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Operational Definitions of Learning at Iowa Concepts

Mindset – A set of assumptions, attitudes, and beliefs that you hold

Growth mindset – The belief that your abilities can be developed through practice and effort

Fixed mindset – The belief that you have a certain amount of natural ability and that it cannot change

Deliberate practice – A type of practice that is purposeful and effortful

Metacognition – Thinking about your own thinking

Metacognitive Planning – Thinking about your goals and the best strategies to reach them. This is the first phase of metacognition.

Metacognitive Monitoring – In-the-moment awareness of your learning and how you're doing with a task. This is the second phase of Metacognition.

Metacognitive Evaluating – Your appraisal and review of how your learning went. This is the last phase of metacognition.

Memory – Your ability to recall information and concepts

Active Learning Strategies – Strategies that manipulate the material in some way. These are more effective and produce stronger memories. They include self-testing, elaboration, generating examples and many others.

Passive Learning Strategies – Strategies that do not manipulate the material and are less effective. These include re-reading notes and textbooks, highlighting, and re-writing notes.

Fluency illusion – Information that is familiar to us seems more memorable and we overestimate how well we truly remember it.

Desirable Difficulties – Learning tasks and study strategies that feel difficult but lead to better memory of the material.

Effective Learning Strategies

> **Spaced Practice** – Spreading out your study sessions over several days or weeks.

> **Retrieval Practice** – (also known as self-testing/testing effect) The act of recalling information from memory in some form (practice testing yourself over the material).

> **Interleaving** – A study technique where you mix materials or topics within a study session.

> **Elaboration** – A study technique where you build connections among material and make the material meaningful.

> **Power Hour** – A study strategy where you spend 45 minutes focused on studying/ completing a task without distractions. After this time is up, you take a 10-minute break.

> **Massed Practice (cramming)** – A study technique where you study in one long session, usually right before an exam or deadline. It is less effective and unlikely to create long-lasting memories.

Fostering Students' Growth Mindset

Mindset is a set of beliefs or assumptions that someone holds, this includes how students view their own learning. Having the right attitude or mindset about learning is crucial to setting students up for success. Mindset determines how someone interprets setbacks and how they respond to challenges. We think of mindset on a continuum from a fixed mindset to a growth mindset. Your mindset can be different in different areas of your life. A student may have a more fixed mindset about one subject but a growth mindset in another. A fixed mindset is the belief that everyone has a certain amount of natural ability and that it cannot increase. A growth mindset, however, is the belief that abilities can be developed through practice and effort.

How It Affects Students

Students with a fixed mindset often have an all or nothing approach. They will often make statements such as, "I'm not a math person. I've just never been good at science." This mindset can be demotivating and can cause students to interpret any setbacks as evidence that they are not capable. They may also tie their identity to certain strengths and be disheartened at the first sign of a challenge (e.g., "I've always been good at biology; how could I get a C – this must not be for me"). Students with fixed mindsets often interpret any challenge as intimidating and may be reluctant to put forth any extra effort. It often creates a self-sabotaging cycle where a student believes they are not a math person and therefore does not put in extra effort or adjust their strategies when faced with a challenge.

Students with a growth mindset find new approaches to solve problems. A growth mindset helps students realize that they can learn, recover from setbacks, and challenge themselves. In this view, challenges are seen as opportunities to try different techniques and learn from them. It promotes help-seeking behaviors in students, such as going to office hours or supplemental instruction.

Students can often mistake Growth Mindset as blind optimism, assuming that having a positive attitude is going to automatically lead to success. But it isn't magic! Students need to be actively engaged and put in effort to succeed. The first step is thinking you are able to learn, and the second step is determining how you will learn. Many students also simply focus on effort – thinking, "that didn't go well, I guess I'll just try harder next time." However, it's possible to spend a lot of time and effort on strategies that are not effective for learning. Students need to be deliberate about their strategies and make sure they know what is and what isn't working for them. Having this mindset helps students understand that learning something might not be easy and might take some time, but they can improve with the right approach.

What You Can Do to Foster Students' Growth Mindset

Have students reflect on their mindset: Helping students become aware of their mindset in any situation is the first step to promoting a growth mindset. Encourage students to examine their own views about their learning and the courses they are in. Ask students questions that help them reflect on their own thinking. Do they believe they are capable of learning any subject? How much does effort impact their success in their courses?

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Recommend that students complete Mindset Assessments: There is an overall Mindset Assessment students can take that shows them where their current mindset lies. In addition, the Mindset Triggers Assessment identifies situations where students are more likely to have a fixed mindset.

Emphasize that their mindset can be changed: Stress to students that their mindset can be changed and is not static. Once they understand what their mindset currently is, they can work towards developing a growth mindset using the strategies below.

Remind them of their long-term goals: Many students can feel discouraged or unmotivated in certain courses. Help students refocus on how that course will impact their long-term goals. It may teach them a skill they will need in their future career; it could be a course that is necessary for their major, or it could promote critical thinking skills that they will use the rest of their life. Thinking about their own personal *why* can help them focus and make improvements.

Celebrate their progress: Point out that every small step forward is a step closer to their goals. Help students to acknowledge the progress they have made so far this semester or in their college career. Remind them of all that they have already learned and all the challenges they have overcome.

Use phrases that promote a growth mindset: Incorporate growth mindset focused language into your interactions with students. Promote the use of the word yet when talking about learning. "You haven't learned this…yet. You don't understand this…yet." The word *yet,* can take pressure off students to achieve perfection immediately. Below are other examples that can benefit students' mindset.

- Remember that there is time to change, and you are capable of anything!
- There are many different resources (including me!) that can help you achieve your goals.
- Your intentional effort and hard work will set you up for success.
- Remember that change doesn't happen overnight, but with consistent and intentional effort!
- Learning is a process, and it can take some time to figure out what works best for you.
- Sometimes growth can feel like a sudden improvement and sometimes it is more gradual and harder to recognize unless we look back.
- I'm proud of all the work you've done so far this semester, and you should be too
- Keep up the great work, your future self will be so grateful!
- Remind yourself that you successfully overcame academic challenges before this class.

Promoting Students' Metacognition

Metacognition means thinking about your own thinking. Having students reflecting on their own learning can help them track their learning and struggles and find what is working for them and what isn't. Students' ability to reflect on their learning improves many aspects of learning. Using metacognition increases students' ability to determine which strategies are most useful to them and problem-solve if something needs to be adjusted. Metacognition is a skill that can easily be learned and implemented.

Three important components of metacognition are planning, monitoring, and evaluating. Any learning task involves these three components. Metacognitive planning requires learners to understand what they are being asked to learn or do, and it involves understanding how long a learning task will take. Monitoring is the in-the-moment or on-line awareness of learning or performance. Finally, evaluation is the appraisal of how things went. Did they understand all of the concepts? If not, then the student can re-engage with metacognitive planning to get guidance learning the material.

What You Can Do to Promote Students' Metacognition

Planning

- **Encourage syllabi reviews**: Encourage students to map out their semesters by looking through their syllabi early. Students should look for exam and assignment due dates and how they will need to prepare. Even a quick skim through can help them organize their time.
- **Promote planner use**: Weekly planners are a great way to help students organize their time. Paper planners and online planners help students determine what will be coming up during the week and where they should place their priorities. Ask students what type of planner they use to organize their work. There are many planner apps students can download.
- **Sunday weekly plans**: Recommend students to take 5 to 15 minutes each Sunday to plan out their week. Mapping out what upcoming work they have, when they will study, and any other plans they need to incorporate. Having a designated time to write out or think about their week will set them up for success.
- **Set goals for studying**: Prompt students to start setting goals for each of their study sessions. These goals should be specific and feasible in the time allotted. Having a goal at the outset of the session can help students focus and manage their time.

Monitoring

- **Identify confusing concepts**: Have students write out or think about what concept they are unclear about, or what the "muddiest point" is in their course content. Once they have determined what they are unclear about they can seek help through office hours or ask other students. Have them try implementing this after most study sessions.
- **Distraction check**: Have students reflect on how distracting their study environment is. After a few study sessions, ask students to analyze how distracted they were in their study environment. If they could maintain focus most of the time, that is a great environment to continue studying. If they are often distracted or unfocused, they will need to switch up their

study locations. Some students benefit from louder environments while some require quieter areas. Finding what works for each study is a trial-and-error process.

Evaluating

- **Reflect on more than time spent studying**: Many students only evaluate their study habits based on how long they spent studying. While this does provide some information, it is an incomplete view of how their studying went. Ask students to reflect on what, where, and how they were studying. What did they focus on? Where did they study for the majority of the time? What techniques were they using? These questions can provide a better idea of how effective their studying was.
- **Make a list of what worked and what didn't:** Talk with students about how they felt regarding their study habits. Have them make a list of things that did work for them and things that did not. Try to include many different aspects of their studying, including the resources they used.
- **Suggest using exam wrappers or assignment analysis**: After exams or assignments, promote the use of exam wrappers or assignment analysis. These are structured reflections that can help the student identify what specifically worked well for them and what they may need to change in the future.

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Improving Students' Memory Strategies

When students learn material for classes, they are trying to create long-lasting memories that they can retrieve later on. Some learning strategies result in stronger memories than others. To build strong memories, students should be using effective learning strategies. Effective learning strategies often feel difficult for the student, these are desirable difficulties because that additional effort increases students' understanding and memory of the material.

Ineffective Learning Strategies

Often, students use less effective study strategies that involve passive techniques. These include rereading notes or textbook chapters, highlighting notes, and rewriting notes. Although students are reviewing the information, this passive process often results in the fluency illusion where the material appears more familiar to them and therefore **feels** more memorable. Students will then overestimate how well they know the information and may underprepare for exams/assessments. Another less effective strategy often used is massed practice. This type of learning (aka cramming) uses one long study session, right before a deadline or exam. While they may retain part of the information in the short-term, it is much less likely to be remembered long-term. They also have less time to make connections between the material and to apply the material in new ways. This can lead to shallower memories and a lack of deeper comprehension of material that is required in many courses.

Effective Learning Strategies

Effective study strategies use active techniques. These are techniques that involve manipulating the material in some way and applying the concepts. Strategies that are more active, like self-testing or explaining the solution to others, engage the brain more and lead to better understanding of the material. Two of the most effective study strategies that students can implement are spaced practice and self-testing.

Spaced practice means to spread out study sessions over several days or weeks. Revisiting material in multiple, shorter sessions over time allows students to elaborate and form connections between ideas. It is more effective to space out learning over time in 30 to 60-minute sessions. Even if students spend the same number of hours studying, spacing out their learning allows them to retain more information, improves their understanding, and is less stressful.

Self-testing is an effective strategy because the process of trying to remember material strengthens the memory of that information. Students need to actively recall information instead of simply becoming familiar with it through passive activities like rereading notes or textbooks. Self-testing engages the brain more and leads to better understanding of the material long-term. It also helps students identify any gaps in their understanding so they can go back and review it or ask questions during office hours.

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What You Can Do to Improve Students' Memory Strategies

Explain the limitations of only using passive study strategies: Rereading and highlighting notes are one of the most common study strategies for students. These can be helpful at the beginning of learning, but they have limitations. Only using passive strategies results in students simply becoming familiar with the information instead of understanding it. This can lead to the common occurrence in students where they reread their notes several times, believe they know the material, but then do poorly on exams. Help students identify other strategies they can include in addition to those passive techniques.

Promote the use of active study strategies: Encourage students to use different active study strategies that manipulate the material in some way. These strategies may feel more difficult to students, but that difficulty promotes deeper learning. A few active study strategies include self-testing, completing practice tests or reviews, and explaining the information. Explaining the information to someone in their own words helps them understand the information at a deeper level and apply it in different ways.

Encourage spaced practice: Students often try to cram their studying in at the last minute. Encourage students to space out their studying over several days or several weeks if possible. When students space out their studying, they retain more information and strengthen their memories. It also lets them revisit material they might have forgotten and gives that information a boost in their memory! Encourage them to focus on learning a little bit of material at a time in 30 to 60-minute study sessions.

Describe the benefits of self-testing: Explain to students that testing themselves in some way (flashcards, Quizlet, practice tests) will not only strengthen their memory but it will also let them know where they may be struggling. Let them know that to take full advantage of the benefits, make sure they respond on their own before looking up the answers! Wait to flip that flashcard over and force themselves to describe the concept. Cover their notes and try to remember everything on the page! Solve the chapter review questions before looking at the answers! This will feel more difficult, but they will have a better understanding of the material and be less likely to forget it.