**My Christian perspective in Teaching Maths**

Monday July 25th, 2022

**Introduction**

**1. Thank you**

Thank you all for coming. There are a lot of good presentations on this afternoon, and I feel greatly honoured that you have chosen to come to this one.

**2. My hope**

Let me brutally honest with you, immediately. Over 50 years I have been to lots of PD sessions, and I have found 80% of the presentations to be a waste of time to me. I would rather have been back at school doing something useful.

So, it is my strong resolve today, NOT to waste your time. Everything I say today is from the heart and intended to be helpful and encouraging, even inspiring.

I also want to hear your stories and experiences.

Someone once said to me at a conference, “Andrew, aim to take away one good idea or thought from the conference. If you can do that then it has not been a waste of your time.”

**3. My plan**

60 minutes is a long time. So, I have broken up this session into three parts.

**In the first part,** I will talk about My Basic Work Ethic. In particular I will talk about why I love to come to work each day as a Teacher.

Then we will have a discussion about what things motivate you and what things drain your energy.

**In the second part,** I will talk about some of the My Teaching Experiments I have made on my Teaching journey. Some of these have been dependent on the particular classes I had, and also on me discovering some of my particular strengths.

Then we will discuss the various experiments you have tried in your classroom because I am still learning, and I take notice of what you are trying to do.

**In the third session**, I will discuss my current project, which is how to manage the widespread problem that high school children do not know their times tables. I will teach you how to use the Fast Facts program and at the end of the session, each school may take home a box of FastFacts, valued at $100.

So now to the first part, which is …

**A. My Basic Work Ethic**

**In 2005,** after being a Maths teacher for over 35 years, I thought I had finished with classroom teaching. I had a successful publishing business that was now branching out into the Sydney and Melbourne markets. I was also in the fifth year of a financially exciting career as a property developer. I gave away all my Maths resources, books and files. I was focused on my developing business career.

But I was quite wrong. My business plan as a property developer developed a serious flaw. The Global Financial Crisis of 2008 exposed it and by 2010, I was bankrupt and had even had to sell the Publishing business, and our home.

In 2010, in order to put bread on the table, I returned to teaching with thankfulness, but also with feelings of humiliation and discouragement.

Like a South African migrant, I had no resources, except 40 years of experience and a talent for teaching.

I came across Tim Keller’s book, *Every Good Endeavour*, and found it was just what I needed. The ideas resonated with the pain in my heart and soul. Tim Keller is the pastor of Redeemer Presbyterian Church in New York. This church takes their view of work so seriously that they have now set up a Centre for Faith and Work.

Specifically, the book looks at Work in general not Teaching in particular. Keller shows us that Work is a triple blessing.

**First,** when we do good work, we honour God who did the first weeks’ worth of work in creating the world. In that week, God was giving us a demonstration on how we are to work. He was like a Maths teacher giving a Type example to his students before asking them to go and copy his example. Copying God’s template is to truly love, honour and respect Him.

**Second,** when we do our work competently, we are a huge blessing to our neighbours. Showing love to our students and to their parents is to give the students a really good Maths lesson.

I well remember a lesson given to a Year 11 class at La Salle College on Pascal’s triangle, where the students were gasping in their seats at seeing all the applications of the triangle unfolded to them.

They loved it! Good work is a way of showing love to our neighbours.

**Third,** we are made for work and lots of it. I find I am happier being at work in my Maths classroom than I am when I am idle on holidays. On Fridays, I go to Recess on an adrenaline high. I have just had a double period of teaching Year 10 Maths. I have carefully stepped through the various stages of explaining compass bearings and calculating distances and bearings. I bounce into the staffroom for morning tea and know I have really enjoyed myself and want more of the same.

Good work is a huge blessing to ourselves.

When I started teaching at Rehoboth in 2014, I found the School Board wanted us as teachers to do a Biblical devotional and prayer in our morning Home Rooms each day. They also wanted us to develop a Bible connection to our Maths lessons each week. So, I developed my view of Work into a succinct acronym called GEMS. Let me explain.

Each morning I put up the diamond with the word GEMS in it.

G = God

E = Earth

M = Man

S = School

Then I would ask one of the students to explain the picture. The response I was looking for was

1. God made the Earth and all the living things in it.

2. God made Man and put him in charge of the Earth.

3. Man made School to teach his young people how to rule the Earth.

Then I would develop some aspect of the four topics to give us some inspiration for the day ahead. I formed these little gems into a booklet for the 40 weeks of a school year.

The young people loved it as it gave them a framework for all their efforts at learning at school. It helped them to connect School to their role in the wider world. It empowered them.

**For Group Discussion**.

Q1. What are the things that get you energised about work?

Q2. How do you give glory to God in your work?

Q3. What are the things that drain you about your work, and what can you do about it?

**Handout 1: The GEMS booklet.**

**B. Some teaching experiments**

My teaching journey has been filled with experiments where I am trying to improve what I am doing with my students.

There have been seating plans where I put boys with girls. Another seating plan where I put the high achievers at the front and the non tryers at the back.

There have been times I have used weekly Work contracts to ensure that the children were doing their work.

I have moved my Teacher’s desk to the back of the room.

I have used Revision Assignments before tests.

But for this presentation, I am going to focus on just three big experiments.

1. Worksheets

**In 1971**, it was my first year with the Education Department and they posted me to Port Hedland Junior High School. I had six Maths classes and I was on my own with no Head of Department. I did not know what I was doing. At night when I sat at the kitchen table trying to prepare for the next day’s lessons I would stare into space and think,” What am I doing? These classes are not like when I was at school. These classes are not like when I was on Prac. Why is everything so stressful?”

It was the year of the New Maths. The Maths superintendent, Dr John Greenway, had gone to America to get his doctorate in the new Maths and he had assembled a team in at head office to write the new textbooks which every government school teacher was using. I tried them with my students but my students did not engage with them. What was going wrong? As I watched their struggles, I started to write my own worksheets for them. In those days, we used Gestetner machines. The stencils were waxy blue. One used a metal stylus to write on them, a bit like writing on papyrus. Then you hooked them onto the drum of the machine and pumped the ink and turned the handle for as many copies as you wanted. I numbered my first worksheet AC 001. I tried my worksheets on the children and they liked them and felt they could do the questions.

By the end of the year, I had got up to worksheet AC 201. And I had discovered that children preferred my worksheet to the exercises in the book.

2. Revising Hanrahan

Fast forward to **1988**. I was now married, and we had six children. We had just moved from Rockingham to Lesmurdie, but no-one wanted to buy our Rockingham house. No wonder! Interest rates on mortgages were at 18% p.a. We were in acute financial stress.

In desperation, I approached the CES (the Commonwealth Employment Service) to get some advice. Should I stack shelves, drive taxis or trucks? He said, “No. The best advice I can give you is to do more of what you are good at. “

I went home to think. I was a school teacher and my salary was locked in and there was no overtime option. Someone suggested tutoring. So, in desperation, I started tutoring. And being financially driven I quickly tweaked the system to maximise the result.

Working for John Macdonald at $20 per lesson but giving $6 per lesson to John.

Then working for myself at $20 a lesson still travelling to student homes.

Then working at home at $20 lesson with no travel.

Then reducing lesson times from 60 minutes to 40 minutes to fit more lessons in.

Maximising at 6 lessons before 6 pm then another 6 lessons after 7 pm.

The students came from all kinds of schools, but they were C/D students wanting to pass Maths 1. Maths 1 had been intended for the top 25% of students but now about 40% of students were enrolled in it. The current textbook, Hanrahan, had been written to cater for the top 25%. No wonder the next 15% were struggling. I started to write worksheets for these tutor students to help them bridge the gap from where they were to where the course was pitched.

Then I approached the Hanrahan family to get permission to revise the book so that the modern student could access the course. They agreed and so this experiment proved to be a great help for those weaker students and provided teachers with something they could use.

3. Exam Questions books

Fast forward another ten years to **1998**.

In 1990 I began 6 years at Swan Christian College as the Deputy Principal. Everyone completely underestimated how much time was necessary to be the Deputy of a High School of 350 students. My Maths class lessons were prepared each morning on the drive down from Lesmurdie. In any contest between the Deputy role and the Maths teacher role, the Deputy role always won.

By the time I left Swan, my role as the Textbook writer had been taken over by Alan Sadler. We still had 6 children and we still needed an extra income but now writing Maths textbooks was impossible. Alan Sadler was just too good.

I was teaching Year 12 students. As they approached each Topic test they would complain to me, “Sir, we have done all the Sadler questions, but the exam questions are actually harder than Sadler. Can you help us?” So, for the next test on Geometric Sequences, I searched through all the old exam questions for any questions on Geometric Sequences. Then I cut and pasted these together and went to the photocopier to run off a class set. While I was standing there for the 3 minutes it took, I thought to myself, “There must be dozens of Maths teachers all over the state who are standing next to photocopy machines doing just what I am doing. One of us will be the first to realise this and take the initiative and write a book of exam questions.

In my excitement, I put together a book of Discrete Maths questions, got permission from the Curriculum Council, and raced to the printers. Now 6,000 students do Discrete Maths, so I thought that if I printed off 3,000, we would be able to sell them all. I brought home 150 boxes of books and spread them around our loungeroom assuring my wife that these will sell like hotcakes.

After 6 months of intensely lobbying schools and speaking at conferences of Maths teachers, we sold 500 books. So for the next 6 months we had 125 boxes of books stacked around our loungeroom giving me a reminder of how slow schools are to change their ways of doing things.

That experiment came about because I wanted to help students to better achieve in their exams.

**For Group discussion**

1. Now let us turn to the experiments you have tried in your classrooms. I will ask each of you to tell us one thing you tried and why you tried it and how did it go.

2. What particular talents do you have that your colleagues do not share, and how have they strengthened your teaching?

3. What are the things that most hinder or weaken your efforts and what are you doing to tackle the problem?

4. List one significant thing you have learned since graduating.

**Handout B: Year 7 Maths book Index and Chapter 4 Percentages, Ratios & Rates**

**C. My current project**

**1. The Dilemma.**

One of my biggest challenges with today’s generation of students in Maths classes is that they do not know their times tables. It causes problems in almost every topic I teach in lower school and it costs the students easy marks in their exams in upper school.

***Exhibit A: Essential to Secondary Mathematics***

**2. The lazy answer**

Most Maths teachers simply say “Oh well. They should have learned them in Primary school. Too late to do anything now. Just give them a calculator.”

But that just does not sit well with me. The current Maths curriculum is based on a spiral where we come back to things year after year. We build on previous knowledge. Thus in Measurement, we do Perimeter one year, then Area the next then Volume, then Total surface area. So if they do not understand the Metric system, then I need to fix that understanding before I can move on to this years’ topic. I make it a rule that students can come into my class not knowing something but they do not leave my class until they are taught how to do it.

The problem is that if they do not know their Times tables, then they have a negative attitude to all of Maths. They think they cannot factorise trinomials simply because they do not know their tables.

$$x^{2}+10x+24=(x+4)(x+6)$$

**3. My answer to the problem.**

So for the last thirty years, I have used flashcards to help the young people learn their tables. The nature of the tables cards has evolved over the years. And its format is now more or less settled into the boxes you see before you.

a. The Pre Test

The first thing I do with each class as they enter the room at the beginning of the year is to give them a Times Tables Test and they have 5 minutes to answer the questions

***Exhibit B: The Time Tables Test***

I would like you to try the Test in order to show you how the system works.

b. The rules

I then give each person a set of cards and explain how to use them.

***Exhibit C: A set of cards X 2***

***Exhibit D: The Green Rules card***

***Exhibit E: The Tables Record Sheet***

C. The trial run.

Now let us give the system a trial run.

You need to pair yourself with someone else.

Now lets try the two minutes of silent practice before we do a test run.

Now do the test run with the person on the right going first and the left side person doing the checking. When you finish the 50 cards put up your hand and I will call out a time, a number between 1 and 60.

You then record your time on the Test Record sheet. If you do not finish in time then simply put a dot in that box to indicate that you are still working on it.

If you are successful then you may exchange your set for a harder set.

***Exhibit F: The*** $÷7$ ***set***

Once you have completed a set then you return it to the Box trays and change it for another.

***Exhibit G: The four Box trays***

d. Questions

**Q1. Does it work?**

Yes it works but not uniformly. When I do the post Test some three months later, I find that overall the class has improved, by maybe 5%. But some students have dramatically improved, by say 30%. Some have stayed about the same and some have even gone backwards.

**Q2. Why does it not produce bigger results?**

It depends on the student’s motivation. Some students see this as a golden opportunity and really focus and push themselves. Some show by their body language that they do not believe that this can work for them and they go through the motions with a token effort.

There is a general malaise in educating adolescents today, which John Collier has diagnosed really well.

* Parents no longer believe in education and send their children to school to be happy.
* Children are addicted to Screentime at 20 to 30 hours a week and so they are just not into the hard work of learning.
* Parents do not know how to be parents. They have abdicated the role from the day they dropped the child off into Day-care. The children call the shots in the house.

**Q3. Have you tried this in Primary School?**

Yes. The children love it and I have tried it with Years 3, 4, 5 and 6. The problem is with the teachers attitudes. As a general rule, Primary teachers are not into Rote learning. I have shown then the strategies I use such as

* Chanting tables
* Skip counting
* Pairwise quizzing each other
* Shoot the Sheriff
* Writing out the tables

I have shown them how to use the system, but they are so busy, they want to use the time to do classroom organisation while the children cheat their way through the cards.

I spoke to one Primary Principal about the importance of ten minutes a day of Mental Maths to learn the times tables, and she looked at me and said “That is radical. We focus on Problem solving.”

Q4. What about students who **do** know their tables?

There are two answers to that question. The easy answer is to ask students to start with a fresh sheet and this time aim to complete each set in less than 50 seconds.

The second answer is that we are developing a set of extension cards which will challenge the more able student by mixing up the cards a bit and having less repetitions. It is not available just yet.

**Handout 3: The Fast Facts box with box stickers**

There is a box here today for each School that really wants to give it a go. The first box is Free.

After that, send me an email and you can order them for $100 a box.

**Conclusion**

I feel as though I have bared my soul to you today in telling you my Christian perspective as a Maths teacher.

I have talked to you about my Christian work ethic in that I see Teaching as a privilege and a blessing to God, to our neighbours, and to ourselves.

I have talked about my teaching experiments and how they all proceeded from the desire to help the students.

I have given you a box of Fast Facts because I am convinced it is the best way to help our Secondary students to learn their Times tables.

I hope you have some one thing there that you can take away that will be a blessing to you.

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