

Unit 5

Building New Neural Networks

Major principles

- Teachers cannot transmit knowledge to learners.
- Learning is a dynamic process of building and rebuilding new neural networks.
- Performance depends on context.
- Students need to learn to create contexts to support their own learning.
- Skills tend not to be isolated abilities learned in a linear fashion, but rather webs of interrelated abilities.
- Learning new skills and concepts depends on coordinating more basic skills to form increasingly complex skills.
- Regression is essential to learning.

This unit can feel more like safe ground to teachers than the units on emotion and how we perceive and solve problems. Although we imagine that many of the ideas in this unit also challenge some of your bedrock beliefs about learning, teachers are often more comfortable with what seems familiar—in this case, the seemingly rational process of assimilating new knowledge and developing new skills. So it is important to remember that, though we are presenting cognition separately, emotion and cognition cannot be separated in learning or in any other typical brain function. It is, therefore, entirely appropriate to continue to discuss emotion as well as cognition as you proceed through these exercises.

In addition, this is a good time to become conscious of yourself as a learner. Teachers tend to teach as they have been taught, a tendency that can obscure the memory of how they actually learn. The first assignment is intended to remind you, so we suggest you become as fully aware as possible of yourself as a learner, and forget during this assignment that you are a teacher.

Assignment 1: Write about and discuss your experience of working to internalize, understand, remember, and use the new concepts introduced in this course.

You are working to learn many new concepts, and like any learner you are building new neural networks. Write down the answers to the following questions:

1. Do the course ideas about how we learn coincide with the process of learning that you are experiencing?
2. What specific steps have you had to take to understand these ideas and be able to put them into your own words to explain or discuss them with your colleagues?
3. What scaffolding has the course provided?
4. Have you had to create some of your own scaffolds?
5. How has the context (the conditions under which you are taking this course) affected your learning?
6. Can you articulate how you are putting the pieces of the unit (or course) together to build an increasingly complex understanding?
7. Have you been aware of periods of regression?
8. If so, what did you do during these times?
9. Have you discovered moments when you resisted or rejected new ideas?
10. If so, what happened in those moments?

In answering these questions, try to be as specific as possible by illustrating your responses using actual moments you recall. (The reflective, introspective nature of this assignment might require more than an hour's work. Keep track of the time it takes you to complete in your journal.)

Assignment 2: Explore the interplay between your experiences as a learner and as a teacher.

1. Does your teaching reflect what you now understand about learning?
2. Are your expectations for how your students learn aligned with what you know about how you learn?
3. Are there areas where your experience of learning conflicts with the research about learning as presented in this unit?
4. How will you resolve those conflicts?
5. Have you found students who don't learn the way you learn? How will you teach these students?
6. Have you discovered things you need to change in your teaching? What are they?
7. Why do they need changing?
8. How will you change them?

Try to look at these issues as specifically as you can by drawing on actual

experiences (in your learning process and from your classroom) to illustrate your thoughts. (Again, the nature of this assignment may require more than an hour of work. Keep track of the time it takes you to complete.)

Assignment 3: Think about how you might change your approach to teaching based on the ideas from this unit and create a lesson that embodies these changes.

1. Write down the changes you might make to your approach to teaching based from the ideas in this unit. Be very specific.
2. Create a lesson or series of lessons that embody these changes.
3. When you are able to implement your plan in the classroom, keep a journal of how it works and of your observations. Ideally, try to assess the students' skill or knowledge level both before and after the lesson(s).

(This assignment will require more than an hour. At a minimum, you will need an hour to think about the changes you might make to your teaching and another hour to create a plan. Keep track of the time you devote to writing about the actual implementation.)

Assignment 4: Analyze a lesson by breaking down into its component parts the concept or skill the lesson teaches.

Recall the example of the baby who was learning to fill a cylinder with blocks (See Unit 5, Section 6 video, "Johanna and Mother"). This process of building more complex new skills or of developing a greater understanding is the basic model for how we learn. Recall, too, that Judy and Bob were assigned the more complex task of writing an essay on the significance of Andrew Jackson's policies, but the process of developing the skills to write such an essay is the same as it was for baby Johanna.

Just as Johanna learned more basic skills on her way to mastering the simple skill of filling a cylinder, over their years in school, Judy and Bob constructed skills that they would need to coordinate in order to accomplish the more complex task of writing an essay on Andrew Jackson. They constructed the skills of reading documents, summarizing them, and developing a point of view about them. They learned to write essays about abstract ideas, use evidence, and organize an argument. They developed an understanding of cause and effect and how the past influences the future. At least, they ought to have done these things before tackling the assignment on Andrew Jackson. If, for example, they still struggle to read documents relevant to the task because their vocabulary is inadequate, the base on which they are constructing their new conceptual understanding of Jackson's policies (never mind their significance) will be weak, and the teacher will need to address this weakness.

Select a specific lesson or assignment that you have planned for one of your classes. Break down into its component parts the concept or skill that the lesson teaches—the smaller skills and bits of knowledge on which rests the more complex

skill or understanding, the intended outcome of the lesson. Also look at the connections among these components that must be made for the successful completion of the lesson. Write down the answers to the following questions:

1. Are the students ready for this lesson?
2. If not, what needs to be done before they should attempt it?
3. What parts might you still need to scaffold?

Assignment 5: Give the above assignment to your students. Those who did it well were probably ready.

Write down the answers to the following questions:

1. Can you analyze the work of one student who did poorly to determine what components or connections embedded in the more complex skill might be missing from that student's knowledge base?
2. Does this analysis provide insight into what this student might need to do in order to improve the base on which the assignment rests?
3. Might emotional factors be interfering with the successful completion of the assignment?
4. What might you do to help this student?

Assignment 6: Write about and discuss your approach to grading.

Although some schools have replaced grades with narrative assessments, most have not. So, teachers will likely continue to operate in a grade-based system. Write down the answer to the following question: What changes might you make in your approach to grading to take into account regression as a constructive and necessary part of learning?

Suggested readings between Unit 5 and Unit 6:

Possible review:

Fischer, K.W., and L.T. Rose. "Webs of Skill: How Students Learn." *Educational Leadership* Vol. 69, No. 3 (November, 2001): 6-12.

Schwartz, M. "Cognitive Development and Learning: Analyzing the Building of skills in Classrooms." *Mind, Brain, and Education* Vol. 3, Issue 4 (December, 2009): 198-208.

Possible preview:

Blodget, A. "Motivation: Making Room for the Self in School." *Independent School*, National Association of Independent Schools, Spring 2009 (online feature).