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College Teaching and the Development of Reasoning

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College Teaching and the Development of Reasoning Project

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Poster Session No. 2- Location 56:

Location: Hyatt Regency Chicago, 151 East Wacker Drive, Crystal Ballroom

Date: Sunday, Feb. 15, 2009 Time: 8:00 AM - 6:00 PM

8:00 – 8:30 a.m. - authors with even numbers

College Teaching and the Development of Reasoning, the Book¹

Author: Robert G Fuller, University of Nebraska Lincoln,

Co-Authors²: Thomas C Campbell, Illinois Central College

Dewey I Dykstra, Jr, Boise State University

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Abstract:

Part of the foundation for the research in physics education house of physics was the work of Robert Karplus and Arnold Arons in the 1970s. They expressed a strong concern about conceptual understanding and mature reasoning of students. Karplus led a team of AAPT members to produce a workshop, *Physics Teaching and the Development of Reasoning*, that was published by the AAPT in booklet form in 1975. That work was broadened to include other college disciplines and was offered on many campuses for faculty development activities for more than a decade. This book, with the AAPT booklet in Appendix B, brings together those broader materials along with new chapters to show how today's interest in interactive learning is based on this earlier work of Karplus and his interest in the work of Jean Piaget.

Footnotes:

¹ This book will be the first title in the new series, *Science & Engineering Education Sources*, **Calvin S. Kalman, Editor-in-Chief**, by Information Age Publishing, Inc. of Charlotte, NC. It was published in the summer of 2009. Go to <http://www.infoagepub.com/>.

² In addition to the book editors named above, the book was informed by advice from **Arnold A. Strassenburg** and **Lesler G. Paldy**, of SUNY, Stony Brook, who helped with the original AAPT version and from **Dean Zollman**, Kansas State University and **Anton E. Lawson**, Arizona State University.

(over)

The Cadet Population Puzzle

Amy Inquist, a first year cadet, wondered how many students were attending the Academy. Everyone she asked gave her a different answer, so she decided to conduct an experiment to see if she could determine the student population of the Academy. Since she could not get all of them together at once, she decided to interview a few cadets and get them to wear blue armbands for one week. A week later she interviewed some cadets and noted how many of them were wearing blue armbands. Here are Amy Inquist's data:



First set of interviews:

She talked to 45 cadets and they all agreed to wear blue armbands for a week.

Second set of interviews (a week later):

She talked to 72 students and of those 9 were wearing blue armbands.

Amy assumed that the students wearing armbands mixed thoroughly and randomly with the students not wearing blue armbands, then she tried to approximate the number of students attending the Academy.

From her data, can Amy compute the approximate number of cadets at the Academy? _____
Explain your answer.

If you think she can compute a number,
what number do you think she would get? _____
Explain your reasoning:

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Student Responses:

Student A: No! If she wants to know how many cadets there are she should just ask the registrar.

Student B: No, because wearing armbands might become trendy.

Student C: Yes, she can do it. There are 45 cadets wearing armbands and there are 63 cadets who are not wearing armbands, so added together there are 108 cadets.

Student D: Yes she can do it. The nine students wearing armbands the second time are $1/8^{\text{th}}$ of the total number of students she interviews. So the 45 students are $1/8^{\text{th}}$ of the total number of cadets, so the total is 8 times 45 or 360 cadets. Hmm, it is quite a small Academy. ☺

Which types of students do you teach?

How do you help them develop more advanced reasoning patterns?

Read our book and find out!

(over)