Helping Students Learn

In their article for *Change Magazine*, Halpern and Hakel review how research on human learning can help improve our pedagogy. They define the underlying goal for any kind of formal instruction as "the assumption that knowledge, skills, and attitudes learned in this setting will be recalled accurately, and will be used in some other context at some time in the future" (2003). They lay out some basic principles for enhancing long-term retention and transfer of learning:

1. "**The single most important variable in promoting long-term retention and transfer is 'practice at retrieval.'"** The important point here is that "information that is frequently retrieved becomes more retrievable." Retrieving information that was learned earlier to produce responses to new questions, or in different contexts, is key to promoting retention. Spacing these instances of retrieval so that the time between them becomes gradually longer, rather than grouping them all together, also improves retention. As an example of how practice at retrieval in different contexts and content domains can be worked into a course, Halpern and Hakel suggest having students teach "concepts and skills to other students," or respond to "frequent questions asked in class or posed online."
2. **Vary the conditions under which learning takes place.** "When learning occurs under varied conditions, key ideas have 'multiple retrieval cues' and thus are more 'available' in memory." While this method can make learning more difficult, it will also make learning more successful. In the classroom, this can mean mixing different types of problems and solutions into the same lesson.
3. **Learning is enhanced when learners are required to take information that was presented in one format and "re-represent" it in an alternative format**. Here Halpern and Hakel draw on "dual-coding" theory. Since humans process information through two distinct channels—visuospatial and auditory-verbal—information that "is represented in both formats is more likely to be recalled than information that is stored in either format alone." Providing students with the opportunity to use both visuospatial and auditory-verbal channels to work through course content enhances their learning and recall. Hakel and Halpern suggest requiring students to construct concept maps representing the network of ideas presented in their readings or research topics. Similarly, students could be required to provide a verbal or written explanation of a mathematical or schematic learning task.
4. **"What and how much is learned in any situation depends heavily on prior knowledge and experience.** The best predictor of what is learned at the completion of any lesson, course, or program of study is what the learner thinks and knows at the start of the experience." Therefore, "we need to assess learner knowledge and understanding at the start of every instructional encounter, probing for unstated underlying assumptions and beliefs that may influence the knowledge, skills, and abilities that we want students to acquire."
5. **"Learning is influenced by both our students' and our own epistemologies."** Hakel and Halpern believe that "the best way for students to learn and recall something will depend on what you want learners to learn and be able to recall, what they already know, and their own beliefs about the nature of learning." By helping students to articulate their beliefs about learning, instructors can help them examine these beliefs, and provide students with learning tasks that help them build new models of how they learn.
6. **"Experience alone is a poor teacher."** The idea that learning should be "authentic," "that is, nearly identical in content and context to the situation in which the information is to be learned will be used," is often held up as an ideal in higher education. However, "what is missing from most authentic situations—and from most real-life situations as well—is systematic and corrective feedback about the consequences of various actions." Without this built-in feedback, students may learn exactly the wrong thing from any authentic learning task. As an example, Hakel and Halpern

describe the use of actors as fake patients in medical school. These actors can provide a variety of examples and opportunities for systematic feedback that working with real patients cannot. Activities like simulations or role-playing can be integrated into courses in any number of ways.

7. **"Lectures work well for learning assessed with recognition tests, but work badly for understanding...** learners need cues that trigger interpretation and force them to engage the material actively"—lectures fail to provide opportunities for either of these things.
8. **"The act of remembering itself influences what learners will and will not remember in the future."** Here Hakel and Halpern are drawing on "memory trace" theories that determine what we will retain and what we will forget. They caution professors to think carefully about what they want students to remember. For example, focusing assessments on "relatively unimportant points in the belief that 'testing for the footnotes' will enhance learning…will probably lead to better student retention of the footnotes at the cost of the main points."
9. **"Less is more, especially when we think about long-term retention and transfer."** Hakel and Halpern suggest that professors think about exactly how much information their students will need to recall when they attempt to transfer what they've learned to a new situation. By imagining the future use of the course content, professors can more effectively guide their decisions about how deeply to probe a particular area or what level of detail is necessary. "If cursory knowledge of a broad area is indeed desirable, then learners and instructors should be collectively conscious of this goal… But if deep understanding of basic principles is what is wanted, then the teaching and learning process needs to be structured accordingly."
10. **"What learners *do* determines what and how much is learned, how well it will be remembered, and the conditions under which it will be recalled."** This final point points out the importance of selecting the best learning activities to enhance retention and transfer. Halpern and Hakel believe that "what professors do in their classes matters far less than what they ask students to do" (2003).

Using the principles of Hakel and Halpern as a guide, the LTO suggests using the following principles to help students learn more effectively:

Get to know your students

- **Introductions** – Depending on the size of the class, you could invite students to introduce themselves and share some of their background, or lead them in an informal group discussion (Fink).
- **Help students get to know each other** – Create a positive, social classroom environment by giving students a chance to interact with each other. "Ice breakers raise the energy levels and get students comfortable… especially if you want to foster a collaborative environment… Icebreakers work even better when they allow students to get to know each other in the context of the course material" (CMU).
- **Assess student knowledge and motivation**
    - **Give students an ungraded pretest** that assesses knowledge and skills necessary for the course. "The questions might cover the major themes you will address during the semester." These questions can also be used on the mid-term and final "enabling you and the students to compare their knowledge at the beginning and end of the course… In addition, it provides students with examples of the types of questions you will ask on quizzes and exams" (CFE).
    - **Have students write a few sentences** about why they are taking the course, what they expect to get out of it, and what challenges they anticipate (CMU). Have students compose an "ungraded short essay on the first day of class. Short essays can reveal several important student characteristics, including perception, knowledge, and attitudes about the subject,

analytical and conceptual skills, as well as general writing ability" (UNC). To save time, conduct surveys or questionnaires or ahead of time using D2L or Google Forms.

- **Consider a mandatory office hour** – require students to "make an appointment with you, find your office and visit you there before the next class or two. This gets students to your office, breaks the ides with a short one-one-one interaction, and makes it much more likely that the students will come back for help when they need it" (CMU).

See our Teaching Tips on the First Day of Class for more ideas:
http://www.ryerson.ca/content/dam/lt/resources/handouts/firstdayofclass.pdf

Present course material in multiple formats

- **Make any presentation material accessible**.
  Making course material accessible won't just benefit students with disabilities. For instance, all students may find it easier to study or take notes from captioned videos, or EAL students may benefit from being able to go over new vocabulary before lectures.
  - When creating PowerPoint slides or other presentation material, use large, sans serif fonts and high contrast colors.
  - Provide slides and handouts in a variety of electronic formats (PDF, Word, HTML) that can be manipulated by students for ease of use.
  - Any visual content should be assigned alternate text, audio content should be transcribed, and video should be captioned (W3C, 2010).
  - Try to provide lecture notes or materials to students in advance so students can be more prepared for each class.
- **Include images amongst all the text**
  Albert Chong and Claire Farago, professors of Fine Arts from the University of Colorado, suggest that visuals can not only enliven the driest course content, but can also create a climate of openness and relevancy that fosters inclusivity and participation from students. Images can embody diverse ideas, provide cultural context," and provide concrete visual examples of abstract concepts (Chong, 1999).
- **Provide alternate modes of assessment**
  - Create online quizzes or self-tests on D2L so students can get constant feedback on their progress or gaps in their knowledge.
  - Build drafts, revisions, or peer review into writing assignments.
  - Provide a choice of assignments if possible, including flexible topics, formats, and due dates.
  - Distribute grading schemes, rubrics, and sample assignments to students so they know what is expected of them.
  - Design assignments that "minimize non-essential tasks," such as "learning irrelevant software just to access information" or requiring "non-essential physical travel" (UID).

See our Teaching Tips on Universal Design for Learning for more ideas:
http://www.ryerson.ca/content/dam/lt/resources/handouts/UDL_handout.pdf

Encourage active learning

- **Lecture methods:** When presenting course material in a lecture format, vary your methods. One possible methods is the *"interactive lecture* which evolves around orderly brainstorming in which students generate ideas in response to a question or prompt ('Call out what you know about DNA'). The flow of examples and counterexamples, generalizations and specifics, or rules and exceptions encourages students to grapple actively with the topic." Another method is using *"problem solving, demonstrations, proofs, and stories.* This method begins with the instructor posing a question, paradox, or enigma – some provocative problem that whets students' interest: 'What would happen if…' The suspenseful answer unfolds during the class period, with students actively or passively anticipating or pointing toward solutions" (Davis, 1993). Read more in our Teaching Tips on Making Lectures More Engaging: http://www.ryerson.ca/content/dam/lt/resources/handouts/EngagingLectures.pdf
- Engage students with various forms of participation or activities:
    - **Gather class opinion or assess student knowledge using clicker polls or quizzes**. Display results to the entire class to show consensus or areas of contention. A vote requires students to publically commit to their positions, engaging them with the discussion (Garvin, 2004).
    - **Encourage participation via micro-blogging technologies such as Twitter**. This may capture the comments and questions of students who are too shy to speak up, and students who might have otherwise been distracted by technology (CTE).
    - **Use jigsaw group projects:** In a jigsaw project, the class is divided into groups. Each member of a group is asked to complete some discrete part of an assignment. When every member has completed their assigned task, the pieces can be joined together to form a finished project. "For example, students in a geography course might be grouped and each assigned a country; individual students in the group could then be assigned to research the economy, political structure, ethnic makeup, terrain and climate, or folklore of the assigned country. When each student has completed their research, the group then reforms to complete a comprehensive report" (Cal State).
    - **Have students debate the material via role-play**. Ask students to volunteer to take on a role in a debate. When picking students to role-play, consider whether you want them to argue for the position they currently hold, or if you want them to argue against their current beliefs. Try to pick students across the room from each other so that their dialogue will bring the students sitting in between into it, rather than shutting them out (Garvin, 2004).
    - **Use case method**. Having students work through complex, ambiguous, real world problems engages students with the course material, encouraging them to "see it from an action perspective, rather than analyze it from a distance" (Angelo & Boehrer). Case studies are, by their nature, multidisciplinary, and "allow the application of theoretical concepts…bridging the gap between theory and practice" (Davis & Wilcock). Learn more in our Teaching Tips document on Teaching with Case Method: http://www.ryerson.ca/content/dam/lt/resources/handouts/CaseMethodBestPractices.pdf
    - **Flip the classroom.** The flipped classroom is model of blended learning that typically takes the form of web-based video lectures delivered at home, with class time devoted to problem solving, discussion, debates, case studies, and other activities. Learn more in our Teaching Tips document on The Flipped Classroom: http://www.ryerson.ca/content/dam/lt/resources/handouts/flipped_classroom.pdf

Visit our Teaching Tips on Active Learning for more ideas:
http://www.ryerson.ca/content/dam/lt/resources/handouts/activelearning.pdf

Provide students with learning skills

Many students, especially those in their first year of study, may have come to university lacking some of the skills necessary to be successful students. By providing students with some basic tips on how to take notes or study for exams, instructors can not only increase their chance of success in their coursework, but also provide students with lifelong learning skills.

- **Include a section in your syllabus describing some of the services available from Student Learning Support**, and spend some time on the first day of class reviewing the types of help Student Learning can deliver. The Student Learning Support website provides some boilerplate that can be included on your syllabus, as well as some interactive learning modules that can be embedded in your course shell. http://www.ryerson.ca/studentlearningsupport/for-faculty/index.html
- You can also include some information on the **research skills workshops** held regularly at the library, and the research appointments and reference assistance that is available directly from the library website: http://library.ryerson.ca/guides/
- **Selecting assigned readings:** Perform a "triage" on your reading list. Review all the materials you have considered assigning and rate each one "according to its relevance to success in the course (e.g. 'absolutely essential,' 'good supporting material,' 'exotic,' 'appealing to experts,' 'idiosyncratic choice')." Only the readings that fall into the category "absolutely essential" should be assigned as "required reading." Each of these texts should be mentioned in class, be included in projects and assignments, or appear on examinations (Hobson, 2004). Learn more in our Teaching Tips document on Getting Students to do their Assigned Readings: http://ryerson.ca/content/dam/lt/resources/handouts/student_reading.pdf
- **Another skill you can assist students with is note taking**. For instance, rather than distributing a full set of your slides before class, consider creating "guided notes" (notes where some material is left off) that students can use during lectures (UDL, 2012). You can also give them some additional note taking strategies, such as the Cornell system. The Cornell system requires students to "distinguish important information or concepts from other less important information." These important concepts are then listed in the left margin of the page, with definitions, evidence, and further details about the corresponding concepts listed on the right. This can help students break the material down into manageable chunks, as well as help them focus on the most important concepts of the course material (Hadad & Reed, 2007). Finally, you can present students with this list of techniques based on memory theory that can assist them in their studying:

1. During lecture, use the Cornell note taking system
2. Try to sit in a location in lecture and while studying where distractions are minimal
3. Listen for cues from the lecturer about what is most important (i.e., repeating concepts, stories on concepts, etc.)
4. After lecture, re-write notes into study notes between concepts
5. When reading and going over lecture notes, put important definitions and concepts on flash cards
6. Put information from the text into study notes
7. Categorize material in study notes to see how they relate
8. When studying, use concepts in unique and personal sentences

Excerpted from Hadad & Reed, 2013

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