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**Honors students' calculus understandings: comparing calculus and Mathematica and traditional calculus students.**

Schoenfeld, Alan H. (ed.) et al., Research in collegiate mathematics education. III. American Mathematical Society, Providence, RI (ISBN 0-8218-0882-6). CBMS Issues in Mathematics Education 7, 163-215 (1998).

This study compared the understandings of third semester honors calculus students from the Calculus and Mathematica (C and M) curriculum ( $n = 16$ ) and a traditional calculus (TRAD) curriculum ( $n = 10$ ). Three instruments examined students' understandings of limit, differentiation, and integration: (a) a technology-restricted, written test, (b) a problem-solving interview permitting technology, and (c) an understanding interview. Analysis of test performances revealed significant differences, favoring TRAD students, on the limit tasks, on conceptually-oriented items, and on tasks presented without figures. Detailed analysis uncovered few between-group differences but many similarities, e.g., a dynamic view of the limit, conceptual difficulties with differentiation, and understanding of integration's properties. Problem-solving interviews found the C and M students to be more successful and flexible in solving real-world problems than their TRAD counterparts. In the understanding interviews, C and M and TRAD students had difficulties explaining limits and differentiation; however, they displayed formalized understanding of integration. Additionally, the study discussed curricular advantages and disadvantages mentioned by students and focused on the technological differences. The TRAD students pointed to the TRAD curriculum's restriction of technology as an undue hardship whereas the C and M students felt technology aided them in developing understandings but perceived it did not strengthen by-hand skills especially when the skills were needed entering upper level undergraduate mathematics courses.

*Classification:* I15