# The expertise activity

**Learning attitude activity: Drawing on the expertise of students**

By Yuhfen Lin & David Brookes

**Handout:**
**Reflection becoming an expert**

1. Think about one area of your life that you're really good at. (For example, music, cooking, computer games etc…) Were you good at it from the very beginning?

2. How did you become an expert in this area? What specific step(s) do you need to take in order to get to where you are right now? (Think about time commitment, the detailed cognitive process of learning. Try and be as specific as possible, use examples.)

3. Were there ever times that you didn't accomplish your goal during practice or competition? How did you feel when that happened, and what did you do next?

4. Now that you are an expert, do you still make mistakes? Do you know when you are making a mistake? How do you know? What do you do when you know you have made a mistake?

5. As a group, make a diagram on your whiteboard. This diagram should be a learning cycle that connects together a set of repeatable elements that could be used to become better at your chosen field. In other words, describe a repeatable process should you engage in to become more and more expert-like at ________ (sports/cooking/computer gaming etc etc)

6. Now that you heard about learning strategies from different groups, which strategies can be applied to learning physics? Based on your answer, can you come up with suggestions for study strategies for another student who wants to do well in this class?

**Introduction and Orientation:** Students are expert learners, just not yet in your science class. This activity is intended for instructors who are trying to implement a student-centered, reformed science curriculum in their class.  In such circumstances instructors often encounter student resistance.  Students, for example, might say “why can’t you just tell us the answer instead of making us figure it out for ourselves.” This activity is designed to help students access their expertise as learners and transfer their effective learning experiences in other domains to their science class. If you are trying to help students to become expert learners in science you are likely using regular formative assessment and self-assessment with your students. If helping students to become expert learners is one of the principal instructional goals of the class, this activity should be extremely helpful.

**Implementation Overview:** Students are experts. They might not be experts in the subject we are teaching. We will ask them to start thinking of a field of their expertise in a deeper level.

1. Ask students to think about their field of expertise. Here is one way to phrase it.  “I would like you to talk to your neighbors for 3 min on what you are really good at. This can be sport/art, video gaming, cooking…or anything. Write down all your areas of expertise on the white board.”
2. Have students share their field of expertise with the rest of the class. As they do, group the areas under broader categories on the board. For example, you can group “basket ball,” “baseball,” and “football” under the “sports” category. Group “piano,” “violin,” and “painting/sketching” under an “arts” category. Use this chance to divide students into groups based on those fields. If there is someone with a rather unique field of expertise, she/he can choose to be in a group with her/his other expertise or the group that’s the most closely related to her/his field. In other words, as the students are discussing, the instructor should place a list of the commonly occurring areas of expertise on the board. The number placed depends on the size of the class.  Students should then choose which group they want to join.
3. Hand the handouts to the students and have them have discussions on the questions in their expertise groups.
4. The key activity for the group discussions is: Ask students to draw up a diagram to demonstrate the process it takes for them to learn to become an expert in their field of expertise, on their whiteboard. You might say “Please construct a diagram that shows to the rest of the class how to move from novice to expert in your field of expertise. The diagram should be a learning cycle that illustrates a repeatable process that can be engaged in to progress from novice to expert.” Try to emphasize that the diagram should be a learning cycle rather than a list or a simple progression. Students tend to make a list of “what does it take to become an expert,” but this (somewhat) defeats the purpose of the activity.
5. As they work and discuss, walk around. Here are some key questions you can ask to keep students on track:

    · Can you become good at something (e.g. tennis) by watching others play tennis?

· When you're playing xxx game and lose against other players, what do you do? Do you just give up and never play again? What do you do when you fail? (Apply same question to cooking: What do you do when you make something and it tastes bad? Do you never cook again?)

· How much time does xxx take to become good at it? (per day, per week)

· When you practice, how do you practice? Do you just go and practice with no structure? If not, what do you do?

· How do you know when you're doing well at something? How do you know when you've succeeded? How do you distinguish between success and failure?

· What do you do after you have succeeded at something? Do you quit? What do you do next?

· How do you maintain interest? Do you ever become bored with xxx? If so, why? What is it about xxx that keeps you excited after all these years?

· Students will tend to make lists. Encourage them to take that list and turn it into a learning cycle that can be repeated over and over to become more and more expert.

6. Once diagrams are completed, hold a whole class discussion. Each group shares their learning cycle with the rest of the class. This could happen either by a) a spokesperson(s) from each group making a short 2 min presentation, followed by questions and discussion, or b) have all groups hold up their whiteboards simultaneously so that everyone can see all boards and have them study each others diagrams for a few minutes before having a group discussion. Discussion should revolve around: a) Questions for clarification, b) What is missing from our own diagram that we might like to add, now that we've seen others.
7. Continuing discussion: Ask students to discuss what is in common between all the diagrams, and the instructor should distill those items on to a board as the students suggest commonalities.
8. Ask students to talk to their expertise group about how they can transfer those common learning strategies into the learning for this science class. Ask them to think about the similarities and the differences between learning science and (for example) learning how to become an expert at, say, a computer game.
9. Call another whole-class discussion. Have them talk about what they should do for learning in this class. Especially how to face difficulties and challenges. How self-assessment is important in class. How do you use external feedback (e.g., from the instructor) to improve your own learning? The instructor should show the students, the student centered classroom diagram and connect it to the various activities that happen in that particular classroom. If necessary the instructor should modify that diagram to suit their particular context and situation. (One could add in loops for self-reflection and meta-cognition, for example.)

From this discussion, emerging themes could be: a) Getting things wrong. It is okay to make mistakes. You can't always get it right the first time. b) Persistence: it takes many tries to get things right. c) You're not an expert by watching others, only an expert by doing. d) When doing practice, it has to be reflective and meaningful practice. Practice shouldn't waste time. In terms of sport, you don't just work hard and exhaust your muscles. You think about what you did right and what you did wrong and work on the problem areas. e) Formative self and peer assessment is key to learning. How is this going to happen in this science class?

**Final Note:**
It is important that you connect what the students come up with to specific elements of YOUR class. For example: We connect students' ideas about the need to fail and improve and the role of formative peer and self-assessment to specific elements in our class where students are allowed to recover points by re-doing things like homework and exams.
When students recognize the importance of challenge to maintaining interest, we connect that to the fact that in this physics class we are going to give you activities to do that are at the very edge of what you're capable of. It is going to be hard and challenging for exactly that reason that if we made it easy, you (the students) would not be interested.
Students talk about the need to fail and the need to persist in the face of failure in order to improve. We connect that back to the classroom by highlighting that learning physics can be uncomfortable and involve frustration and failure and that this is a necessary part of the learning process. Highlight that it is critically important to keep trying even when you (the student) has failed at something or is stuck and doesn't know what to do.
Although this may be obvious, we would like to emphasize that this entire activity is designed for learning environments that implement learning elements like formative assessment cycles, student-driven inquiry processes etc… The goal is to help orient students to this "new" way of doing things. If you give this activity to a lecture class that doesn't use these learning elements, students are probably not going to see the point of the exercise.