

Inquiry Mode and Rehearsal Mode



While students need to solve challenging tasks to advance in mathematical sophistication, they also need to rehearse their knowledge and strategies to develop facility. Thus, it is helpful to distinguish to productive modes of work students can adopt: inquiry mode and rehearsal mode.

Inquiry mode occurs when students are trying to solve a novel problem, exploring some new material, generating further examples. It is activity that produces something ‘new’ for the student that breaks new mathematical ground.

Rehearsal mode involves rehearsing something that has been introduced before: identifying some numerals, naming some figures, reciting some number word sequences. It is a practice that repeats something with which the student is acquainted, with the intention of increasing familiarity and ease, and perhaps working towards automatization. Successful inquiry and rehearsal have distinctive qualities, as suggested in Table 2.1.

	Inquiry mode	Rehearsal mode
Challenge	Tasks need to be challenging but solvable	Tasks need to require just a moment’s thought, mostly involving recall
Engagement	Student engagement and energy arise from thinking hard, taking initiative and discovery	Student engagement and energy arise from the brisk pace of the task, and the regularity of success
Autonomy	Students need autonomy in approaching the task, and preferably autonomy in checking their solutions	The task is mostly externally directed – for example, by a teacher, a game, a computer, or a worksheet. Answers are checked immediately.
Time	Time needs to be relatively long, long enough to exercise student’s persistence and initiative	Time needs to be relatively short, sufficient to practice without getting tired or distracted
Pace	Pace varies with the ebb and flow of students’ inventions and puzzling	Pace is kept fairly brisk and even
Follow-up	Inquiry work is well served with follow-up sharing, discussion and debate, to bring communal mathematical reasoning to bear on students’ work	Rehearsal work can be follow-up with revisiting two or three of the items that caused difficulty

It behooves a teacher to be mindful of these distinctive qualities of activity. If an inquiry task is set, but the teacher also provides an approach to solving it, then students may not make sense of the task for themselves, and may not establish interest in solving it. If an inquiry task is set, but the teacher intervenes whenever the pace stalls, the students may never fire up their puzzling mind. On the other hand, if a rehearsal session includes a difficult task, it will confuse and dishearten the student. If a rehearsal session is frequently interrupted for discussion, students may lose attention, and not effectively rehearse their knowledge.

An instructional task will be suited to one or other of these modes, depending on the knowledge of the student. For example, for Anya, the task ‘write down all the ways of making ten’ is an inquiry task, requiring thinking time, scribble room and some follow-up inquiries – ‘Convince me that you have found them all.’

For Ben, and indeed for Anya two weeks later, the same task is a rehearsal task, requiring about one minute, just six orderly lines of writing, and a quick self-check against the answer made the previous week. Each student will benefit from a mixed diet, with plenty of inquiry, and some regular rehearsal. In a class with varied knowledge – that is, in any class – arranging a mixed diet for all students is not straightforward.

ACTIVITY IA5.6: Crazy Grid

Intended learning: To add ten or multiples of ten to any number.

Instructional mode: Shorter, rehearsal mode for individuals, small groups or whole class.

- Materials: Crazy grid drawn on the board or from Resource CD, base-ten materials as needed.
- Description: Present a grid with one number displayed (see Figure 5.7). *One day, I was trying to print a hundred grid, and the printer went crazy. For some reason, almost none of the grid printed. Can you help me fill in the missing numbers?*

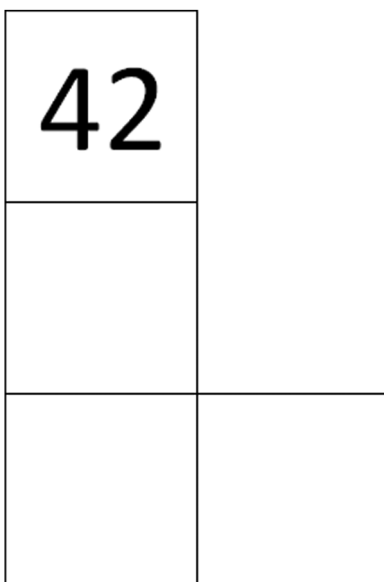


Figure 5.7 A sample crazy grid

Responses, variations and extensions:

- This task is designed for students who have worked patterns on the hundred grid and are familiar with the format of the hundred grid.
- Examples of extensions are to begin with a number: (a) in the hundreds (257); (b) that requires hurdling the centuple (87); and (c) that is in the hundreds and requires hurdling the centuple (493).
- As students develop facility, have them insert only one specified missing number rather than all the missing numbers.

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