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Advancing Student Learning Inside and Outside of the Classroom with Cognitive and Motivational Supports

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Abstract

Supporting students in using effective learning strategies is a complex process. It involves more than simply telling students to use a set of strategies. The present article briefly reviews three themes that are important to consider when trying to support student learning both inside and outside of the classroom: (1) situating student and teacher experiences; (2) providing metacognitive knowledge of when, how, and why a learning strategy can be useful; and (3) tapping into motivation to energize students to put forth the effort to engage with such strategies. Across these themes, there are challenges in supporting students to use effective strategies. To overcome those challenges, it is crucial to incorporate teacher and student perspectives into the design and implementation, drawing on common ground and authentic experiences.

Keywords Learning strategies · Motivation · Metacognition · Teacher supports

Learning involves more than just spending time with the content; it also involves spending time learning how to learn. Yan et al. (2023) clearly state that if we want to improve learning, we must consider how we spend our time when learning. As learners and teachers, we engage in many similar processes and strategies to navigate how we learn and/or support students in their learning. As learners, we have to be aware of how we are learning, what steps or strategies we are implementing, and evaluate how well a learning experience went while also reflecting on where and how one can improve. As teachers, we also have to monitor how well our students are learning, scaffold learning and study strategies within our practice, and evaluate how well those supports worked. However, we are rarely explicitly taught how to regulate how we learn in school (e.g., Zepeda et al., 2019) or how to support the regulation of learning in teacher education programs (Dignath & Veenman, 2021).

For many of us, somewhere along our development, we figured out a set of strategies that worked well enough to get us to where we are, but what we might not have known is that there is an ever-expanding literature examining the science of how we learn which

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would have helped lead to more effective learning experiences and outcomes (see Dunlosky et al., 2013 and Koedinger et al., 2013 for reviews). The science of how we learn has much to contribute to educational practice, as emphasized by Yan et al. (2023). Therefore, in this commentary, I highlight some of the major themes they provided while also elaborating on additional aspects that are imperative to advance student learning *inside* and *outside* the classroom. Figure 1 illustrates three of these themes and how they conceptualize the efforts to support the use of effective learning and study strategies.

Student and Teacher Experiences and Interactions

The first theme is that the support of effective learning is a reciprocal process in which teachers and learners impact one another as they each have agency over the learning that is co-occurring in educational contexts. For example, teachers recognize the supports that should be provided and implement them in their classroom practices. Meanwhile, students are given the space to regulate their learning based on the provided supports and their past experiences. Through this process, both students and teachers provide feedback to one another on how to improve. Learning emerges through these interactions (e.g., Greeno & Engeström, 2014). Further, this process spans the learning that occurs inside and outside of the classroom, such that teachers can provide instruction that allows learners to strategically engage with learning that is happening in the moment, but that this instruction

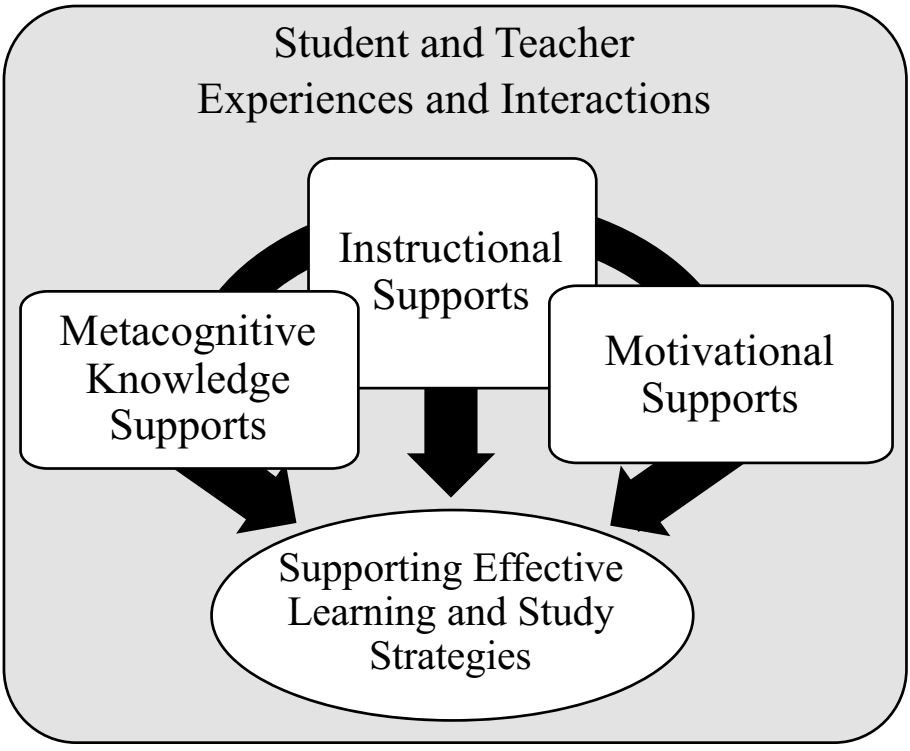

Fig. 1 Representation of critical components needed to support the use of effective learning and study strategies

can also impact the learning that students engage with on their own outside of the classroom and during future learning opportunities. As described later, for this connection to be most beneficial, it should be explicit and motivated.

Additionally, teachers and researchers should not make assumptions about which strategies students are aware of and implement in their own studying practices without asking students about their perspectives. Much of the prior work surveying learners about the cognitive and metacognitive strategies they use to study has been measured at a general level and/or not tied to a specific studying event (e.g., Hartwig & Dunlosky, 2012; Karpicke et al., 2009; Morehead et al., 2016). There are benefits to this approach as it provides a generalized overview of which strategies are most salient to students, but as seen in prior work that surveyed how students studied for a specific exam for a course (e.g., Zepeda & Nokes-Malach, 2021), there are often mismatches between the generalized measures and the exam-specific measures. In fact, the specific measures provide additional context and reveal how students think and use the strategies together, which can help inform instructors on a more authentic way to promote the use of effective strategies in the classroom. For example, the use of testing oneself and explaining the material to themselves (arguably two forms of retrieval practice) was often accompanied by students saying they monitored their understanding such that students tracked what they did and did not know and what was difficult for them to retrieve (i.e., metacognitive awareness). This relationship suggests that if we want to support the use of retrieval practice, a productive approach might be for teachers to take an already familiar pattern of strategy use that has been seen in their classrooms and modify their supports to enhance the use of the strategies (e.g., add in the interleaved and spacing components).

One take-home message is clear from this surveying work; learners often do not realize that the structure of learning is a study strategy in and of itself. For example, in open-ended questions, students rarely say how they structured their learning, including spaced and interleaved practice (e.g., I started studying a few weeks before, I would mix old and new concepts when studying). This research suggests that supporting these strategies and highlighting how they are ways to improve learning is critical.

Integrating Metacognitive Knowledge into the Instructional Supports

The second theme is that these supports encompass more than just the instruction of the content but also structuring the course to incorporate cognitive supports such as interleaved and spaced practice and the metacognitive knowledge behind those supports. Within this theme, it should be emphasized that these are intentional instructional moves teachers make as they design their courses. This includes the assignments that are created, the assessments that are given, the language that is used, and the resources that are provided. Within these instructional moves, even if the strategies are implicitly supported, students should also receive direct and explicit instruction about what the strategies are (i.e., declarative metacognitive knowledge), how to use them (i.e., procedural metacognitive knowledge), *and* when and why to use the strategies (i.e., the conditional metacognitive knowledge; Schraw & Moshman, 1995). This last aspect of metacognitive knowledge, the conditions by which the strategies operate, are often forgotten pieces of information that not only encourage the application of the strategy across different topics and contexts but also provide utility and meaning behind the strategies.

Motivating the Use of Instructional Supports

The third theme is that direct instruction to implement learning or study strategies is not always enough. Telling students they should use a strategy, along with the metacognitive knowledge behind it, is not convincing enough to help them implement the strategy when we consider their educational development. By the time learners reach college, they have already had to study in some manner, and it was effective enough to get them to where they are. Why would they change their strategies? Students will often say that they know other strategies are better for them but that they do not have the time or the energy to risk trying something new. In addition, implementing strategies like interleaved and spaced practice often reduce the salience students feel in their learning (e.g., these practices make it evident to the students when they are not able to retrieve the information). These responses reveal the motivational and emotional aspects that also contribute to the implementation of more effective strategies.

Similar to the cognitive and metacognitive strategies, motivational and emotional supports can be provided through the framing of activities and teacher talk (e.g., Boden et al., 2020; for a review, see Meyer & Turner, 2006) and as well as the independent strategies students use (e.g., self-efficacy self-talk, proximal goal setting) (see Wolters, 2003 for a review). Again, these supports can occur both inside and outside of the classroom, such that learners engage in their own strategies and these strategies can be supported via the instruction and instructional design of the class. For example, to support student self-efficacy of a learning strategy (a motivational construct emphasized by Yan et al., 2023), instructors can implement proximal goal setting into their instruction by breaking down larger tasks into smaller, more attainable goals that can be more easily achieved at a lower cost to students than a larger assignment or higher stake assessment. For instance, the use of exit tickets is a smaller, more obtainable goal that can scaffold the use of interleaved and spaced practice while helping students prepare for a more significant assessment. Likewise, students can be encouraged to implement proximal goal setting in their own studying practices while also engaging in efficacy self-talk in which they remind themselves that they are capable of doing the task. Teacher talk supporting mastery and students' capabilities in using difficult strategies and the accompanying failure to retrieve that is often felt can also compliment this approach (e.g., "It might not feel good using this strategy at first, but you will get better at it. That is why we are practicing.").

Complicating matters is that there are several different theories and conceptualizations of motivation and emotion, making it difficult to determine how to go about supporting students in using challenging yet effective strategies. Exactly how to support students in using these strategies via motivational and emotional supports is a small yet growing area of research that has much promise for impacting educational practice. One approach has been to take existing psychosocial interventions that support student motivation to learn and adapting them to support learners in learning about effective learning and study strategies (see Zepeda et al., 2020 for an overview). Embedded within this approach is the notion that if learning and the use of effective learning strategies are valued, then the instruction and instructional design of the course should support those values. We cannot expect students to use those strategies on their own if we do not supply the space and low-cost opportunities to do so inside and outside of the classroom.

Challenges and a Path Forward

Many researchers have emphasized the need to support effective learning and study strategies to improve learning, but it is not immediately obvious how to do so in the classroom. Yan et al. (2023) provide excellent examples of how to integrate interleaved and spaced practice while leveraging a common instructional practice (e.g., enhancing the use of exit tickets by incorporating interleaved and spaced practice). This approach has many benefits as it taps into existing pedagogical choices that are familiar to many instructors and students and adapts these practices to enhance the impact on learning. Taking this approach further, exit tickets could also be used to help students reflect on their learning and study strategies through the use of motivational messages. Prior work has shown that adding self-assessments that provide students with reflection prompts can support their motivation (Bernacki et al., 2016).

There are many demands on teachers' time, so finding the time to learn about and incorporate more effective teaching tactics and strategies into their work is challenging but well worth the effort. As Yan et al. (2023) point out, these support tactics and strategies have been shown to benefit a variety of learners across different domains and contexts. Although it may not be easy to help teachers overcome the obstacles they face in incorporating new techniques into their teaching, there are novel approaches that might be of value. One example is integrating learning-to-learn courses into the curriculum that explicitly teaches learners how to regulate their learning (e.g., Bernacki et al., 2021; Biwer et al., 2020). Other examples include the use of AI and other forms of educational technology that can offload some of the extra burdens that are placed on teachers when trying to support students in regulating their learning (Greene, 2021). Regardless of the approach, it will be crucial to incorporate teacher and student perspectives into the design and implementation, drawing on common ground and authentic experiences.

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Declarations

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References

Bernacki, M., Nokes-Malach, T., Richey, J. E., & Belenky, D. M. (2016). Science diaries: A brief writing intervention to improve motivation to learn science. *Educational Psychologist, 36*(1), 26–46. https://doi.org/10.1080/01443410.2014.895293

Bernacki, M. L., Vosicka, L., Utz, J. C., & Warren, C. B. (2021). Effects of digital learning skill training on the academic performance of undergraduates in science and mathematics. *Journal of Educational Psychology, 113*(6), 1107–1125. https://doi.org/10.1037/edu0000485

Biwer, F., de Bruin, A. B. H., Schreurs, S., & oude Egbrink, M. G. A. (2020). Future steps in teaching desirably difficult learning strategies: Reflections from the study smart program. *Journal of Applied Research in Memory and Cognition, 9*(4), 439–446. https://doi.org/10.1016/j.jarmac.2020.07.006

Boden, K. K., Zepeda, C. D., & Nokes-Malach, T. J. (2020). Achievement goals and conceptual learning: An examination of teacher talk. *Journal of Educational Psychology, 12*(6), 1221–1242. https://doi.org/10.1037/edu0000421

Dignath, C., & Veenman, M. V. (2021). The role of direct strategy instruction and indirect activation of self-regulated learning—Evidence from classroom observation studies. *Educational Psychology Review, 33*(2), 489–533. https://doi.org/10.1007/s10648-020-09534-0

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14*(1), 4–58. https://doi.org/10.1177/1529100612453266

Greene, J. A. (2021). Teacher support for metacognition and self-regulated learning: A compelling story and a prototypical model. *Metacognition and Learning, 16*, 651–666. https://doi.org/10.1007/s11409-021-09283-7

Greeno, J. G., & Engeström, Y. (2014). Learning in activity. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (2nd ed., pp. 128–148). Cambridge University Press. https://doi.org/10.1017/CBO9781139519526.009

Hartwig, M. K., & Dunlosky, J. (2012). Study strategies of college students: Are self-testing and scheduling related to achievement? *Psychonomic Bulletin & Review, 19*(1), 126–134. https://doi.org/10.3758/s13423-011-0181-y

Karpicke, J. D., Butler, A. C., & Roediger, H. L. (2009). Metacognitive strategies in student learning: Do students practise retrieval when they study on their own? *Memory, 17*(4), 471–479. https://doi.org/10.1080/09658210802647009

Koedinger, K. R., Booth, J. L., & Klahr, D. (2013). Instructional complexity and the science to constrain it. *Science, 342*(6161), 935–937. https://doi.org/10.1126/science.1238056

Meyer, D. K., & Turner, J. C. (2006). Re-conceptualizing emotion and motivation to learn in classroom contexts. *Educational Psychology Review, 18*(4), 377–390. https://doi.org/10.1007/s10648-006-9032-1

Morehead, K., Rhodes, M. G., & Delozier, S. (2016). Instructor and student knowledge of study strategies. *Memory, 24*(2), 257–271. https://doi.org/10.1080/09658211.2014.1001992

Schraw, G., & Moshman, D. (1995). Metacognitive theories. *Educational Psychology Review, 7*(4), 351–371. https://doi.org/10.1007/BF02212307

Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist, 38*(4), 189–205. https://doi.org/10.1207/S15326985EP3804_1

Yan, V. X., Schuetze, B. A., & Rea, S. D. (2023). *Becoming better teachers: Augmenting learning via cognitive and motivational theories*. Human Arenas.

Zepeda, C. D., Hlutkowsky, C. O., Partika, A. C., & Nokes-Malach, T. J. (2019). Identifying teachers' supports of metacognition through classroom talk and its relation to growth in conceptual learning. *Journal of Educational Psychology, 111*(3), 522–541. https://doi.org/10.1037/edu0000300

Zepeda, C. D., Martin, R. S., & Butler, A. C. (2020). Motivational strategies to engage learners in desirable difficulties. *Journal of Applied Research in Memory and Cognition, 9*(4), 468–474. https://doi.org/10.1016/j.jarmac.2020.08.007

Zepeda, C. D., & Nokes-Malach, T. J. (2021). Metacognitive study strategies in a college course and their relation to exam performance. *Memory & Cognition, 49*, 480–497. https://doi.org/10.3758/s13421-020-01106-5