

# **Mastery tests to cope with mixed backgrounds in an introductory statistics course**

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# Context

## ➤ **Statistics in New Zealand schools**

- **One of largest 7<sup>th</sup> form subjects**
- **Modern syllabus emphasising data**
- **But many students don't do 7<sup>th</sup> form stats**

## ➤ **Massey University**

- **No formal prerequisites**
- **Distance students with varied backgrounds**
- **Internal students with varied majors**



# Statistics courses

## ➤ 100-level courses

- Statistics for Business
- Introductory Statistics
- Introductory Biostatistics
- ~~Principles of Statistics~~

} Statistical methods

## ➤ Core for...

- BBS
- BSc



# Problems

## *161.120 Introductory Statistics*

- **Need to cover all topics from basics**
  - Weak students with no stats background
- **Easy to bore top students**
  - Some will be our majoring students
- **Mixture of new and old material each week**



# New approach

## ➤ **First 5 weeks**

- **Overlap with 7<sup>th</sup> form**
- **Assessed by mastery tests**
- **Told that good students don't need to come to lectures**

## ➤ **Last 7 weeks**

- **Some earlier topics extended**
- **Topics not taught at school**
- **New material for everyone**

**Internal only  
in 2011**



# Resources

➤ **Moodle site**

➤ **Study guide**

➤ **Nothing on paper**

➤ **Customised CAST e-book**

[Start CAST](#)

➤ **Paperback textbook**



# Mastery tests

- **Three tests with 10 questions each**
- **Questions**
  - Each is a Java applet
  - Many aspects randomised
  - Different questions each attempt
  - Repetition only helps if concepts mastered
- **Practice on same questions as exercises**

[CAST exercises](#)



# Mastery tests

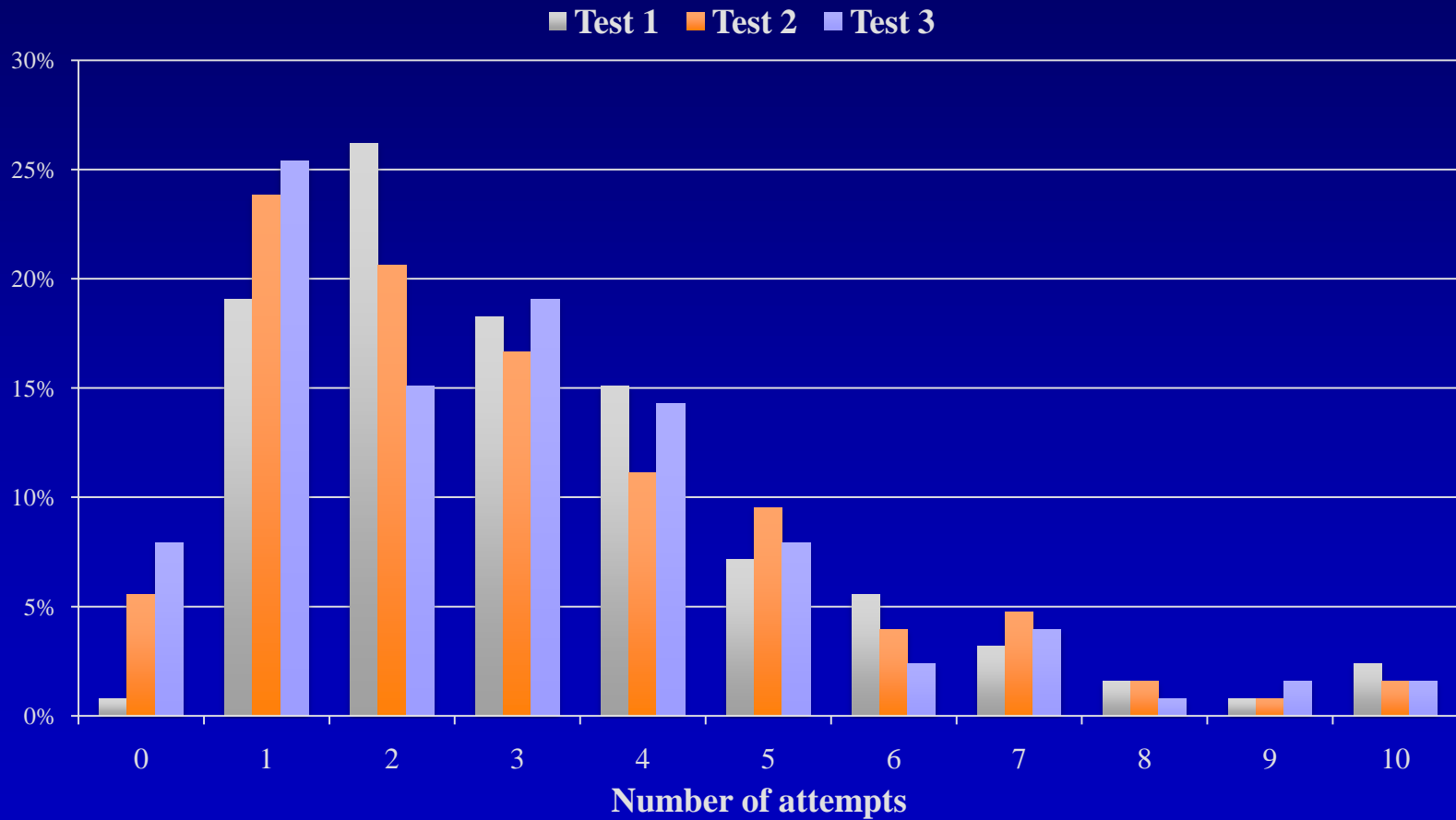
- **Hosted on custom Moodle site**
  - Implemented as question-type plug-in
- **Max of 10 attempts**
- **12 hours between attempts**
- **Immediate feedback**

Start Moodle 2.1

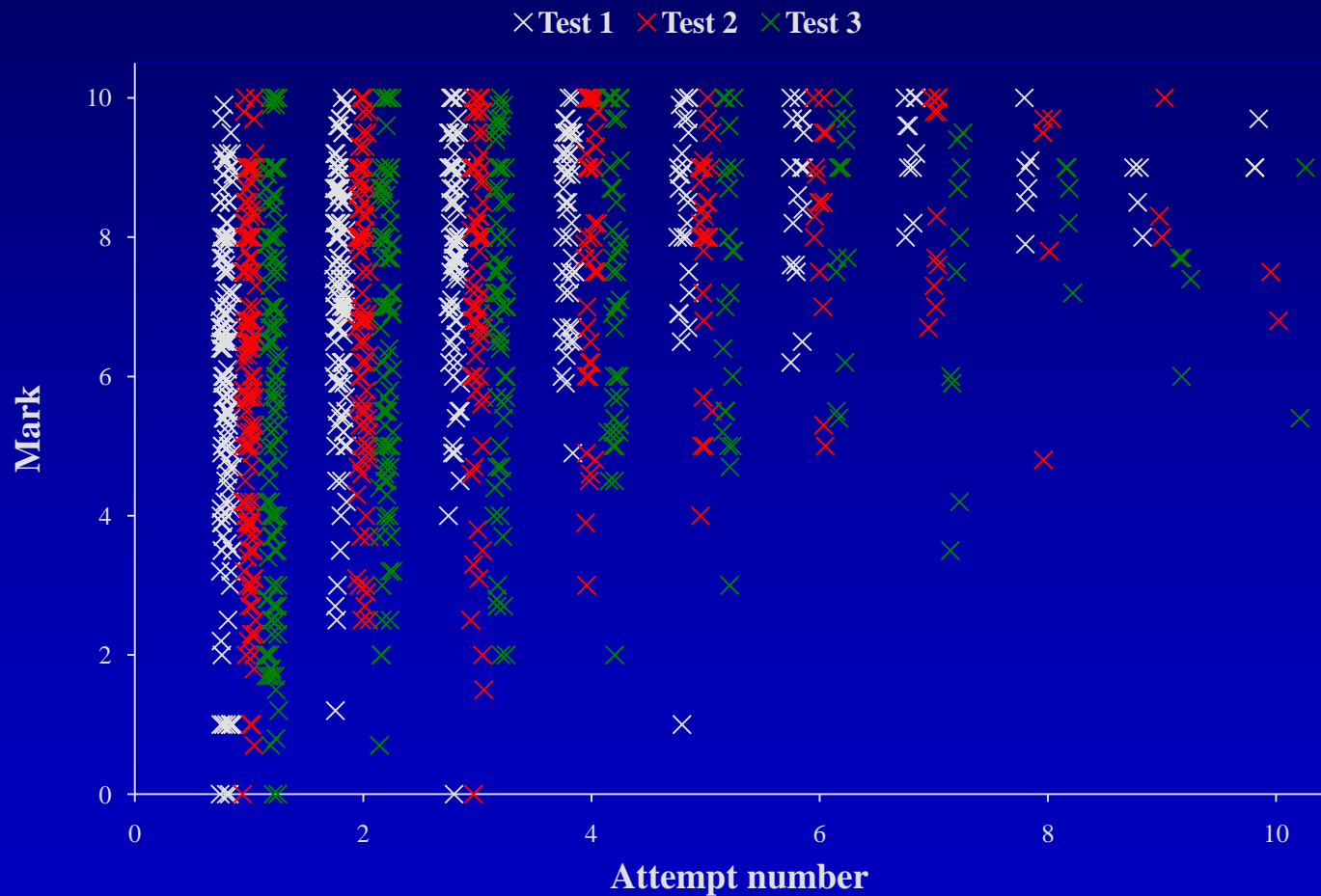




# Number of attempts



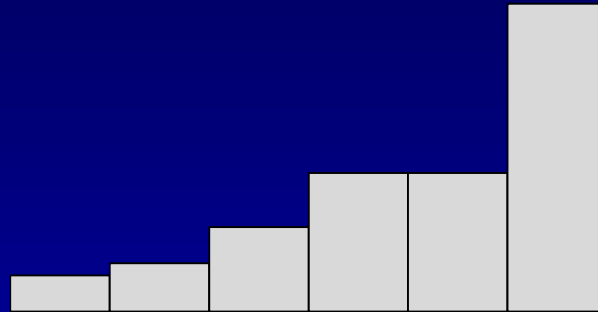
# Marks for individual attempts



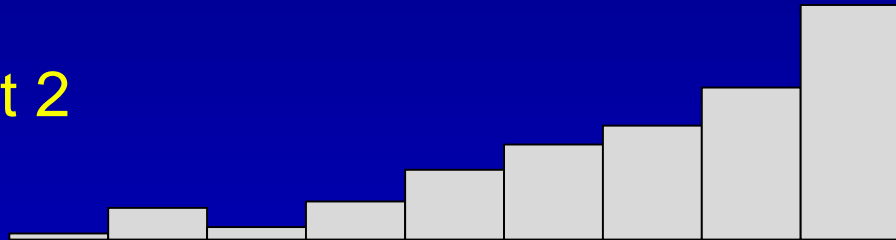


# Maximum mark

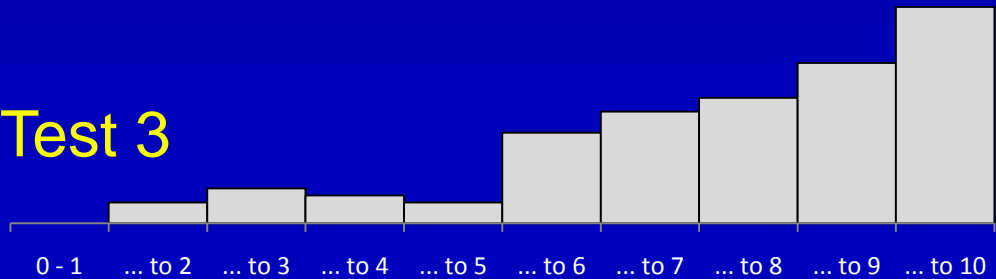
Test 1



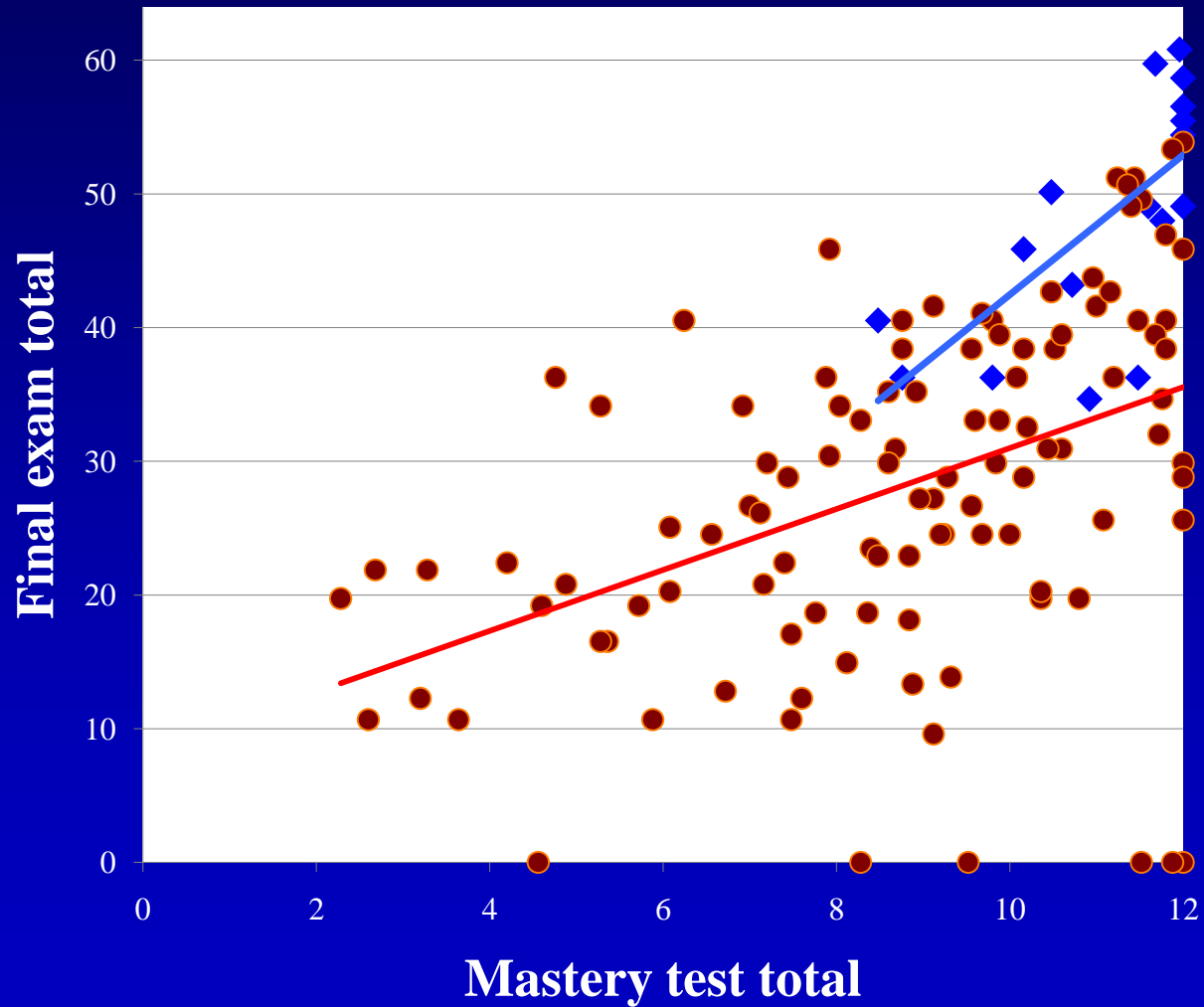
Test 2



Test 3



# Mastery vs Final exam





# Conclusion

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- **Students liked mastery tests**

- No pressure
- Could improve mark
- Early engagement
- No effect on lecture attendance

- **Results were good**

- Many persevered until they mastered concepts



# But...

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- **Cheating?**
- **Final pass rate was no better**
- **Could only assess specific concepts**
  - **Very fine-grained questions**  
(... but no worse than most multi-choice tests)
  - **Projects in 2<sup>nd</sup> half of course**



# Download

## ➤ **CAST**

- **Introductory & advance e-books**
- **About 1,000 dynamic diagrams (applets)**
- **Exercises**

<http://cast.massey.ac.nz>

## ➤ **Tests**

- **Moodle question-type plug-in**
- **About 100 questions**

[http://castAdmin2.massey.ac.nz/download/cast\\_moodle\\_plugin.zip](http://castAdmin2.massey.ac.nz/download/cast_moodle_plugin.zip)  
[http://castAdmin2.massey.ac.nz/download/cast\\_moodle\\_plugin21.zip](http://castAdmin2.massey.ac.nz/download/cast_moodle_plugin21.zip)