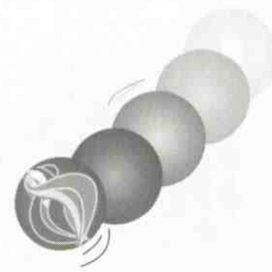
Kidspiration® for Inquiry-Centered Activities



EDWARD L. SHAW, JR., PAIGE V. BAGGETT, and BARBARA SALYER

Abstract. Computer technology can be integrated into science inquiry activities to increase student motivation and enhance and expand scientific thinking. Fifth-grade students used the visual thinking tools in the *Kidspiration®* software program to generate and represent a web of hypotheses around the question, "What affects the distance a marble rolls?" The software encouraged flexible and creative thinking as students generated hypotheses, performed preliminary tests of their ideas, easily edited and revised their web, and created pictorial representations to anchor their thinking. The *Kidspiration®* software can be used in many different science inquiries and can help teachers meet the unique needs of visual learners as well as ESL students.

Key words: computer technology, inquiry, *Kidspiration®*, motion

EDWARD L. SHAW, JR. *is a professor of elementary science education at the University of South Alabama. He is a former fifth- and sixth-grade teacher. He is interested in the impact of technology, process skills, and learning styles on the achievement and attitudes of elementary science students.*

PAIGE V. BAGGETT *is an instructor at the University of South Alabama and is pursuing a Ph.D. in instructional design and development. She is a former elementary school teacher who is interested in approaches of technology integration. Paige has taught language arts methods and reading methods, supervised elementary student teachers, and is currently teaching art education.*

BARBARA SALYER *is an assistant professor of secondary science education at the University of South Alabama. She is a former middle and secondary science teacher. Her teaching and research interests include science inquiry, integrated science, and student learning in science.*

The evolution of technology continues to impact our lives. With the availability of the World Wide Web, it is easier than ever to access information that motivates students to explore topics. Although each discipline offers Web sites that students can investigate, tour, and gain current information, this is especially true in the field of science. Children can explore virtual places (NASA, museums, exploreums, etc.) with the click of a mouse. Obviously there is value in the Web as a vast resource for information dissemination, but how do we fit higher-level interaction into the curriculum? Can we integrate technology with minds-on/hands-on science?

Science for All Children stated, "Children learn best when they can link new information to something they already know. Therefore, it is often most effective to introduce a new concept by providing children with inquiry-centered experiences" (*Science for All Children* 1997, p. 23). Teachers should, according to the *National Science Education Standards (NSES)*, "create opportunities that challenge students and promote inquiry by asking questions" (National Research Council 1996, p. 3). The *NSES* further expressed that the interaction of science and technology in the classroom has to be addressed. At issue "is how to select a task that brings out the various ways in which science and technology interact, providing a basis for reflection on the nature of technology while learning the science concepts involved" (p. 191).

How do we accomplish this task? How can we use technology as a tool to foster guided discovery? Can we begin by asking a simple, divergent question based on familiar concepts? What would result if we provided appropriate materials for the investigation, integrated technology that would facilitate the inquiry process as well as reporting of results, and asked a question such as, "What affects the distance that a marble rolls?"

Jacy and Ainsley brainstorm hypotheses using Kidspiration® software.

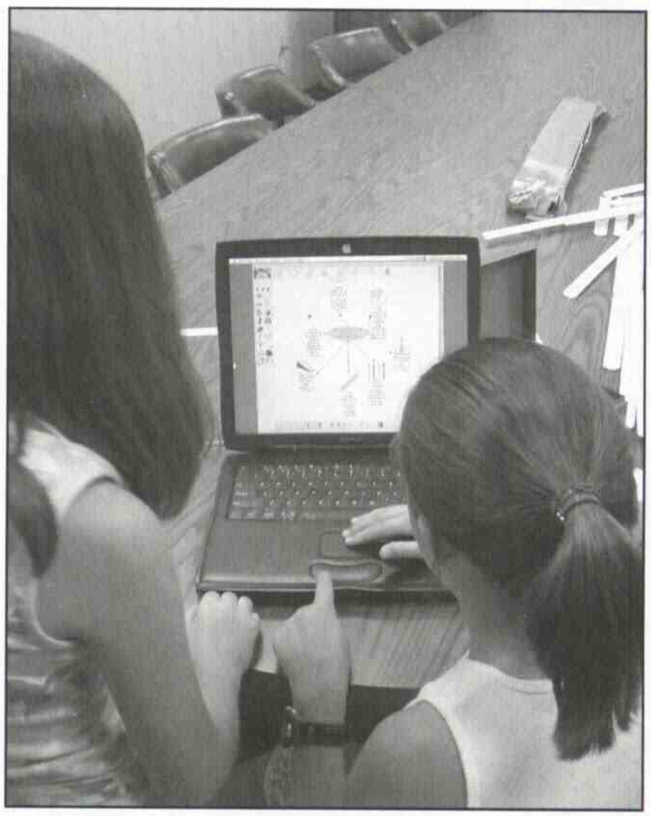
We selected a software program *Kidspiration®*, designed for K–5, that can be used in a variety of inquiries to explore the questions stated above. *Kidspiration®* and *Inspiration®* are software programs designed to facilitate the creation of visual diagrams as well as linear outlines to organize information and express thoughts. *Kidspiration®* is the early childhood version of the two. A newer version of the software, *Kidspiration 2®*, is now available. Ideas that are sequential or hierarchical as well as random and brainstormed may be portrayed in graphic organizers, concept maps, or knowledge webs. This program can be used with a laptop or desktop computer and can be tried free for 30 days. This trial version is available from the *Inspiration®* Web site. (See resources.)

Activity

Two fifth-grade girls (one attending a large public school, the other attending a parochial school) were selected to participate in a science–technology inquiry. We gave the two girls access to *Kidspiration®* software prior to doing the activity so that the degree of familiarity with the software would not be a barrier to the science inquiry. We gave the students a 30-minute demonstration of the main features of the software and then allowed them to explore its features on their own for one week prior to beginning the inquiry.

On the day of the activity, we presented the two girls with the question, "What affects the distance that a marble rolls?" We stated the question and wrote it on a white board. We provided marbles of varied sizes, weights, and composition (glass, metal, wood) plus construction materials such as blind slats and a meter stick. We also provided a laptop computer with *Kidspiration®* software installed. The only initial verbal instructions provided were to think about and use the given materials to answer the question posed and to record their thoughts and findings using *Kidspiration®*. The students requested they work on their own; we left the room and remained down the hall, except for checking on them periodically to monitor progress, answer questions, and provide any assistance requested.

Given the limited instructions and freedom to construct the knowledge representation in their own way, the students initially created a web of hypotheses using *Kidspiration®* software and engaged in selecting graphics as presented in the Brainstorming Diagram (See Figure 1) that appropriately represented their thoughts. The students were engaged in using the materials provided to informally test the ideas as they generated each hypothesis. The students freely tested the various marbles on different surfaces, different blind slat elevations, and different locations along the length of the blind slat. At about 30 minutes into the process, the students requested scales for weighing and paper and pencil for recording weights, which we supplied. As we monitored the progress, we observed that the students moved back and forth between generating ideas and adequately representing them with the software. As they exhausted their ideas, we noticed that more time was spent refining their visual representation using the features of *Kidspiration®*. The students worked for approximately one hour on this part of the process.



Ainsley and Jacy find the most representative symbols to display their ideas.

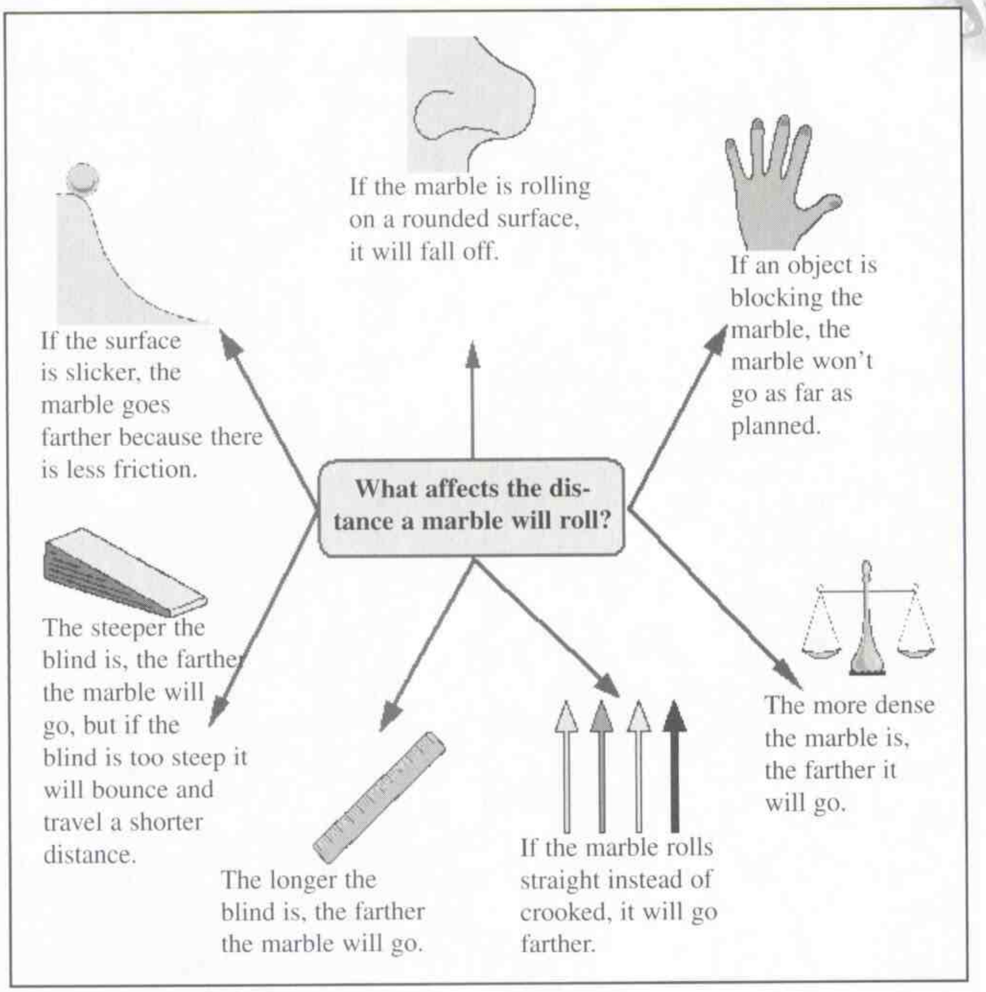


Figure 1. Brainstorming diagram.

When we noticed this iterative process slowing down, we scaffolded the students' learning by suggesting that they choose one of the hypotheses generated and more extensively and formally test it to reach a conclusion and visually represent it using the *Kidspiration*® software. As illustrated in the Hypothesis Testing Diagram (Figure 2), the students chose *"the steeper the blind slat is, the farther the marble will roll"* as the hypothesis to test. After making this decision, one of the students asked if she should include the "parts" like she did in a previous science fair assignment. We affirmed this suggestion and the students began to arrange the diagram with the question as the main idea, followed by the hypothesis and the "science fair parts" as the sub-categories. The girls tested the hypothesis by increasing the height of the ramp from 7.16 to 17.2 cm. They measured and recorded the distance the marble rolled each time the height of the slat was increased.

As they recorded the results, the students asked if they should enter the "numbers" into "that program that makes bar graphs." (One of the students had previously used Microsoft Excel® to enter data and create a graph.) We acknowledged that their suggestion was good and made provisions at a later date for the students to enter the data in Excel® and to create a graph representing their results (See Figure 3). A few days after the activity, we worked with the students to create a line graph using the data from their results. This activity required our assistance with the decisions made using the "chart wizard" in Excel®, but it also proved to be a beneficial learning experience initiated by the students.

As the students edited their visual representation of the Hypothesis Testing Diagram, they recalled the discrepancy between the behavior of the wooden and glass marbles on the carpet and tile floor. We again took the opportunity to scaffold their learning by suggesting that they take the materials and investigate this additional question. As a result, the students took the blind slats, marbles, and meter stick and tested their new inquiry on the tile and carpet. They concluded that the wooden marble rolled farther on the carpet while the glass marble rolled farther on the tile.

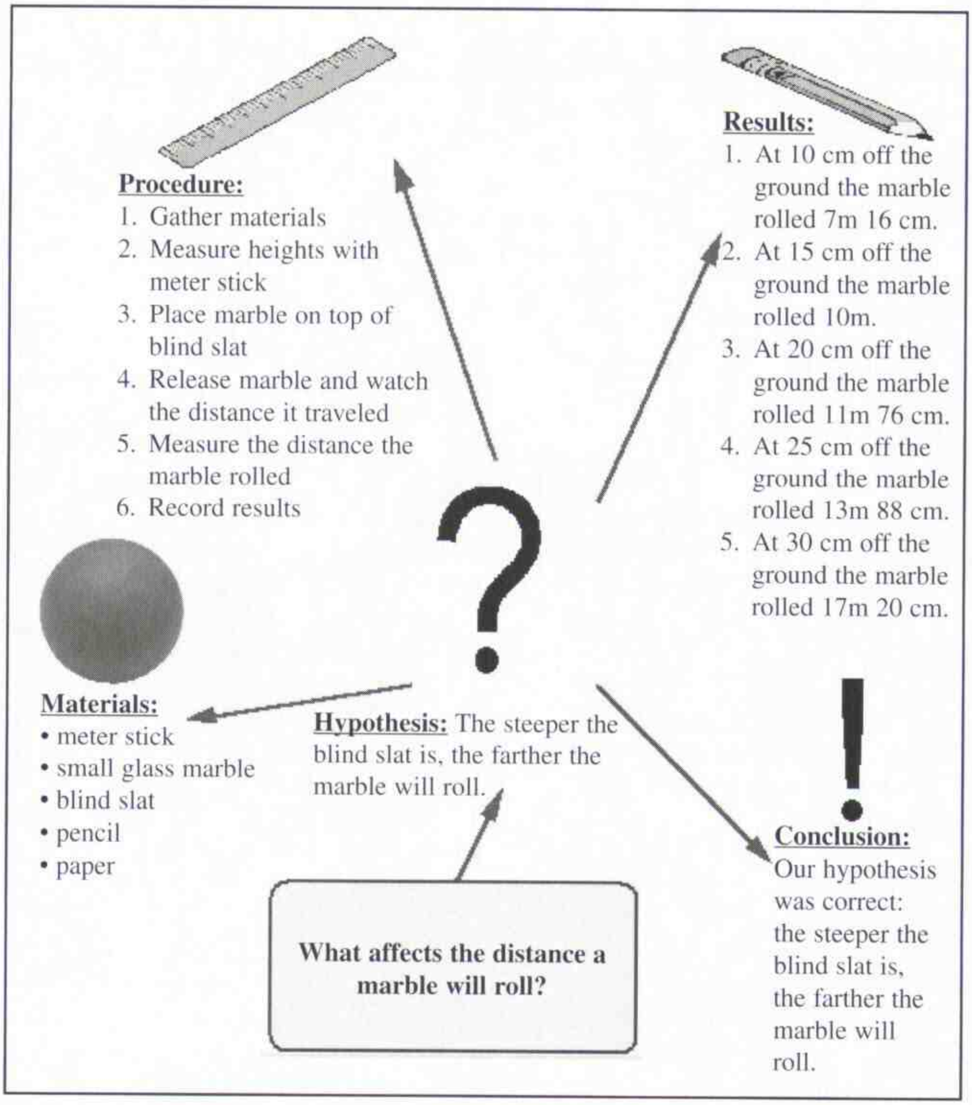


Figure 2. Hypothesis testing diagram.

Measuring the height of the incline takes teamwork.

This additional exploration took approximately forty-five minutes to complete.

Summary

Overall, we found that the integration of the technology was very motivating to the students. Similar to the advantages of word-processing, the students were easily able to revise and edit their representations. The students became very engaged in selecting the appropriate symbols to represent the meaning they were portraying. They were especially proud of the sphere rolling down the hill on the Brainstorming Diagram. As with many symbols in *Kidspiration*®, this is animated in the computer view of the diagram. They also found the audio features of *Kidspiration*® to be gratifying. After the students typed information, they could place the cursor on the text and the

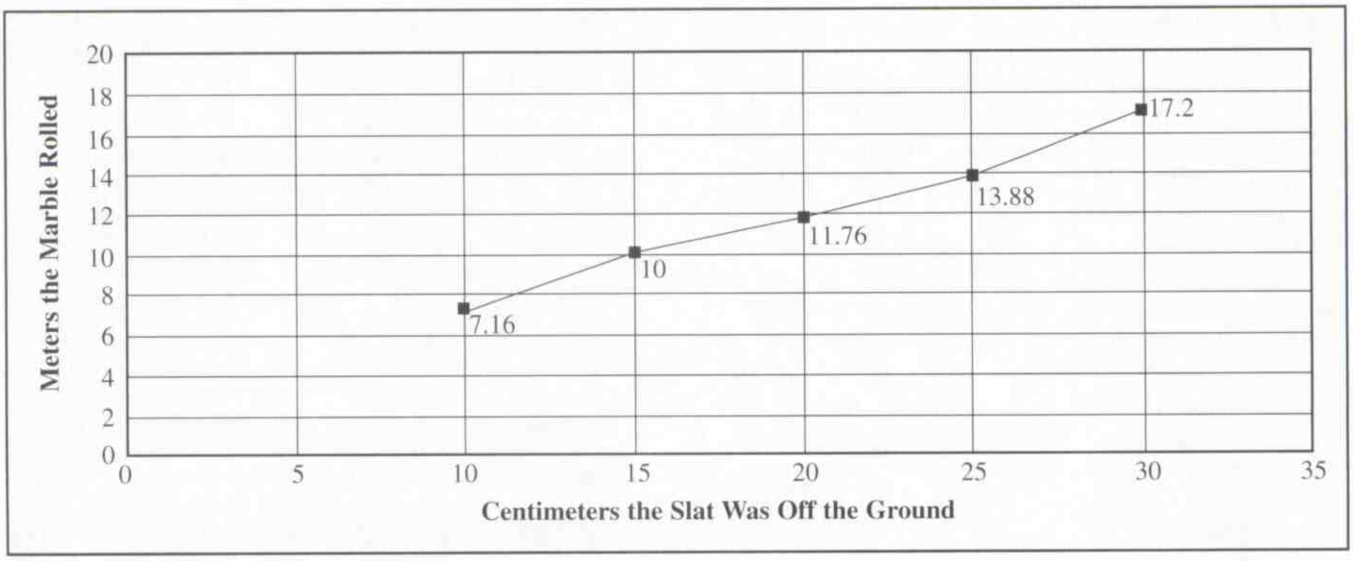


Figure 3. Hypothesis testing: The steeper the blind slat is the farther the marble will roll.

"What color should we select? Decisions! Decisions!"

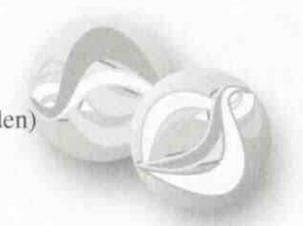
software would "read" it back to them. It would also "read" their names when typed into the name box. They discovered they could change the voice in which the information was read. This proves to be advantageous not only for the visual aspect of learning but also the auditory learning/teaching mode.

We were pleasantly surprised that the students began the activity with the desire for independence and we provided very little scaffolding. The suggestions we made during the process were enough impetus to direct the students on a path of their own inquiry and discovery. The activity could be broken into two or more days if the time requirements exceeded class scheduling.

The integration of *Kidspiration*® provided a tool for inquiry, investigation, communication, and the creation of products representing the students' knowledge structure. The students' increased knowledge of the scientific process, technology use, and science content took not just a parallel, but a truly integrated path as the students engaged in all of these areas. As illustrated with this activity, we can and should integrate technology with a "minds-on, hands-on" science activity, and strive to "inspire" inquiry and discovery.

Extensions of the Marble Activity

- Weight of marble
- Length of ramp
- Force or height of release
- Surface material (tile, carpet, wooden)



Additional Questions

- What affects the dissolving of an effervescent tablet?
- What affects the size of a bubble?
- What affects the accuracy of a putted ball?
- What affects the distance a Frisbee travels?
- What affects the freezing of water?

References

National Research Council. 1996. *National science education standards*. Washington, DC: National Academy Press.

Science for all children. 1997. Washington, DC: National Academy of Sciences.

WWW Resources

- *Inspiration*®, and *Kidspiration*®, are visual thinking tools that help students see, organize, and develop ideas through outlines or diagrams, honing students' linear and global information processing styles. Available: http://www.inspiration.com/.

- The North Canton City Schools elementary teachers provide lesson plans and links to tutorials. Available: http://www.northcanton.sparcc.org/~elem/kidspiration/collection.html.
- Graphic Organizer Generators on the Web. Create your own graphic organizers online. This site includes concept maps, KWL charts, SQ3R organizers, timelines, and Venn diagram generators. Available: http://www.teachnology.com/web_tools/graphic_org./.
- National Science Teachers Association (NSTA) members and nonmembers have recommended Web sites in the various science and technology categories at this site: http://www.nsta.org/recommendedsites/.

Other Resources:

Science Curriculum Resources:

Chahrour, J. P. 2000. *Flash! Bang! Pop! Fizz! Exciting science for curious minds.* Hauppauge, NY: Barron's Educational Series.
Twenty-five activities and experiments that emphasize "doing" science and "thinking like a scientist." Includes suggestions for home–school connections.

Kelsey, K., and A. Steel. 2001. *The truth about science: A curriculum for developing young scientists.* Arlington, VA: National Science Teachers Association.
Introduces students to the process of scientific research including developing testable research questions and hypotheses and designing controlled experiments.

Regents of the University of California. 2000. *Full option science system (FOSS): Variables.* Nashua, NH: Delta Education.
Module in the Scientific Reasoning and Technology Strand, Grades 5–6. Students engage in scientific inquiry, including identifying and controlling variables and conducting controlled experiments.

St. Andre, R. 1993. *Simple machines made simple.* Englewood, CO: Teacher Ideas Press.
Teacher-friendly unit of activities on simple machines designed around the idea that "simple machines help us do work by trading force for distance." Includes a chapter on inclined planes that could be used as an extension of the experiment that the two students performed.

Literature Connections:

Banks, J. T. 1995. *Egg-drop blues.* Boston, MA: Houghton Mifflin Company.
Judge, a sixth-grade student, who struggles to do well in science, convinces his twin brother, Jury, to work with him on his school's egg-drop competition, the "Einstein Rally." Descriptions of their brainstorming and experimentation efforts that lead to the production of a winning confetti-filled, bubble-wrapped egg container are interwoven in the story of the relationship between twin brothers who are coping with challenges like dyslexia and parental divorce.

Thimmesh, C. 2002. *The sky's the limit: Stories of discovery by women and girls.* Boston, MA: Houghton Mifflin.
The stories of discovery in this beautifully illustrated book range from Beatrix Potter's fascination with natural history that led to her discovery that lichens are both algae and fungi to that of Donna Shirley credited with developing the idea of using a microrover, such as Sojourner that explored the surface of Mars, on planetary missions. Thimmesh follows the stories of famous discoveries with stories of discoveries by school-age girls such as sixth-grader Katie Murray's discovery of potentially harmful lead levels in home-grown vegetables and eighth-grader Rachael Charles' experiments on using solar puddles to purify drinking water.