



# **Report on the second SSAI Workshop on Integrating Statistical Ideas into Mathematics**

**Held on 6 August 2008  
Macquarie University**

*5 October 2008*

Organised by:  
NSW Branch,  
Statistical Society of Australia

*Report prepared by:  
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## *Executive Summary*

After a very successful first workshop in July 2007, the NSW Branch of the Statistical Society of Australia decided to hold a second workshop to continue building relationships among all those involved with, and interested in, further developing the statistical components of the NSW secondary school mathematics syllabi. Whereas the first workshop focused on what statistical topics it would be most useful to have included at high school level and how they could most coherently be linked, this second workshop took as its theme approaches to the professional development and support of mathematics teachers in statistical directions. This theme is significant, since richer statistical content is expected as an outcome of the current review of the Stage 6 Mathematics syllabi, while few NSW mathematics teachers are as yet experienced in teaching such statistical material.

The half-day workshop was held at Macquarie University on 6 August 2008. The number and calibre of the speakers and attendees continued to signal the strong interest among educators in tackling the challenges of providing statistical education at the appropriate level to the appropriate students at the appropriate time.

Forty-five people registered for and attended the workshop (six of them as speakers). Another three expressed strong interest but were unable to attend. Attendees came from private and state schools, TAFE colleges, universities, and policy-making and professional organisations. The author of this Report chaired the presentations.

As at the first Workshop, speakers covered a range of topics, starting with an update from the Board of Studies representative, Margaret Bigelow, on the syllabi revisions. This was followed by our plenary speaker, Prof Helen MacGillivray, ALTC Senior Fellow, Queensland University of Technology. (The Australian Learning and Teaching Council (ALTC) this year became the successor organisation to The Carrick Institute.) Professor MacGillivray shared her experiences of working with teachers and syllabus developers over the last two decades. Prof David Griffiths, School of Mathematics and Applied Statistics, University of Wollongong, spoke of the experiences of his department with the one day mathematics teacher workshops the University has sponsored over the last several years. Stuart Palmer, Mathematics Co-ordinator at PLC Sydney (Croydon), provided some examples of how he uses real data to build conceptual understanding in the classroom. Dr Peter Howley, School of Mathematical and Physical Sciences, University of Newcastle, presented teaching ideas from his recent paper 'Keeping it real, keeping them interested and keeping it in their minds'. And David Keanan-Brown, President, Mathematics Association of NSW, set the scene for the breakout groups to discuss appropriate types of professional development activities and how MANSW could contribute.

Some leading suggestions, and possible future activities, from the day include:

- Rather than to be constantly 'reinventing the wheel', it is preferable to establish a clearing house of existing statistics teaching materials that use authoritative approaches.
- To assist teachers in real time, set up an online discussion forum for teachers to build learning communities, in order to share recommended readings, draw attention to materials available from other sources, discuss teaching difficulties, etc.
- Ensure that professional development activities to assist mathematics teachers involved in teaching statistical topics take place regularly, and make use of self-guided materials which revisit basic ideas and concepts cyclically as a teacher's knowledge grows.

## ***Introduction***

This second half-day workshop was organised by the NSW Branch of the Statistical Society of Australia and held at the Macquarie University Graduate School of Management Conference Centre on 6 August 2008. Its aim was to update attendees on the current status of the review of the NSW Stage 6 Mathematics syllabi and to discuss possible approaches to providing high school teachers with the professional development and support required to allow them to confidently teach the statistical components of the new syllabi. The number and calibre of the speakers and attendees continued to signal the strong interest among educators in tackling the challenges of providing statistical education at the appropriate level to the appropriate students at the appropriate time.

## ***Program***

The workshop commenced at 1pm with a light lunch. Presentations are detailed in Appendix 1.

- Eric Beh, the current President of the NSW Branch of the Statistical Society of Australia, opened the workshop.
- Margaret Bigelow, NSW Board of Studies, was the first speaker and updated the attendees on the state of development of the new Stage 6 Mathematics syllabi.
- The plenary speaker, Helen MacGillivray, ALTC Senior Fellow, Queensland University of Technology, followed with a talk summarising her substantial experience of working with teachers and syllabus developers over two decades.
- David Griffiths, University of Wollongong, spoke of his experiences with the one-day workshops that the University has held for mathematics teachers over the last several years.
- Stuart Palmer, Mathematics Co-ordinator at PLC Sydney (Croydon), shared some of the ways he uses real data to build conceptual understanding.
- After the coffee break, David Keanan-Brown from MANSW shared some of the ideas the MANSW executive has been discussing regarding ways of providing professional education to mathematics teachers to assist them in confidently teaching the statistical topics in the new syllabi. He provided some starting points for the breakout session.
- The final speaker prior to the breakout session was Peter Howley, University of Newcastle who spoke on ways of making statistical ideas real and keeping students interested.

The aim of the breakout session was to discuss and evaluate different approaches to professional education in statistics for mathematics teachers and also to nominate other resources or kinds of support that participants thought would be useful. A summary of the breakout session discussions is provided at the end of this Report.

The workshop ended at 5:30 pm and was followed by drinks and dinner at a nearby hotel for those who wished to stay on.

## ***Who Attended***

Forty-five people registered for and attended the workshop (six of them as speakers). A further three people expressed strong interest but were unable to attend. The author of this Report chaired the presentations. Approximately a third of the participants had attended the first workshop in 2007. All the teachers present were either the head of their Mathematics department or were very senior Mathematics teachers – an indication that the workshop attracted appropriate attendees.

A wide range of institutions was represented at the workshop, as shown below. Those attending from universities were from the disciplines of statistics and education.

### **ATTENDEES:**

#### **Policy-making and Professional Organisations**

MANSW	1	Nirimba Education Office	1
NSW Dept Educ and Training	3	NSW Board of Studies	1

#### **Private Schools**

Masada College	1	Brigidine College	1
Catherine McAuley	2	Redlands	1
Pymble Ladies College	2	Kings School	1
St Josephs	1		

#### **State Schools and TAFE colleges**

Burwood	1	Ku-ring-gai Creative Arts	1
Wiley Park Girls	1	Normanhurst Boys	2
Mackellar Girls	2	Conservatorium of Music High School	1
Marsden	2	Picnic Point	2

#### **Universities**

University of Sydney	1	Macquarie University	2
University of New England	1	University of Newcastle	1
University of Western Sydney	2	University of NSW	1
Charles Sturt University	1		

#### **Other organisations**

Casio	1	Working Mathematics	1
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### **SPEAKERS:**

University of Newcastle	1
NSW Board of Studies	1
Queensland University of Technology	1
University of Wollongong	1
PLC Croydon	1
MANSW	1

### **CHAIR:**

Statistical Society of Australia	1
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All the three teachers who were unable to attend due to distance highlighted the need for workshops such as this to be offered in regional centres.

## *Speaker session*

### **Margaret Bigelow**

Margaret summarised orally what had happened since the previous workshop in the revision of the Mathematics Stage 6 syllabi. She and her colleague Peter Osland had toured the state of NSW holding focus groups and surveying teachers to gain feedback on the current draft revisions. She confirmed that there will still be changes to the draft documents as a result of the feedback.

Focusing specifically on the statistics components of the syllabi, Margaret told the attendees that everyone was generally comfortable with the topics and level provided in the General courses. The Board of Studies is hoping to attract more students to the Advanced courses and confirmed that the statistical topics in these syllabi are still being finalised. There is, in the present draft of Mathematics Extension 1, one probability topic (the binomial distribution) but no statistics topic. There are no probability or statistics topics in the present draft of Mathematics Extension 2. Margaret pointed out that this situation could change only if some mathematics material were moved out to other courses.

Margaret then encouraged questions from the audience. Questions centred on three themes.

The first theme was around the support documents that are currently being developed. Teachers are not able to judge how difficult to teach are the statistical components already shown in the draft syllabi because they have not been able to review the content of the support documents for these components. Margaret assured questioners (i) that support documents are being developed concurrently for all statistics topics in the syllabi, (ii) that they are living documents which will be updated regularly once in use and (iii) that they will mention the use of technology throughout. She also confirmed that no support documents would be released for any syllabus until there was sign-off on that syllabus.

A second theme was the use of technology, particularly in the teaching of statistics. Questions and discussion focused on the use of graphics calculators. Issues raised include the inequities that result for schools or children who can't afford graphics calculators, to what extent such calculators should be used for statistics, the need for calculators once everyone has computers, the oddity of insisting on graphics calculators at school level when universities seem to be content for students to use non-graphics calculators, and what calculating aids students will be using once in the workforce. No consensus was reached on these controversial matters, but the door has been left open for some continuing discussion with the Board of Studies over the use of technologies, in particular, in the teaching of statistics.

A third theme was the implication of the current push towards a national curriculum in several school subjects, including mathematics. Helen MacGillivray indicated that in her view there was already around 95% consistency across Australia in mathematics syllabi from K-12 and that what differences there were were mainly at the senior high school level. She added that, even with a national curriculum in mathematics established, it was still intended that the form of assessment be left up to the individual States. [Added subsequently: the work of the National Curriculum Board can be followed on its website <http://www.ncb.org.au/>]

## **Helen MacGillivray**

Helen was the plenary speaker for the workshop.

Helen began by giving her own response to some of the questions that had been raised in Margaret's session. In Queensland, while the use of technology had been mandated for a number of years, no specific technology was specified. Exams contained computer output for interpretation rather than requiring students to work with a computer. She warned about the use of graphics calculators for statistics, pointing out that students did not always take care when interpreting the line of best fit and the goodness of fit statistic.

Helen stressed that the way to develop good understanding of statistical methods is to work with and dig into complex data. Hence teachers need interesting datasets and good teaching plans. She feels that there are currently insufficient backup resources for teachers and an over-emphasis on calculator use. Helen also emphasised that careful use of language is important in the teaching of statistics: in understanding the problem, investigating the data, and summarising and interpreting the results

She went on to describe her experiences working with school-level mathematics syllabus committees on the introduction of statistics topics. Her full presentation is attached as Appendix 1 to this report. She discussed the senior mathematics scene in Queensland high schools when new syllabi in 1992 introduced an emphasis on data but in a way she found 'too formal, black-boxy, procedural and jargonistic'. She highlighted some of the problems, which led to a change being made in 2001. After the changes, apparently, many teachers now love teaching statistics and have developed some great data investigations, but admit that it was a lot of work.

Helen then focused on some of the current topics in the Data and the Chance strands of the Queensland syllabus. She gave some specific tips on teaching these topics well, and finished up with some general principles. Among these were (i) the need to provide excellent back up information and elaborations to help teachers gain insight into the value of statistical methods, (ii) the importance of minimising technical jargon, and (iii) the indispensability of constantly bringing out the link between probability and data in explaining what Statistics is about.

## **David Griffiths**

David provided the history of the workshops with mathematics teachers the university has held over the last several years and indicated that they plan to continue with them on an annual basis. Contents of these workshops vary each year and the university is interested in working with teachers to ensure the content meets their needs.

## **Stuart Palmer**

Stuart started his presentation with some examples of what he is doing at his high school to encourage towards study of mathematics (and statistics) those students who have the ability but lack the enthusiasm. He thinks it is tragic that interest in mathematics is fading at high school level. Stuart handed around posters that he had prepared, featuring students from the school who had done mathematical subjects at university and gone into careers where they used those mathematical skills.

Stuart then took the audience through a presentation he uses to teach his students the concept of standard deviation. He first steps through the calculation in an example and then poses some questions, asking (for example) what would happen to the standard deviation if particular changes were made to one or all of the values in the example.

### **David Keanan-Brown**

David was speaking on behalf of the Mathematics Association of NSW (MANSW). He was particularly interested in obtaining feedback from the subsequent breakout session on the kinds of professional development activities and delivery styles that could be funded in the short term to support the teaching of all the new topics in the syllabi, and of the statistics topics in particular.

David listed ideas that MANSW had already discussed. These include:

- Conferences.
- Long in-service courses: over a series of weeks with a series of presenters, each going to the same school week after week.
- One-off in-service courses – though these have not been found to be cost effective.
- A travelling professional development presenter who can focus on what is new in the syllabus e.g. a retired teacher funded for one year by MANSW.
- Video conferencing.
- Downloadable software
- Books (not texts) that could be on-sold through MANSW on a not-for-profit basis.
- Software sold in a similar fashion to the books.
- University workshop days (he asked: ‘why don’t other universities offer what Wollongong does, an annual workshop for school mathematics teachers?’).
- Specially written material, for use either before or after the textbook.

Challenges that were identified include:

- What professional qualification should the presenter have – teacher, statistician, both?
- Location issues.
- Availability of teachers for workshops, conferences etc.
- How to include independent school teachers into state school activities.
- The time and energy required to develop support materials.

Some of these issues were taken as the basis for discussion in the breakout session.

### **Peter Howley**

Peter shared his experiences in teaching a multi-disciplinary university course in statistics where, to build enthusiasm, reduce learner resistance and enhance understanding of the subject, he tries to keep the subject ‘real’, to keep the students interested, and to get students to keep the subject ‘in mind’. Peter stressed the need to minimise the algebraic notation while maximising the relevance to students’ other studies and their intended career plan.

### ***Breakout session***

The breakout session was planned to be reasonably unstructured, although several questions were provided to the facilitator of each of the three groups, as triggers for group discussion. These questions were:

What style of PD delivery would you expect will be most highly valued and most effective

- (i) a series of video conferencing using the existing DET facilities?
- (ii) a travelling PD presenter, aiming to reach all major urban and regional centres?
- (iii) specially written material such as (a) practice papers (b) other?

In thinking about this please consider:

1. What hurdles need to be overcome to deliver the statistical content in the maths syllabi at high school?
2. What could be done to overcome any of these hurdles?
3. What currently works well in maths and could any of these ideas be used for statistics topics?
4. What currently works less well / is less well-received by students in maths and can the same be said for statistics topics?
5. What are the relationships with, and developments from, statistics topics in the years 1-10 syllabi?
6. What are the relationships with the advanced years 11–12 mathematics syllabi?

Notes of the feedback from each breakout group are provided in Appendix 2.

### *Suggestions for professional development and support activities*

At the plenary concluding session that followed the breakout period, leading ideas from each of the three breakout groups were brought forward.

The following are among the valuable suggestions that were made, for syllabus design, for supportive resources, and for professional development activities.

- A crowded syllabus presents constant challenges to teachers who seek to teach so that students will retain what they have learnt. It would help if the senior syllabus was restructured to reduce the amount of repetitive content from years 7 to 10.
- Teachers who are confident in their understanding of a statistical topic are much more able to teach that topic well. However, the majority of mathematics teachers have little or no training in statistics or in undertaking statistical investigations, so need to be taught themselves prior to teaching in the classroom. There is a pressing need for good quality resources aimed at teachers towards this end.
- Rather than to be constantly ‘reinventing the wheel’, it is preferable to establish a clearing house of existing statistics teaching materials that use authoritative approaches.
- To assist teachers in real time, set up an online discussion forum for teachers to build learning communities, in order to share recommended readings, draw attention to materials available from other sources, discuss teaching difficulties, etc.
- As regards professional development activities, the challenge of having a very geographically dispersed population of schools kept rearing its head. While any activity that MANSW, or anyone else, could provide would be extremely welcome, an ideal activity would be one that occurred regularly (one-off days are ineffective), and that made use of self-guided materials which revisited basic ideas and concepts cyclically as a teacher’s knowledge grew.

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In closing, the attention of workshop participants was drawn to the very recent publication online of the complete proceedings of an international conference, held in Mexico in July 2008, on the theme ‘Statistics Education in School Mathematics’. The sponsors of the conference were the International Commission on Mathematical Instruction (ICMI) and the International Association for Statistics Education (IASE).

Full details may be found at [http://www.ugr.es/~icmi/iase\\_study/](http://www.ugr.es/~icmi/iase_study/)

The menu on the left of this webpage links to a ‘Discussion document’ which canvases issues similar to those addressed by this workshop. There is also a link to ‘Background papers’, a comprehensive reading list including ideas for supporting school mathematics teachers teaching statistical topics. And, of course, there are the contributions to be found among the 68 papers of the international conference itself (click on ‘Proceedings’).

In the first instance, the following two conference papers will be found constructive:

- Joan Garfield, Univ. of Minnesota, USA, & Dani Ben-Zvi, Univ. of Haifa, Israel, *Preparing School Teachers to Develop Students’ Statistical Reasoning*. (From Conference Topic 4)
- Paul Fields, Brigham Young University, USA, *A Case Study in Collaboration Preparing Secondary Education Teachers*. (From Conference Topic 6)

*Appendix 1 – Powerpoint slides from the speaker presentations*

<b>Speaker</b>	<b>File name</b>
Margaret Bigelow	<i>Oral presentation only</i>
Helen MacGillivray	Statistical Lessons_Helen M.ppt
David Griffiths	<i>Oral presentation only</i>
Stuart Palmer	1_DoesCalculatorCalculateStandardDeviation.ppt
David Keanan-Brown	<i>Oral presentation only</i>
Peter Howley	Keeping it real and interested and in their minds.ppt

## *Appendix 2 – Detailed notes from the Breakout groups*

### **Notes of the discussion in Breakout Group A**

**Facilitator: Eric Sowe** (who prepared these notes)

*What style of PD delivery would you expect to be most highly valued and most highly effective:*

*(i) a series of video conferencing using the existing DEST facilities?*

*(ii) a travelling PD presenter, aiming to reach all major urban and regional centres?*

*(iii) specially written material such as (a) practice papers (b) other?*

- Note: there was no discussion of the above matters.

*In thinking about this please consider*

*1. What hurdles need to be overcome to deliver the statistical content in the maths syllabi at high school?*

- The biggest constraint on teaching for good learning is the crowdedness of the Mathematics syllabi. There is never enough time (i) to ensure that ideas are well grasped, and (ii) to allow teachers the opportunity for creativity in teaching that many teachers crave, and that students so appreciate.
- A crowded syllabus is ultimately self-defeating. Though each topic may be ‘covered’ in class, it’s questionable how much is learned *and retained for the long term*. This is as true for statistics content as it is for mathematics content.
- There is also never enough time for marking assignments of real depth, yet these are exactly the kinds of assignments that engender good student learning.

*2. What could be done to overcome any of these hurdles?*

- Undoubtedly the weight of subject matter in the school Mathematics syllabi at *every* Stage needs to be reduced. This requires long-term review. But that objective should begin now with the new Stage 6 syllabi.
- In particular, if Statistics topics are expanded in the syllabi, Mathematical content should be deleted (perhaps more than proportionately).
- Apart from this long-term strategy, it’s important to design teaching so that the amount of ‘busy work’ in class is reduced. For example, it’s really unproductive to have students entering data into calculators or computers in class time. A way around this is to have pre-loaded data sets available.

*3. What currently works well in maths and could any of these be used for statistics topics?*

- It goes without saying that successful teachers of Mathematics topics understand those topics (and even more-advanced topics) very well. However, very few teachers know much about the Statistics topics – and that’s especially true for more-advanced topics. Professional Development for Mathematics teachers on Statistics components of the syllabi needs to be structured so that, first and foremost, teachers gain a *confident* understanding of the nature and scope of Statistics, and of the relationship of Statistics to Mathematics. In short, teachers will value time spent giving them a *perspective* over the discipline of Statistics, what kinds of questions it can answer, and what its limitations are.

- Communities of Practice are very valuable for developing teachers' confidence in how to teach syllabus topics well. Developing Communities of Practice in teaching Statistics topics would be an important achievement. This may be enhanced if Mathematics timetabling were co-ordinated at District level, so that taught topics progress in step at different schools.
- There are increasing numbers of overseas-trained teachers in NSW schools. They often come without any background in statistics, and even lack knowledge of some of the topics in the Stage 6 General courses. PD programs need to be devised with such teachers specifically in mind.

4. *What currently works less well / less well-received by students in maths and can the same be said for statistics topics?*

- Authoritative resources are in insufficient supply in regard to Statistics topics (and even in regard to some Mathematics topics). If Statistics topics are expanded, it will be very important to ensure that the additional Support Materials are truly authoritative.
- There is a dearth of teaching materials that teachers can adopt in the secure knowledge that they are using authoritative approaches. A clearinghouse offering such materials would be valuable: hard-pressed teachers teaching to a crowded syllabus often do not have the free time to design their own effective teaching materials.

5. *What are the relationships with and developments from statistics topics in the years 1 - 10 syllabi?*

- Currently, working through the Statistics topics in the high-school level Year 7-10 syllabi can feel very mechanical to students. Since there is hardly any abstract analysis in Years 7-10, when students encounter abstraction in the Stage 6 syllabi they are often totally bewildered.
- A solution: make the Statistics in Years 7-10 more motivating. Show students clearly the meaning and purpose of a statistical approach to data. If analytics and abstraction are judged too difficult to introduce in Years 7-10, at least show students more real-life contexts for the topics they cover.

6. *What are the relationships with the advanced years 11 – 12 mathematics syllabi?*

- It's not clear how the Stage 6 Statistics topics and Mathematics topics mesh. But it *is* clear that students learn a great deal from *investigations*, and other challenging kinds of assessment tasks. Interpreting data sets, whether in a mathematical or in a statistical context, is always a challenging investigation.

## Notes of the discussion in Breakout Group B

**Facilitator: Chris Reading** (who prepared these notes)

*Q1 What hurdles need to be overcome to deliver the statistical content in the maths syllabus at high school?*

- Not knowing the content itself, e.g., causality versus correlation.
- Not knowing how to work statistically.
- Not knowing how to teach statistics.
- Need ideas on how to introduce underlying concepts.

*Q2 What could be done to overcome these hurdles?*

- Don't follow the textbooks.
- Check the Board of Studies Excel spreadsheets.
- Need learning modules that can be shared
- Learning Federation needs more mathematics and statistics objects for senior students.
- Software has to be good and affordable.

*Q3 What currently works well in mathematics could any of these be used for statistics topics?*

- Incorporate physical activities, i.e., “do” data investigations.
- Using an investigative approach involves a paradigm shift that is difficult for teachers.
- Let technology do the “hard yards” and then spend time on the conceptual understanding and interpretations.
- Connect with other subjects but ideas are needed on how to do this.

*Q5 What is the relationship with and developments from statistics topics in the years 1-10 syllabus?*

- There is too much repeating in the years 11-12 syllabus of content already dealt with in the year 7-10 syllabus.
- Concepts are not advancing developmentally.
- Probability is the most poorly written topic.
- The probability and data topics need to come together again.
- The important concepts could be covered well in a small amount of time with good resources. This might be achieved by doing a data investigation (e.g., see the work of Anthony Harradine).

*Comments about professional development*

- Mathematics teachers have never been taught how *to teach statistics* and need to be given the chance to learn this.
- Mathematics teachers have never been taught how *to do statistical investigations* and need to be given the chance to learn this.
- The difference between mathematical thinking and statistical thinking needs to be clarified for teachers.
- It should not be assumed that teachers *know* the statistics content in the syllabus.
- A discussion board should be set up for teachers to use for advice on statistics (e.g., Ask an Expert), to share recommended readings (e.g., about technical terms).

- Professional development needs to be cyclic, revisiting ideas/concepts as it develops.
- All professional development needs to have follow-up activities as one-off days are not effective.
- Professional development needs to be re-usable, self-guided and “sent out”.
- Any roaming should be electronic, especially videoconferencing should be considered, e.g., a dial-in conference with interactive activities once a month would be good.
- Advice on online delivering of professional development could be sought from the Centre for Flexible Delivery (CFL).

## Notes of the discussion in Breakout Group C

### Facilitator: David Griffiths

This group discussion centred around three themes.

First was teacher's skills in statistics and how to enhance them. This group agreed that maths teachers generally don't have detailed enough knowledge about statistics and teaching statistical topics so the challenge is how to provide those skills.

Suggestions included:

- the Statistics Society providing the knowledge or, at least providing a structure in which the knowledge could be imparted to the mathematics teachers.
- sending people out to do demonstration lessons
- Teaching teachers via online courses developed by one or more universities as a collaboration

Second was the need for resources. This discussion covered ways of sharing information, experiences, skills and so on. Suggestions included:

- Allowing, encouraging or improving the communication between the States
- Providing resources on maths links and TaLE
- Ensuring resources for background knowledge are Australia wide with classroom use relevant to each state's syllabus, in particular for this workshop, the NSW syllabus
- Providing lectures on the web that could be accessible at any time by any teacher

As regards currently available resources the suggestion was that the ABS data was too hard but the Census at school data is useful. A comment was made that the RSS (Royal Statistical Society, UK) site has worksheets etc for general level.

Third was the challenges within the classroom to cover the syllabus. Comments were that teachers don't have time to 'teach' because exams drive teaching in the classroom and so when short of time they prune topics back. The realisation is that statistics requires time and while some aspects can be examined the main benefit is in the practical understandings that students obtain. In order to assist teachers the availability of good, evaluated resources is required. Teachers' time can be better spent using resources that have already been evaluated rather than attempting to source their own material from internet sites, books and so on without knowing the value of these sources.

There were also the comments that 2/5 of the Higher School Certificate covers statistics topics but it certainly isn't marketed in this way, the junior syllabus is very important and should be built on and not repeated and finally that the focus is on the general syllabus but statistical topics within the advanced syllabi should not be forgotten.