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Expectation and variation with a virtual die.

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Summary: By the time students reach the middle years they have experienced many chance activities based on dice. Common among these are rolling one die to explore the relationship of frequency and theoretical probability, and rolling two dice and summing the outcomes to consider their probabilities. Although dice may be considered overused by some, the advantage they offer is a familiar context within which to explore much more complex concepts. If the basic chance mechanism of the device is understood, it is possible to enter quickly into an arena of more complex concepts. This is what happened with a two hour activity engaged in by four classes of Grade 6 students in the same school. The activity targeted the concepts of variation and expectation. The teachers held extended discussions with their classes on variation and expectation at the beginning of the activity, with students contributing examples of the two concepts from their own experience. These notions are quite sophisticated for Grade 6, but the underlying concepts describe phenomena that students encounter every day. For example, time varies continuously; sporting results vary from game to game; the maximum temperature varies from day to day. However, there is an expectation about tomorrow's maximum temperature based on the expert advice from the weather bureau. There may also be an expectation about a sporting result based on the participants' previous results. It is this juxtaposition that makes life interesting. Variation then describes the differences we see in phenomena around us. In a scenario displaying variation, expectation describes the effort to characterise or summarise the variation and perhaps make a prediction about the message arising from the scenario. The explicit purpose of the activity described here was to use the familiar scenario of rolling a die to expose these two concepts. Because the students had previously experienced rolling physical dice they knew instinctively about the variation that occurs across many rolls and about the theoretical expectation that each side should "come up" one-sixth of the time. They had observed the instances of the concepts in action, but had not consolidated the underlying terminology to describe it. As the two concepts are so fundamental to understanding statistics, we felt it would be useful to begin building in the familiar environment of rolling a die. Because hand-held dice limit the explorations students can undertake, the classes used the soft-ware TinkerPlots to simulate rolling a die multiple times. (ERIC)

Classification: K50 K40 U70

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