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To all Teaching Assistants and Instructors: Can best tutoring practices be scaled up for "normal" teaching settings?

>> Consider providing a copy of this to your grad students and TAs. <<

What are the characteristics of the best tutors (one-on-one teachers)? **More importantly**, can these best practices be scaled up for use in **laboratory**, **tutorial**, **field** or **classroom** teaching?

The INSPIRE model for the "optimal tutor", from Lepper, Drake, O'Donnell-Johnson, (2002)[1] describes research-based best practices of tutors who work one-on-one with their pupils. This model is articulated as:

INSPIRE = **I**ntelligent, **N**urturant, **S**ocratic, **P**rogressive, **I**ndirect, **R**eflective, **E**ncouraging.

Context: The research that yielded this model involved studying tutors helping elementary school kids learn math. The goal was to differentiate excellent from mediocre tutors' practices based on student learning. The most effective tutoring followed a recurrent sequence of phases as students worked through a series of problems:

1. Introduction (tutor and student become acquainted)
2. Problem (or question, or other learning task) selection (tutor)
3. Problem (or task) presentation (tutor)
4. Problem solution or task execution (mainly tutee)
5. Reflection (tutor - encourage thought about solutions, implications, etc.)
6. Instruction (when necessary - direct instruction, or discussion of options, etc.)

Tutors steer the tutee's learning by using two diagnostic models, usually simultaneously:

- Cognitive models (tutor is thinking "how is the student thinking working?")
- Motivational models (is the student up to it, ready for it, capable and wanting to do it, etc.)

Tutors' decisions are easy when both diagnostic models point in the same direction, but are more difficult when cognitive and motivational indicators point in different directions. In response to such situations, expert tutors demonstrate strategies that may be counter intuitive to non-expert tutors, and they usually demonstrate sophisticated degrees of perception about the student. Highly effective tutors exhibit characteristics listed under each of seven components of the INSPIRE model. Here are examples of behaviors that typify each component.

INSPIRE Characteristic	Examples of behaviours
1. Intelligent	
Strong subject-matter knowledge	• Provide relevant historical information (instructive or motivational). • Use concrete instructional tactics, eg visual models, for illustrating difficult concepts. • Produce a wide variety of real-world analogies.
Strong subject- specific pedagogical knowledge	• Know which problems will be difficult. • Know what types of errors are most likely. • Know which problems appear to be more (or less) difficult to students than they really are.
General *pedagogical* knowledge	• Use instructional and motivational techniques identified in the rest of this table.
2. Nurturant	
Highly supportive of students.	• Establish personal rapport early. • Empathize with students' difficulties. • Show confidence in students' ability to succeed.
3. Socratic, not didactic.	
Questions, not directions	• More than 90% of remarks are in the form of questions. • Questions are often leading or informative. • Draw as much as possible from the student and to impose your own thinking only as necessary.

[1] From ***The Wisdom of Practice: Lessons Learned from the Study of Highly Effective Tutors*** by Mark R. Lepper and Maria Woolverton; Ch. 7 in Aronson, Joshua, ed. 2002. "*Improving Academic Achievement: Impact of Psychological Factors on Education*". 1st ed. Emerald Group Publishing.

Hints, not answers	• Offer hints or suggestions and avoid directly giving answers. • Act to help students take the next step on their own.
Productive versus nonproductive errors	• Sophisticated understanding of different types of errors, and how to respond effectively to them. • Ignore small errors when they don't prevent arrival at a correct answer (although these may lead to subsequent problems to target difficulties). • Able to identify "productive errors" which can be used to guide students towards discovery of misconceptions. Some are deliberately allowed to occur so that they can be systematically "debuggged". • Able to detect and act upon "nonproductive errors", which may lead students astray, and which need more explicit intervention.
4. Progressive	
Problem progression	• Systematic progression, starting with problems that diagnose students' initial levels of knowledge and misunderstanding. • Subsequent problems selected for the correction of misunderstandings before moving on to further challenges.
Systematic debugging of student errors	• Goal is to prompt students to discover for themselves the reasons for their errors. • Routinely begin with general hints and questions, progressing to more specific questioning types of help only as needed.
Progressive routines	• Effectively structure tutoring sessions using recurring routines, helping focus students' attention on appropriate issues at different phases of the tutorial.
5. Indirect	
Negative feedback	• Avoid overt criticism by posing questions that indirectly imply the existence of an error and, sometimes, the location of that error. • Goal is to prompt students into retracing their own steps and "catching" their own errors.
Positive feedback	• Less likely to provide explicit praise to students, especially praise directed at the person rather than the process of problem solving.
6. Reflective	
Articulation	• Have students reflect aloud immediately after a successful problem solution. This (i) helps gain information from students about possible misunderstandings, and (ii) helps students to understand at a conceptual level. • (Eg: have student keep a written list in their own words of general "lessons" they had learned.)
Explanation	• Periodically ask students to explain answers and procedures. • If incomplete, elaborate on the student's response, thus modelling a more complete explanation.
Generalization	• Periodically ask students to relate work to other types of problems or to real-world situation that they are familiar with and interested in.
7. Encouraging	
Confidence	• Concerned with bolstering students' feelings of competence and mastery. • Eg: emphasize the difficulty of the problems, (i) implicitly giving students an excuse if they do have difficulty and (ii) increasing the value of success.
Challenge	• Likely to challenge students - goad them into a desire to "show" the tutor just how much they can accomplish. • Able to present problems that will be challenging, though not impossible.
Curiosity	• Try to pique students' curiosity, so they want to find answers on their own. • Ask students to predict similarities or differences between current and previous problems. • Deliberately highlight inconsistencies to provoke students into seeking some resolution.
Control	• Offer students choices. • Comply with their requests. • Emphasize a student's sense of agency directly. • Avoid direct didactic methods that could undermine a learner's sense of control.
Contextualization	• Place abstract problems into meaningful and interesting contexts. • Personalize problems so relevance can be seen in familiar real-world contexts that students care about. • Use of enjoyable and provocative stories improves motivation.

So … can these characteristics of one-on-one teachers be scaled up to "normal" teaching situations with moderate to large classes or labs? Certainly. Many strategies in use in the small, medium and large classes taught in UBC's Faculty of Science achieve one or more of these optimal behaviors. Clickers, for example, help instructors be Socratic, Progressive, Indirect, and Reflective – bringing their instruction practice closer to optimal in at least 4 of the 7 components of the INSPIRE model. Other strategies (eg. worksheets) can also be aligned with the model.

Think of your own practice, whether labs, tutorials, field work, classrooms or one-on-one with a puzzled student, and see how many INSPIRE characteristics you can (a) recognize in your teaching, and (b) improve.

Contact EOS-SEI: Talk about your course(s) or teaching and learning in general! Visit EOS-South 361, or contact Francis (fjones@eos.ubc.ca), Brett (bgilley@eos.ubc.ca) or Sara (sharris@eos.ubc.ca). See also http://www.eos.ubc.ca/research/cwsei/.