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PROFESSIONAL GOALS

Teach physics at the High School or College level.
Modernize physics curriculum.
Apply computing to education generally, and physics in particular.

EDUCATION

First Class Bachelor of Arts in Natural Science Physics from University of Oxford with specializations in Theoretical Physics, and Modern Optics and Laser Physics. The Oxford University program is a 3-year course based on a tutorial system with an emphasis on Mathematical Physics. My practical work was singled out for special praise by the examiners.

Continuing studies in Physics, Mathematics and Computing. I have always maintained and extended my knowledge and skills in physics with a view to either returning to a more academic setting, or teaching and mentoring. I usually self-study using books and on-line resources such as Stanford ONLINE and MIT OpenCourseWare, but have also taken classes at UNC e.g., Linear Algebra. I recently completed "Functional Programming Principles in Scala" on Coursera and was awarded 100% with distinction. A central theme in my studies has been to make the geometrical aspects of physics more explicit through better mathematical notation. This would make it more accessible to a younger audience and accelerate their learning. In 2013 I combined my physics and computing knowledge by implementing a website that allows a student to create mathematical physics simulations using the Python programming language running in a web browser.

Mentoring preparation in AP Physics and High School Mathematics. In 2013 I began focused preparation for tutoring students in the traditional High School curriculum, and with attention to the Common Core and Next Generation Science Standards. Through the WyzAnt on-line tutoring system I became approved to teach Algebra through Calculus, as well as Physics.

NCSU Modeling Physics. Audited class given by Matt Greenwolfe for physics teachers. Since then I have tried to incorporate modeling-based approaches and constructivism into my own perspective.

Self-taught Software Architect and Computer Programmer. I learned to program in a scientific setting at the Royal Signals and Radar Establishment in the U.K. Over time I have taught myself to be proficient with low-level languages such as C and C++, scientific/academic languages such as Fortran and Python, and commercial languages such as Java, Scala and JavaScript. Through various projects I have learned elements of Computer Science including data structures and algorithms, object oriented and functional programming, and have mastered several generations of computing technologies.

EXPERIENCE

Professional Software Architect. I started my own software consulting company in Chicago. After growing the company I later sold the practice to my partner. I have since worked for several large companies including Anderson Consulting, TIBCO, Red Hat, Thomson Reuters and Amplify, and principally as an architect or team leader. Through working in large and small companies I have studied and come to understand the different ways in which such bodies can organize and operate effectively. My most recent employments have involved startup environments and mentoring roles with relatively young and inexperienced, but talented, developers.

Architect for (Bill and Melinda Gates Foundation) K-12 Education Software Platform. In 2012 I worked for the educational hardware/software provider Wireless Generation (now Amplify) on the development of a national project to provide a K-12 repository as the foundation for personalized learning. I was an architect working with project and product managers as well as a team leader. On the strength of my ability to communicate effectively as well as understand technical ideas, I was selected as the liaison between Wireless Generation and external standards organizations.

Tutoring students at High School and College levels. I have tutored students on an ad-hoc basis, usually in some form of crisis situation. I pride myself on my patience with students, born of a belief that they can surmount the obstacles they encounter and my ability to present subjects from multiple perspectives.

Citizen Schools volunteer in Durham, NC. I volunteered in a Middle School program for "turnaround schools" to teach game programming. The experience involved preparing a course as well as lesson planning, execution and extra-curricular visits. Students presented their games at completion. The underlying idea is to foster engagement. It was very gratifying to work with the students and I enjoyed seeing the thrill they would get as I helped them make links between their mathematical studies and game programming.

Architect and developer of on-line Geometry-Zen educational software. I have a conviction that programming should be part of the modern day curriculum, not just because it is considered a 21st-century skill, but for the benefit it has in fostering the learning of mathematical and physical concepts. In 2013 I created a programming environment that allows a student to perform 2- and 3-D simulations using only a web browser. The program uses Python as the user language and was extended so that Geometric Algebra and Units of Measure could be programmed in a natural way. I have used the program with students as young as 9 years-old and it is currently used all over the world.

skulpt contributor and Google Summer of Code mentor. I am a contributor to the skulpt open source project that is used by universities to teach Python programming in Computer Science. I was recently invited, and have accepted the invitation, to become a mentor on the Google Summer of Code program.

Student Pilot, Royal Air Force. I was awarded a gliding and flying scholarship while at school and ultimately joined the Royal Air Force. I attended the Officer training at RAF College Cranwell and went on to train as a pilot. The training prepares cadets for the responsibilities and duties of an Officer, provides education on history and current affairs, and develops leadership skills and self-discipline. As a student I leaned to fly jets solo, including navigation, aerobatics, night and formation flying. Although I elected to leave the RAF before being completing the advanced training, the lessons of thorough preparation and the value of practice have endured to this day.

INTERESTS

Running, Swimming, Cycling. I have competed in Olympic-distance triathlon and ran the Boston Marathon in 2010. I continue to run and swim for fitness and pleasure.

Theoretical Physics. Whenever I have free time I study physics. I occasionally read historical accounts and find them very valuable, but mostly like to learn new theories and mathematical techniques.

REFERENCES

Steven Peha. A independent educational consultant and colleague on the Bill and Melinda Gates K-12 Educational Software Platform.

Kimberley Swoboda. A teacher in the Durham school system. Kimberley was my co-teacher and mentor in the Citizen Schools program.

Dorothea Erxleben. A student at NCSU that I helped with Classical Mechanics.