

Random Turtle...from previous page

around some value. This normal distribution around some expected value is characteristic of many random processes. Older students can then use this experience to apply the ideas of trigonometry or calculus. The Logo language was created to provide children with a mathematical environment in which to play, and in this way to learn mathematics on their own terms. This "math play" can continue into the high-school years because of Logo's engaging graphics and mathematical power. By combining this with the notion of the student-as teacher, where the Logo turtle is the willing learner, we can help our students to build their own foundations for learning the mathematics they need. Δ

References

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```
to randomize
if key? [stop]
do.nothing.with random 100
randomize
end
```

As a final touch, print a line to let the player know what's happening:

```
to game
ct
print [Press a key to start the game.]
randomize
setup
play
end
```

By the way, what is random anyway? Δ

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An Interesting Activity that has to do with Statistical Probability

Contemplate the following paragraph before reading on:

This is a highly unusual paragraph. Do you know why? If you try to find out what is odd about it too quickly it probably won't occur to you. Study it without hurrying and you may think of what it is. Good luck!

How often do you write a paragraph that is void of the letter *e*? The one up above is probably the first one you have ever seen. That is because the letter *e* is the most frequently used letter in the English language. On the average, how often do you think it appears? Well, if the previous three sentence are an indication (or sample), then I press the *e* key about 14 percent of the time (37 *e*'s, 258 characters).

An interesting activity (that can be the basis for code breaking activities) is to have students predict what the approximate percent frequency (based on large samples) is for each letter of the alphabet. Students would have to analyze samples of written work. What makes the job simpler is using a wordprocessing program that can give you a character count and tell you the number of occurrences of a given search string. (My wordprocessor wouldn't tell me how many occurrences of a given letter I had, but it would give me a total of occurrences of a given string that I replaced with another string. So I asked it to search for *e* and replace it with *e*. It didn't change my text and told me how many *e*'s I had.)

Here's a challenge for you. Write a program in Logo that will give you a count of each letter of the alphabet for a given list of words.

Next time we will look at some solutions done in different versions of Logo. Please send us your solution.

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Thanks again for your support. Your membership fees pay our costs and keep us active in making people aware of the power of technology in making a difference in the quality of the education that our students receive. But we do only a small portion. It's you and your thousands of colleagues that somehow don't give in to the daily problems, but continue to strive for the vision that Seymour Papert articulated so well in *Mindstorms* to help children fall in love with learning. I hope that you will continue to strive for that goal. Δ

¹These ideas are presented in the May/June 1989 issue of the *Harvard Education Letter* (Cambridge: Harvard University Press)

²Seymour Papert believes that the kind of learning that should go on is Piagetian learning which means "learning without teachers". Some teachers misinterpreted this to mean that they should leave children alone. Independent learning implies that children use teachers as important resources. (Sometimes teaching gets a bad rap because it implies only the didactic approach. But we know that there are many ways to teach. My favorite metaphor for teaching is "bridge building" - connecting children's previous experience with new ideas.)