Sex Education and My Mathematical Career

When I was ten years old and my brother was eleven, our parents sent us to a sex education class (I think they were too shy or prudish to talk about such things themselves). There we learned about these little tadpole things swimming up a tube while eggy things floated down the other way. Then there were chromosomes and DNA, then cell division and fetal development, and finally little babies were born.

I was very disappointed. I kept asking myself "where is the sex?" There was nothing sexy about any of this stuff. As far as I could figure out there weren't even girls (or boys), just tadpoles and eggs. I had to wait many years before Vicky Tannenhouser taught me about sex.

Of course the problem was the "Sex Education" course was a class in reproductive technology with all the good parts left out, and that is exactly how mathematics is taught. Students learn all the techniques of math, they memorize formulas and learn how to solve equations, but they are never exposed to the interesting, beautiful, sexy side of mathematics. Math teachers keep all the good stuff hidden while they teach a bunch of boring, mechanical, "methodology"

This is not entirely the fault of the math teachers. Mathematics is a very useful tool for engineering, physics, economics, and many other subject, so students are taught useful mathematics rather than beautiful mathematics. There is a great rush in the schools to get ahead to more "advanced" topics in applied mathematics, and this leaves no time to explore the useless but beautiful ideas that ring a mathematician's bell.

I clearly remember how I felt when I was seventeen. I thought math was boring, repetitive, and dreary. I planned to study either history or music in university. Then I went to a math talk (there was a free lunch) which changed my life. The speaker told us about infinities of infinities, that is he told us there was no number infinity, but rather many infinite numbers, some bigger than others. The idea of "bigger than infinity" blew my mind, and I wanted to understand what that meant. I soon found out that mathematics was not what I had been taught.

Here is another example. How many degrees are there in a triangle? Everyone is taught that the answer is 180, but there are universes where triangles have more than 180°, and other geometric universes where triangles have fewer than 180°. When this possibility was first pointed out in the early nineteenth century it was dismissed with the words "who cares about possible parallel universes with weird triangles? We live in a universe with 180° triangles". But mathematicians continued to study these alternate geometric universes just because they were intriguing. Here was a chance to get away from the day to day real world into another parallel reality. It was, perhaps, a little disappointing when Einstein's relativity theory revealed that in our real world triangles do not have 180°, that we actually live in one of those alternate geometric universes, and the world of 180° triangles is just another idealized universe invented by mathematicians two thousand years ago.

Here is another example of beautiful, useless, mathematics: What does four-dimensional space look like? In fact what does "four-dimensional space" mean? This is the kind of question that philosophers can answer with a lot of meaningless blather, but mathematicians can answer with great clarity and precision. We cannot see or touch four-dimensional space because we ourselves are only three dimensional, but mathematics gives us the tools to understand things outside our mundane Earthly experience.

Is this kind of mathematics useful? Can I build a bridge or program a computer in four-dimensional space using infinities of infinities? Probably not, but I don't care if it is useful or not. I find it thrilling, challenging, elegant, and beautiful just to contemplate such things, and that's what makes mathematics worth doing.