When Birgit and I agreed to edit this column we accepted the fact that we would disagree from time to time. In fact we felt this would be a positive for readers.

Unlike my co-editor, Birgit Loch, I do not want to do studies into why the majority of students do not attend most lectures. I simply accept that this is a fact of life and nothing we do can significantly alter this reality. While I wish to make each face-to-face lecture as educationally rich and entertaining as possible, I want to provide those students who, because of work commitments or family commitments or distance, cannot attend lectures or choose not to attend lectures, a sound educational alternative. In doing so, I am not led into a specific approach because I am excited about the technology or choose it because it is less costly than face-to-face lecturing. I endeavour to be pragmatic. Our duty is to provide a good education to students whether or not they attend classes.

In my first column I made the point which is obvious to all mathematics lecturers, namely that how we should present material depends on the audience. I also made the point that this is also true as regards the technology we should use.

Let me begin with an apocryphal story.† I was teaching a topology course to a group of third year students. One student turned up to the first class and never came again. To my utter surprise when I was supervising the exam, I saw that particular student had turned up. I knew that he had no chance of passing the exam. But again to my surprise, when I marked the exam papers, he scored 98%. I called the student into my office, and said to him — you came to my first class, never came again, and scored 98% in the exam. Please explain! He responded: Oh I would have got 100% but something you said in the first class confused me!

To bring out the point in the above story, I mention that when I was Dean a young and very talented Professor came to my office and said his time was wasted teaching the weak students in his class. I responded wisely (I think), that the really bright students needed him a lot less than the weak students.

I think these two stories have an important corollary. For third and fourth year students majoring in mathematics, the amount of lecturing can be reduced by at least 70% without reduction in quality. Instead of lecturing, say 100 minutes per week, 30 minutes should be more than adequate. This 30 minutes might, for example, be two 15-minute recorded snippets. The students can be required to buy a textbook or be provided with notes or use a free online book. Today we

†I heard this story from Professor Bert Mond of La Trobe University.
have legal access to many excellent undergraduate textbooks free of charge (for example on abstract algebra, algebraic topology, approximation theory, category theory, combinatorics and graph theory, complex analysis, computer algebra and symbolic computation, differential equations, differential topology, discrete mathematics, fluid mechanics, functional analysis, game theory, group theory, linear algebra, mathematical modelling, mathematics of bioinformatics, mathematics of economics, mathematics of finance, numerical analysis, optimization, partial differential equations, probability and statistics, quantum mechanics, real analysis, relativity, topology) which can be supplemented, if necessary, by printed notes or notes put online.

With the advances in technology, it is not necessary to get professional help to record each 15-minute snippet; this can be done on an iPad, for example. In these snippets, you can give an overview of the subject and of each topic and its importance, and of difficulties and applications. This allows the students to study where and when they wish. It allows you to prepare materials when and where you want also. And this alternative to 50-minute lectures is not more expensive. Further, this allows these advanced subjects, which may not attract many students, to be offered across several universities. Chat groups, forums etc can be established which allow the students to interact with each other, but not necessarily with the lecturer. If considered appropriate the lecturer may also choose to have a couple of meetings each semester using, for example, Skype with all students who wish to participate and ask questions.

So the above is my proposal for teaching advanced mathematics subjects to students majoring in mathematics. My view is that hand-holding (as in the photo below with my grandson) is not necessary for these students, but is needed for some other groups of students. I definitely do not advocate precisely this approach for first and second year students and students not majoring in mathematics. Indeed what I have in mind is preparing the students for such learning by the teaching approaches used in first and second year.

So what do I recommend for other students? I plan to address this in future articles because each different group of students requires a different approach.

Sid Morris has taught mainstream and service mathematics and computing courses to classes of up to 500 students at 12 universities on 4 continents at all undergraduate levels. His online text, accompanied by videos, is used in over 100 countries, and is translated into 8 languages. The facebook group of readers of his book has 5,000 members. He has published internationally 5 other undergraduate and advanced books and served as chair and member of university-wide teaching and learning committees.