

**ZMATH 2016c.01043**

**Anderson-Pence, Katie; Moyer-Packenham, Patricia**

**The influence of different virtual manipulative types on student-led techno-mathematical discourse.**

J. Comput. Math. Sci. Teach. 35, No. 1, 5-31 (2016).

Summary: This exploratory study examined the influence of different virtual manipulative (VM) types on the nature of student pairs' techno-mathematical discourse (TMD). Three fifth-grade student pairs participated in 9 sessions of mathematics instruction using VMs. The study compared three VM types: linked, pictorial, and tutorial. Students' levels of discourse in generalization, justification, and collaboration were measured while working with each VM type. One-way ANOVAs indicated statistically significant differences in the quality of student discourse when using the different VM types. When working with linked VMs, students' discussions reflected consistently higher levels of discourse than when working with pictorial or tutorial VMs. However, pictorial VMs were associated with the largest amount of student to student discussion. The results of this study suggest that in order to encourage meaningful TMD, teachers should choose VMs with features that link multiple representations. The results of this study also indicate that for these pairs, tutorial VMs did not encourage meaningful student to student mathematical discourse. The patterns and trends identified in this study contribute to the existing literature on the complex issues that surround mathematical discourse and the use of technology in the classroom.

*Classification:* U70 D30

*Keywords:* teaching; virtual environments; educational media; linked virtual manipulatives; pictorial virtual manipulatives; tutorial virtual manipulatives; computer as educational medium; communication; student student interaction; techno-mathematical discourse framework; research; grade 5 students; pair work; division; geometry; fractions; learning experiences; quality of discourse; generalizing; justifying; cooperative learning; collaboration; modes of representation