

Investigating the Rebound of Squash Balls: a Computer simulation-based intervention to Foster procedural Skills in Grade 5

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ABSTRACT

For years now there is a great debate among science education researchers about the orientation of learning and instruction. Should we place emphasis on conceptual understanding or on the development of procedural skills? Science for citizenship and science in the technical workplace, both involve greater emphasis on procedural understanding than on understanding of concepts.

The ability to design controlled experiments and make valid inferences from their outcomes are basic procedural skills that have attracted a lot of attention both in science education and in cognitive psychology (Chen & Klahr, 1999; Park & Kim, 1998; Ross, 1988). The acquisition of the control of variables strategy is an important step in the development of scientific reasoning skills.

The *Learning in Physics Group* at the University of Cyprus has a co-ordinated program combining research with the development and validation of inquiry based curriculum. In one aspect of this program, we designed a series of lessons that aimed to guide fifth grade children to develop the control of variable strategy and apply it to the design of valid experiments through the use of an interactive computer based simulation. Specially developed pre-tests and post-tests were administered before and after instruction to obtain comparable data on the intervention that utilized the interactive database simulation package. The results are shown in the following Table:

TABLE I: Participant success rates in Post-tests 1, 2, 3 and 4

		Correct response with correct reasoning	Correct response with inadequate reasoning	Incorrect response
Prior to simulation use	Pre-test 1	73 %	24 %	3 %
	Pre-test 2*	0 %	13 %	87 %
After simulation use	Post-test 3	73 %	6 %	21 %
	Post-test 4*	79 %	0 %	21 %

* *Pre-test 2 and Post-test 4 were identical.*

Our results demonstrate convincingly that it is possible for children aged 11-12 to acquire the control of variables strategy and to apply it in designing experiments and drawing conclusions from experiments in varied contexts. These research findings are similar compared to other research attempts (Chen & Klahr, 1999; Ross, 1988). Furthermore, the integration of the computer based simulation in the development of procedural skills has been effective, since it helped children overcome the reasoning difficulties that evolved from the analysis of Post-test 2.

REFERENCES

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