustrate the topic with another problem and how to solve it,
- Send them to the wall in groups of 3 to work on a similar problem or two; sometimes they work at their desks in groups. I walk around with some guidance.
- Get their attention to look at the front while I show where we are moving in the diagram and then add an additional element or aspect or problem style and how to work it, and give them another example to try.
- Send them off with more example problems to work overnight (hopefully).
- They are also encouraged to draw their own diagrams for organizing the material for the next exam or how to solve a problem...wherever they might find it useful. I draw the diagrams initially, and am planning to scale back after Spring Break.

I think that this might help with focus because they are put at a jumping-off point by the quiz, and then there is a structure in place that is followed most of the time. If I can keep my talking to a minimum, they will not be idle and having to be attentive for very long, and then they will be active again for awhile and then a switch-up to an attentive moment and then back to active work.

Hopefully, if they get enough of a experience with the problems during class, it will increase their focus that evening as they work the problems.

I started with this this Spring, and this first semester I have found it to be challenging. Some topics lend themselves to this better than others and when you are teaching 14 days/week for a 12 hour load it is difficult to have time to retool your introductions and get the routine going. I expect it to be easier in future semesters.

The diagrams help organize information and so I suspect they not only help the students learn the material but also help them get back to work by easily finding their place.

Effort: Maintaining alertness, keeping their work going, not being bogged down by peripherals.

Some of effort involves how much some students are bogged down by any reading that they have to do. Process diagrams that I construct or they construct will help minimize the reading necessary to learn how to solve some kinds of problems and the overview diagrams might also help. Routines can eventually help when they become established.

I also ask them to request videos about any concept of problem style that they are having trouble with. I try to keep the videos between 2 and 5 minutes. This minimizes the need for reading and language processing and they can replay it over and over. The ease of getting a bit of help here or there overnight or without coming to my office might help them keep going.

Finally, this Spring in 4 and 5 hour classes, I give an exam the last day of every week. In 3 hour classes, I give an exam the last day every other week. Comparing to earlier semesters, I think that this makes them more likely to want get each topic down pretty quickly because it is going to be on an exam within about a week or so. The exam grade is over all 14 exams (no exams the last week of class) and I'll drop a few, so there is not as much pressure surrounding any one exam. Since each exam is over less material, it does not seem as overwhelming and this might help lessen procrastination. It might seem that this would cost needed class time, and I was worried about that. So far, however, it does not seem to be the case for the courses that I am teaching. They seem considerably more on-task in class because, well, the next test is only a few days away.

Emotional Regulation: Managing frustrations and emotions

I don't have a lot of ideas here, beyond having a routine and the frequent exams.
Many Freshmen are probably going to find out after the first exam that their concept of sufficient study, wasn't. If that first exam isn't until 3 1/2 or 4 weeks in, then it might be too late to recover....or the mental weight of all the work necessary to catch up, might be stressful to the point of being debilitating.

Working Memory: Sequencing of ideas, remembering directions, holding information while accessing information

Anything that reduces cognitive load will help with working memory. I encourage the students to write down ideas and to draw diagrams to help offload some of the ideas and their interconnections to paper. I use diagrams and other visuals to illustrate ideas and to show the sequencing of processes. Also, keeping to the needed information, expressed concisely, is also helpful. In Mathematics, there are often items which do not have an English pronunciation. For example, f(x). Of course we say 'eff of ex' but if a student isn't listening at the time that we introduce it, then it is just a symbol and without a pronunication it is difficult to weave into our thoughts.

Action: Self monitoring and regulation of behavior.

I suggest that (at home) they find a system for organizing their time and tasks, to make use of a timer, and that they set the stage for productivity by having their phone in another room while sitting down to work. There is more information about that in the document EFHelp.