Published by Joint Faculties of Humanities and Theology, Lund University

DOI: 10.37852/oblu.343.c762

Connecting Teachers – Changing from Within. Proceedings from the 2024 Lund University Conference on Teaching and Learning
ISBN: 978-91-90055-50-2

Maximizing Learning: Practical Strategies for Clinical Education

Max Wictor.
Faculty of Medicine Center for Teaching and Learning, Lund University

Abstract

The ability of students to regulate their own learning plays a key role in achieving meaningful results in medical and healthcare education. Knowledge of what influences learning overall and how students can apply strategies to maximize their learning are often something they realize towards the end of their studies, if at all. This paper outlines a selection of key strategies that students and supervisors can use to improve student engagement and optimize learning in medical and healthcare education. The strategies are grounded in self-regulated learning theory and inspired by the ideas of a growth mindset, flipped classroom, the use of structured models in clinical training and effective questioning techniques. The advantages and disadvantages of commonly used digital flashcards are highlighted and discussed.

A practical example is provided to illustrate how these strategies can be applied in the daily patient encounter, discussing their potential benefits in comparison to the current standard approach. Implementing these approaches early in medical education could provide a strong foundation for personal growth, professional development and a broader medical understanding, giving students the opportunity to learn more.

Introduction

Students are expected to take responsibility for their own learning process and education. Each student at the Faculty of Medicine brings a unique background and varying levels of experience balancing medical or healthcare studies with personal commitments, such as hobbies and family. While student engagement is a key predictor of learning outcomes [1], understanding how and why to actively engage, and how to apply self-regulated learning strategies, is often underemphasized. The work environment in the clinic can be stressful, making it challenging for both the supervisor

and the student to fully maximize the time and learning opportunities. Consequently, students may not fully be equipped with strategies to effectively utilize their time during preclinical and clinical practice.

Many factors influence learning, including the importance of repetition, active engagement with the material and the impact of stress [2], making it crucial for students to understand how these factors affect their ability to learn. Additionally, while learning environments where students mainly quietly observe and imitate other actions may be traditional, they on its own is not optimal for effective learning [3]. Considering that bedside and outpatient teaching remain one of the primary training activities during clinical placements [4], where various medical and paramedical skills are practiced and theoretical concepts applied, it is vital for medical and healthcare students to maximize their learning during these sessions. Understanding what influences learning is particularly important for students early in their education, enabling them to make the most of every educational opportunity already from day one.

The aim of this paper is to provide practical examples of how students can enhance their learning with both academic studies and clinical placements. These insights are shared from the perspective of someone who has recently completed the medical program at Lund University. During my study years, I was deeply involved in education monitoring as a course representative and student representative in various positions within the medical program, probably more than I needed, but who is counting? Later, as my interest in pedagogy and supervision grew, I held workshops in active learning for first-year students at the Faculty of Medicine, and I am now educating junior doctors on how to supervise medical students.

Looking back on my time as a student and having since deepened my understanding of the psychological and sociocultural factors that influence learning and various approaches to supervising students in clinical education, I have noticed that crucial aspects of clinical teaching and learning often do not reach students until late in the program, if at all. Students could have maximized their learning even further if they had been exposed to these insights earlier in their education or training. Building on this, the following sections will explore key themes that in my experience can be especially valuable to students at the very beginning of their medical or healthcare education, as well as those in later stages of study or in related non-medical fields.

Enhancing Learning through Self-Regulation

Self-regulated learning is an active process in which learners establish and pursue clear goals and objectives for their learning [5]. Learners work to monitor, adjust, manage their thoughts, motivation and actions to achieve those goals.

A meta-analysis recently demonstrated a positive and significant association between self-regulated learning strategies and overall learning outcomes in medical education [6]. One key takeaway is that these strategies are considered essential for lifelong learning and arguably even more critical in clinical settings, where decisions must be made in real time. Striving to consistently set both short- and long-term goals, as well as reflecting on outcomes, can yield substantial benefits. This can, for example, be supported by using online tools to schedule and track goals, or by regularly engaging with reflective questions in writing. These reflections should focus on identifying areas for improvement and recognizing strengths, which can foster critical thinking and support continuous professional development.

One approach to self-regulated learning, which I found effective and which is inspired by doctors I have encountered, is to ask reflective questions at different stages of a task or learning session. Before starting, consider questions such as: "*What do I want to achieve in this task or session?" or "Are my goals specific, measurable and realistic?"* During the activity, reflect by asking: *"Do I fully understand what I am learning?"* or *"Should I try a different approach to understand this better?"* At the end of the activity, evaluate by asking: *"Were there any unnecessary steps in this approach?"* or *"What did I struggle with and how can I improve next time?"*

While this approach is valuable, my experience is that it may be too time-consuming to apply to every learning activity. Instead, consider starting with a specific context, such as a new clinical rotation and evaluate that experience using these questions or similar ones found online.

Adapting Mindset for Growth

While self-regulated learning can be highly effective, it requires an open mindset to truly engage with reflective questions from the very beginning. Without this openness, students may fail to see the value in these questions, limiting their potential for growth. This openness and ability to embrace learning challenges are thought to be closely tied to the mindset of the student [7]. Mindset can be categorized into two types: a growth

mindset and a fixed mindset. Students with a growth mindset are more likely to ask questions and focus on improving their skills, whereas those with a fixed mindset tend to avoid challenges and fear appearing incompetent. Moreover, students who exhibit a strong interest in their studies often achieve better learning outcomes and experience higher levels of satisfaction [8].

Completely shifting one's mindset overnight is rarely possible. Many students may believe they have a growth mindset, while in reality they may operate from a fixed one. Since mindset shapes not only professional development but also personal attitudes and behaviors across life domains [7], understanding its impact on learning throughout a study program is essential. Gaining this awareness early can help foster adaptability and support long-term success.

To develop a growth mindset [7], or to explore whether you have one, consider asking questions such as: "How do I respond to constructive criticism?", "How do I measure success?", and "Am I recognizing the journey of growth, or am I only focused on the end result?" Another helpful question to reflect on once a week might be: "What did I learn from a mistake or setback this week?" - a practice that can help normalize the fact that everyone makes mistakes.

Active Learning through Flipped Classroom Approaches

Active learning refers to teaching strategies designed to actively involve students in the learning process. It encourages students to engage in meaningful activities while reflecting on their actions and understanding [9]. This approach can be interpreted as emphasizing both the active role of students and the supportive role of supervisors or teachers in creating effective learning activities and environments.

A method to incorporate active learning is a flipped classroom approach, where students are primed with relevant content before interactive learning activities that engage students in elaboration and collaborate learning [10]. In other words, it is important that the content, or a selection of key materials, is made available to students in advance in order to optimize discussion.

Benefits and Limitations of Flashcards in Learning

Digital flash card applications, which have gained significant popularity in recent years, may help leverage key learning principles, potentially including active recall and spaced

repetition [2]. A 2021 study demonstrated that medical students who frequently used a digital flash card application reported better knowledge retention and achieved higher Step 1 scores on the United States Medical Licensing Examination (USMLE) [11]. However, it is important to emphasize that just because students perform better on a test does not mean they will remember the material after the examination or fully understand the material. Some studies have shown that students using a flashcard-like approach do not retain large parts of the content two weeks after the test [12]. If the examination is held shortly after the learning process, flashcards may be useful. In contrast, for long-term retention and deeper understanding, more comprehensive learning strategies may be required. That said, flashcards can still be effective for reinforcing concepts that have already been understood, especially when used for repetition.

Another study found that medical students during psychiatry rotations appreciated using flashcards, even though this did not translate into improved final performance on the final exam [13]. This complicates the role of flashcards in a learning process. Nevertheless, relying solely on digital flashcard applications for repetition may not lead to a comprehensive understanding of the subject, as the content often emphasizes details over broader concepts. To gain a well-rounded understanding, flashcards should be complemented with other learning activities and additional sources of information. How, for what purpose and when the student uses the flashcard application may significantly influence its overall effectiveness.

One benefit of digital flash card applications is that they allow students to collaborate by studying the same set of flashcards, which can function as a form of peer review [14]. In my experience, when students use flashcards created by peers who have recently completed the course, they may gain a faster grasp of key concepts and be better prepared to formulate insightful questions during lectures and clinical placements.

With the rapid technological advancement of generative artificial intelligence (AI) based on large language models, medical and healthcare education will likely by affected by this technology [15]. The extent to which generative AI will influence personalized learning activities, support clinical reasoning, generate multiple-choice questions, or enhance the use of digital flashcards is uncertain. While the optimal use of generative AI in pedagogy and healthcare, along with its challenges is still unclear, it is important that students who choose to integrate generative AI into tools such as digital flashcards are well aware of its limitations and potential risks.

Improving Questioning Skills

It is important to emphasize that students should feel comfortable asking questions and view this as a natural part of the learning process. Adopting a growth mindset [7], as previously described, can help students embrace challenges and seek feedback to enhance their learning. In addition to the learning environment being supportive of asking questions and the student receiving answers in a constructive manner, how questions are asked is also important. It is likely an advantage if students learn how to ask questions effectively early on, rather than only learning this skill much later in their education, if at all.

As a teacher or supervisor, you can support your students by encouraging them to frame their questions in a way that reflects their current understanding. Rephrasing questions more thoughtfully can increase the likelihood of receiving meaningful feedback [16]. For instance, instead of the student asking, "*What treatment should we give this patient?*", you could guide and encourage the student to ask, "*I suspect (disease) and want to give (treatment). Should we give that treatment because of (reasons), or what are your thoughts?*"

Similarly, rather than asking, "What should we do in this scenario?", you can help the student rephrase their question as: "I'm unsure how to proceed when the patient's symptoms are more diffuse. Should we order these tests to broaden the diagnostics or would it be reasonable to try (treatment) and observe the outcome? Am I thinking along the right lines or how would you approach this?"

From my own experience when I was a medical student, I found that rephrasing my questions in this way led to more concrete feedback, a clearer understanding of my reasoning and guidance on where I was mistaken or how I could improve.

Structured Models in Clinical Training

A structured model can be an effective tool for organizing thoughts and supporting learning during clinical training. Given that medical students often have limited time in each specialty during their clinical rotations, it can be helpful for students to understand the models their clinical teachers or supervisors use to help optimize the learning interaction and structure the clinical approach.

One such model is SNAPPS [17], a mnemonic for summarize, narrow, analyze, probe, plan and select. This model promotes a presentation style that redirects, without

extending, the learning encounter by condensing factual reporting and encouraging the expression of clinical reasoning. The model works best when both the student and the supervisor are familiar with its structure. Today, many structured models are easily accessible online in Swedish, offering valuable resources for enhancing clinical learning.

Another structured model is the One-Minute Preceptor (OMP) model [18]. In a multicenter study, students rated it as a more efficient approach compared to traditional teaching methods [19]. This model is particularly effective in identifying students' learning needs, making it a valuable tool for enhancing clinical training and development of clinical reasoning skills.

Models like OMP and SNAPPS can help structure students' independent thinking during clinical practice, improve engagement with supervisors and enhance the overall clinical experience. If a supervisor is unfamiliar with these models, students who are aware of them can take the initiative to suggest incorporating such methods to support the teaching and learning process.

Practical Implementation of Strategies through a Scenario

The following scenario illustrates how the previously discussed themes can be applied in practice.

Usually, after a student presents a case to their supervisor in a structured manner, there is no established framework for how the dialogue or reasoning process should proceed. As a result, students are often unaware of models that could support or guide these follow-up discussions. Furthermore, there is typically no in-depth preparatory discussion between the student and the supervisor before the patient encounter regarding specific learning outcomes.

In this scenario, a student and a supervisor decide to apply a structured model, SNAPPS [17], during their next patient interaction. For the model to be effective, it is crucial that the supervisor follows its steps, allowing the student to actively engage with the case and articulate their reasoning before the supervisor shares their own perspective.

Prior to the encounter, the student uses self-regulated learning strategies, reflecting on an area for improvement, such as systematically examining the heart, and asks the supervisor to pay close attention during that part of the examination. In addition to reviewing relevant course material, the student also studies flashcards created by

previous students, which may support the recall of key information from similar past patient cases.

During the SNAPPS-based discussion [17], the student formulates questions by including their own suggestions for the correct answers. The supervisor responds with targeted feedback on the heart examination, highlighting both strengths and areas for improvement. Demonstrating a growth mindset [7], the student remains open to constructive feedback and actively seeks to learn by asking clarifying questions.

After the encounter, the student continues to apply self-regulated learning strategies by reflecting on what could be improved in future patient interactions and by setting both short- and long-term goals for development. Lessons learned from the case may then be integrated into a digital flashcard application for future use.

If appropriate, the student can save anonymized notes from the patient encounter to revisit later. These notes can be used for further reflection, such as identifying learning points, or shared with a peer for review. Peer discussions can help highlight missed details [14], alternative differential diagnoses, or reasoning behind why certain diagnoses were incorrect. Additionally, the students may reflect on whether any information was assumed to be obvious or left unexplained by the supervisor because it seemed self-evident.

Conclusion

In conclusion, improving learning outcomes in both academic and clinical settings requires structured strategies and supportive supervision. By using self-regulated learning theory as a guiding framework and building on the ideas of a growth mindset and the use of structured models, students are empowered to think independently and make the most of the limited time during clinical placements. These principles are likely transferable to disciplines beyond medicine.

Providing students with tools and models not only enhances their individual learning experiences, it is also likely to raise the overall quality of healthcare education. By embracing these strategies, students are better prepared to become competent, reflective and adaptable professionals, making them well-equipped for the challenges of clinical practice during their education and throughout their future careers. Lastly, as generative AI continues to evolve, it could offer even greater opportunities to enhance and personalize student learning in medical and healthcare education in the future.

References

1. Wang Y, Ji Y. How do they learn: types and characteristics of medical and healthcare student engagement in a simulation-based learning environment. BMC Med Educ. 2021;21(1):420.
2. Friedlander MJ, Andrews L, Armstrong EG, Aschenbrenner C, Kass JS, Ogden P, et al. What can medical education learn from the neurobiology of learning? Acad Med. 2011;86(4):415-20.
3. Mahan JD, Stein DS. Teaching adults-best practices that leverage the emerging understanding of the neurobiology of learning. Curr Probl Pediatr Adolesc Health Care. 2014;44(6):141-9.
4. Peters M, ten Cate O. Bedside teaching in medical education: a literature review. Perspectives on Medical Education. 2014;3(2):76-88.
5. Pintrich P. The Role of Goal Orientation in Self-Regulated Learning. Handbook of Self-regulation. 2000.
6. Zheng B, Sun T. Self-Regulated Learning and Learning Outcomes in Undergraduate and Graduate Medical Education: A Meta-Analysis. Eval Health Prof. 2024:16327872241288849.
7. Dweck, CS. Mindset: The new psychology of success. Random house. 2006.
8. Luo Y, Xie M, Lian Z. Emotional Engagement and Student Satisfaction: A Study of Chinese College Students Based on a Nationally Representative Sample. The Asia-Pacific Education Researcher. 2019;28(4):283-92.
9. Bonwell, C.C., and J. A. Eison, "Active Learning: Creating Excitement in the Classroom," ASHEERIC Higher Education Report No. 1, George Washington University, Washington, DC, 1991.
10. Prince MJ. Does Active Learning Work? A Review of the Research. Journal of Engineering Education. 2004;93.
11. Lu M, Farhat JH, Beck Dallaghan GL. Enhanced Learning and Retention of Medical Knowledge Using the Mobile Flash card Application Anki. Medical Science Educator. 2021;31(6):1975-81.
12. Roediger HL, 3rd, Karpicke JD. The Power of Testing Memory: Basic Research and Implications for Educational Practice. Perspect Psychol Sci. 2006;1(3):181-210.
13. Sun M, Tsai S, Engle DL, Holmer S. Spaced Repetition Flashcards for Teaching Medical Students Psychiatry. Med Sci Educ. 2021;31(3):1125-31.
14. Mazur E. Peer Instruction: A User's Manual: Prentice Hall; 1997.
15. Hersh W. Generative Artificial Intelligence: Implications for Biomedical and Health Professions Education 2025.
16. van de Ridder JM, Stokking KM, McGaghie WC, ten Cate OT. What is feedback in clinical education? Med Educ. 2008;42(2):189-97.

17. Wolpaw TM, Wolpaw DR, Papp KK. SNAPPS: a learner-centered model for outpatient education. Acad Med. 2003;78(9):893-8.

18. Neher JO, Gordon KC, Meyer B, Stevens N. A five-step "microskills" model of clinical teaching. J Am Board Fam Pract. 1992;5(4):419-24.

19. Teherani A, O'Sullivan P, Aagaard EM, Morrison EH, Irby DM. Student perceptions of the one minute preceptor and traditional preceptor models. Med Teach. 2007 May;29(4):323-7. doi: 10.1080/01421590701287988. PMID: 17786745.