Where is the Logic in Proofs?
Preliminary Research Report

Milos Savic
New Mexico State University
milos@nmsu.edu

Often university mathematics departments teach some formal logic early in a transition-to-proof course in preparation for teaching undergraduate students to construct proofs. Logic, in some form, does seem to play a crucial role in constructing proofs. Yet, this study of 43 student-constructed proofs of theorems about sets, functions, real analysis, abstract algebra, and topology, found that only 1.7% of proof lines involved logic beyond common sense reasoning. Where is the logic? How much of it is just common sense? Does proving involve forms of deductive reasoning that are logic-like, but are not immediately derivable from predicate or propositional calculus? Also, can the needed logic be taught in context while teaching proof-construction instead of first teaching it in an abstract, disembodied way? Through a theoretical framework emerging from a line-by-line analysis of proofs and task-based interviews with students, I try to shed light on these questions.

Keywords: Logic, transition-to-proof courses, analysis of proofs, task-based interviews