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Computational ... Physics Education: Letting physics learning drive the computational learning[1]

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For several years I have been part of a team researching and rethinking why physicists are more willing to admit the value of computational modeling than to include it in what they teach. We have concluded that undergraduate faculty face characteristic barriers that discourage them from starting to integrate computation into their courses. Computational tools and resources are already developed and freely available for them to use. But there loom ill-defined "costs" to their course learning objectives and to them personally as instructors in undertaking this. In an attempt to understand these issues more deeply, I placed myself in the mindset of a relative novice to computational applications. My approach: focus on a physics problem first and then on the computation needed to address it. I asked: could I deepen my understanding of physics while simultaneously mastering new computational skills? My results may aid appreciation of the plight of both a novice professor contemplating the introduction of computation into a course and the students taking it. These may also provide insight into practical ways that computational physics might be integrated into an entire undergraduate curriculum.

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