ACTIVE LEARNING

You have probably noticed the gap between what's learned by reading or listening and what's learned by doing. That's where active learning comes in. The concept can be quite broadly defined as "instructional activities involving students in doing things and thinking about what they are doing" (Bonwell & Eison, 1991). Active learning describes instructional strategies designed to promote students' active participation in knowledge construction processes. And at its core, it puts students at the center, which helps to create a meaningful learning environment. Active learning is based on constructivist theories of learning, emphasizing the importance of making connections between one's prior knowledge and new experiences and concepts.

> Research shows that incorporating active learning strategies into university courses enhances student-learning experiences significantly (Freeman et al., 2014; Theobald et al., 2020).

How can you incorporate active learning into your class?

Extensive research has shown that active learning techniques are generally more effective than traditional lecture for promoting a wide range of desirable educational outcomes, including increased student learning and better retention (Freeman et al. 2014; Michael 2006; Prince 2004).
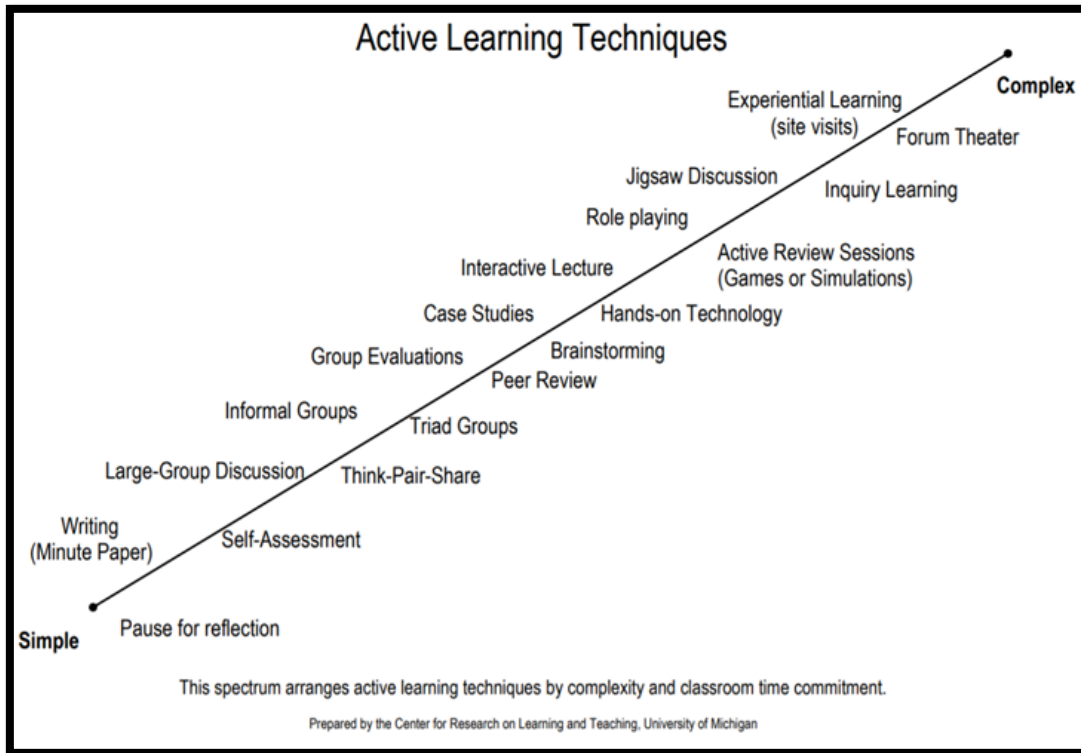
Figure 1. Active Learning Techniques (Retrieved from by the Center for Research on Learning and Teaching, University of Michigan)

As seen in Figure 1, there are several active learning tecniques you may consider using in class. When designing active learning tasks, a few core principles should be kept in mind. Active learning tasks should;

help students meet learning outcomes,

encourage student participation,

provide opportunities for feedback and reflection.

Concept Map: This activity helps students understand the relationship between concepts. Typically, students are provided with a list of terms. They arrange the terms on paper and draw arrows between related concepts, labeling each arrow to explain the relationship.
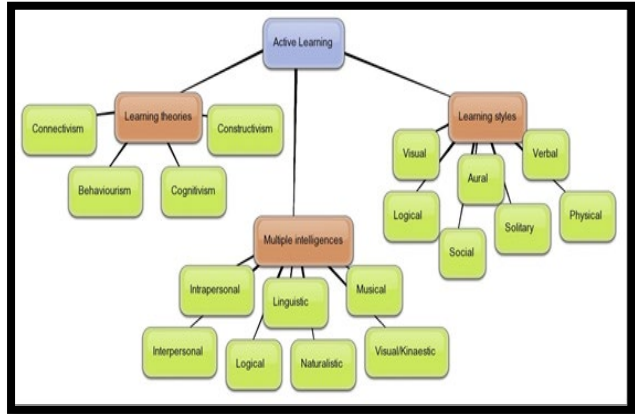
Minute Paper: At an appropriate point in the lecture, ask the students to take out a blank sheet of paper. Then, state the topic or question you want students to address in just one or two minutes. For example, *"Today, we discussed constructivist learning theory. List as many key events and figures as you can remember. You have two minutes."*

Case Studies: It presents students with situations from the larger world that require them to apply their knowledge to reach a conclusion about an open-ended situation. Provide students with a case, asking them to decide what they know that is relevant to the case,

what other information they may need, and what impact their decisions may have, considering the broader implications of their decisions. Give small groups (3-5) of students time to consider responses, circulating to ask questions and provide help as needed. Providing opportunities for groups to share responses helps students to generate complexity and variety of answers.

Think-Pair-Share: Ask students to think or write about an answer for one minute, then turn to a peer to discuss their responses for two minutes. Ask groups to share responses and follow up with instructor explanation. By asking students to explain their answer to their partner, you enable them to critically compare their responses with a partner before they share it with the entire class.

Self-Evaluation: Self-evaluation, which motivates students to reflect on their learning process, is a crucial part of active learning. At the end of each activity, consider giving students time to analyse what works for them, and what doesn't. As you make room for reflection and self-evaluation in class, you become more aware of students' learning patterns.

The Pause Procedure: Pause for two minutes every 12 to 18 minutes, encouraging students to discuss and rework notes in pairs. It also provides an opportunity for questioning and clarification and has been shown to significantly increase learning when compared to lectures without pauses. (Rowe, 1980; Ruhl, Hughes, & Schloss, 1980).

Combining lecture with active learning strategies can improve the effectiveness of instruction. As seen in Figure 2, providing students with 3-4 minute activities after a 10-12 minute lecture enables them to check their understanding of topic and identify gaps in their knowledge.

According to Dale's Cone of Experience, students remember about 10% of what they read, 20% of what they hear, but 90% of what they do. Active learning classrooms are, well, more active. Students are often applying their ideas, working on collaborative projects or using approaches like design thinking to solidify their learning.

Checklist for Active Learning

The activity helps students:

- o Recognize the information is related to something they already know.
- o Draw analogies between the material and the everyday world.
- o Draw on material previously presented.
- o Revisit previous material briefly, or has students recall previous material through targeted questions, when introducing a related topic.

Integrated in the activity is an element that:

- o Gives students multiple contact with new information.
- o Gives students feedback during or after the activity.
- o Provides ways of helping students observe (directly or vicariously) the subject or action they are trying to learn.
- o Gives students problems to solve using both new and old information.
- o Creates real-life problems for students to solve individually or in groups.
- o Allows students to actually do (directly, or vicariously with case studies, simulation or role play) what they need or learn to do.

Activities are designed to:

- o Draw on material previously presented/remind students that they are based on previous information.
- o Have students interact with others.
- o Help students to think about how material is related to their experience/work/everyday world.

Adapted from: "Teaching Blended Learning Courses" in Best Practices in Online Teaching by Larry Ragan under the terms of a Creative Commons Attribution 2.0 license.
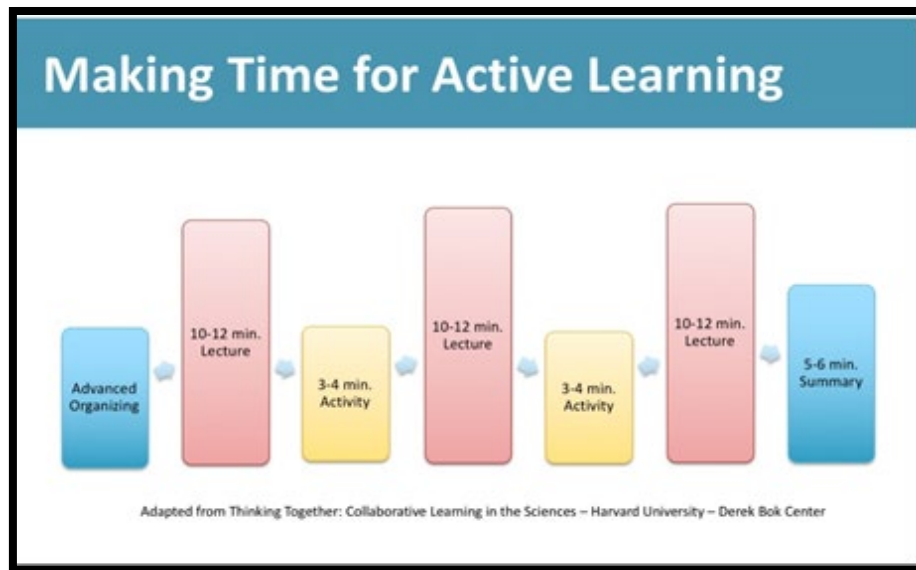
Figure 2. Making Time for Active Learning (Adapted from Thinking Together: Collaborative Learning in the Sciences- Harvard University-Derek Bok Center)

References

Bonwell, C. C., and Eison, J.A. (1991). *Active learning: creating excitement in the classroom*. ASH#-ERIC Higher Education Report No. 1, Washington, D.C.: The George Washington University, School of Education and Human Development.

Freeman, S, Eddy, SL, McDonough, M, Smith, MK, Okoraoafor, N, Jordt, H, Wenderoth, MP. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*(23), 8410–8415.

Michael, J. (2006). Where's the evidence that active learning works? *Advances in Physiology Education*, *30*(4), 159–167.

Prince, M. (2004). Does active learning work? A Review of the Research. Journal of Engineering Education 93 (3):223–231.

Rowe, M.B. (1980). Pausing principles and their effects on reasoning in science. In *Teaching the Sciences*, edited by F. B. Brawer. New Directions for Community Colleges No. 31. San Francisco: Jossey-Bass.

Ruhl, K., Hughes, C.A., and Schloss, P.J. (1987). Using the Pause Procedure to enhance lecture rcall. *Teacher Education and Special Education 10*, 14-18.

Theobald, E. J., Hill, M. J., Tran, E., Agrawal, S., Arroyo, E. N., & Freeman, S. (2020). Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. *Proceedings of the National Academy of Sciences*, *117*(12), 6476–6483.

Active Learning. Harvard University Derek Bok Center for Teaching and Learning. Retrived from https://bokcenter.harvard.edu/active-learning

Active Learning: Teaching Guide. University of Boston Center for Teaching and Learning. Retrived from https://www.bu.edu/ctl/guides/active-learning/

Active Learning. Vanderbilt University Center for Teaching. Retrieved from https://cft.vanderbilt.edu/guides-sub-pages/active-learning/

What is Active Learning? University of Michigan Center for Research on Learning and Teaching. Retrieved from https://crlt.umich.edu/active_learning_introduction

Further Reading and Resources

- 126 Active Leraning Techniques prepared by Iowa State University Center for Excellence in Learning and Teaching.

- Active Learning Overview MIT OpenCourseWare

- Active Learning Strategies in the Traditional or Virtual Classroom Centre for Teaching & Learning, Queen's University