



北京大学
PEKING UNIVERSITY



eLearning Forum Asia 2012

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Next Generation Learning

Visions • Innovations • Possibilities

Great expectations: Balancing the risks and benefits of blended learning and e-assessment in Maths and Statistics education

Presented by:

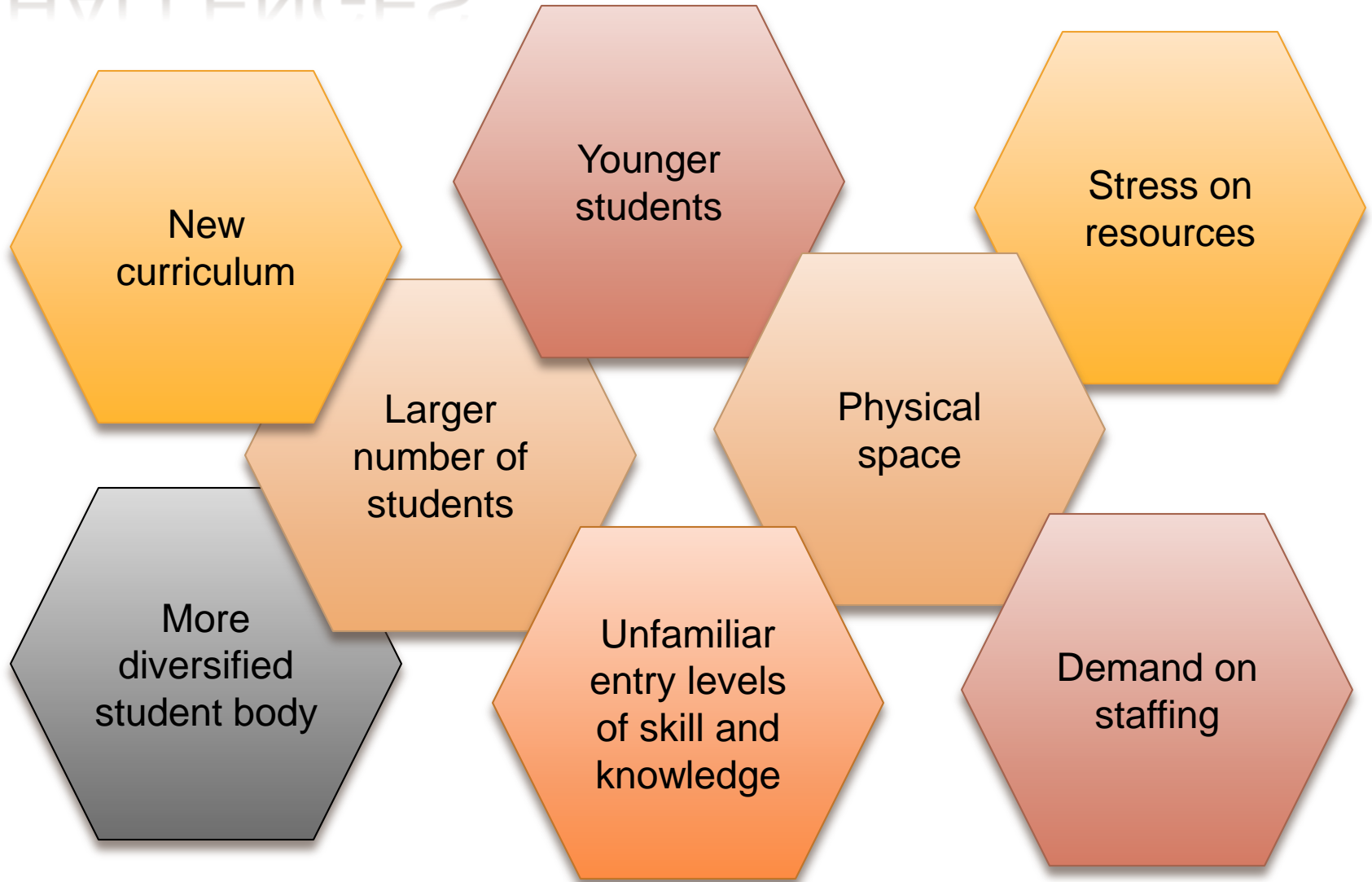
Dr. Jennifer EVANS
Ms. Peggy Pui Kei HO
Dr. HUNG Kim Fai
Mr. David Ian BROWN
Dr. Glory PONG
Hong Kong Polytechnic University, Hong Kong



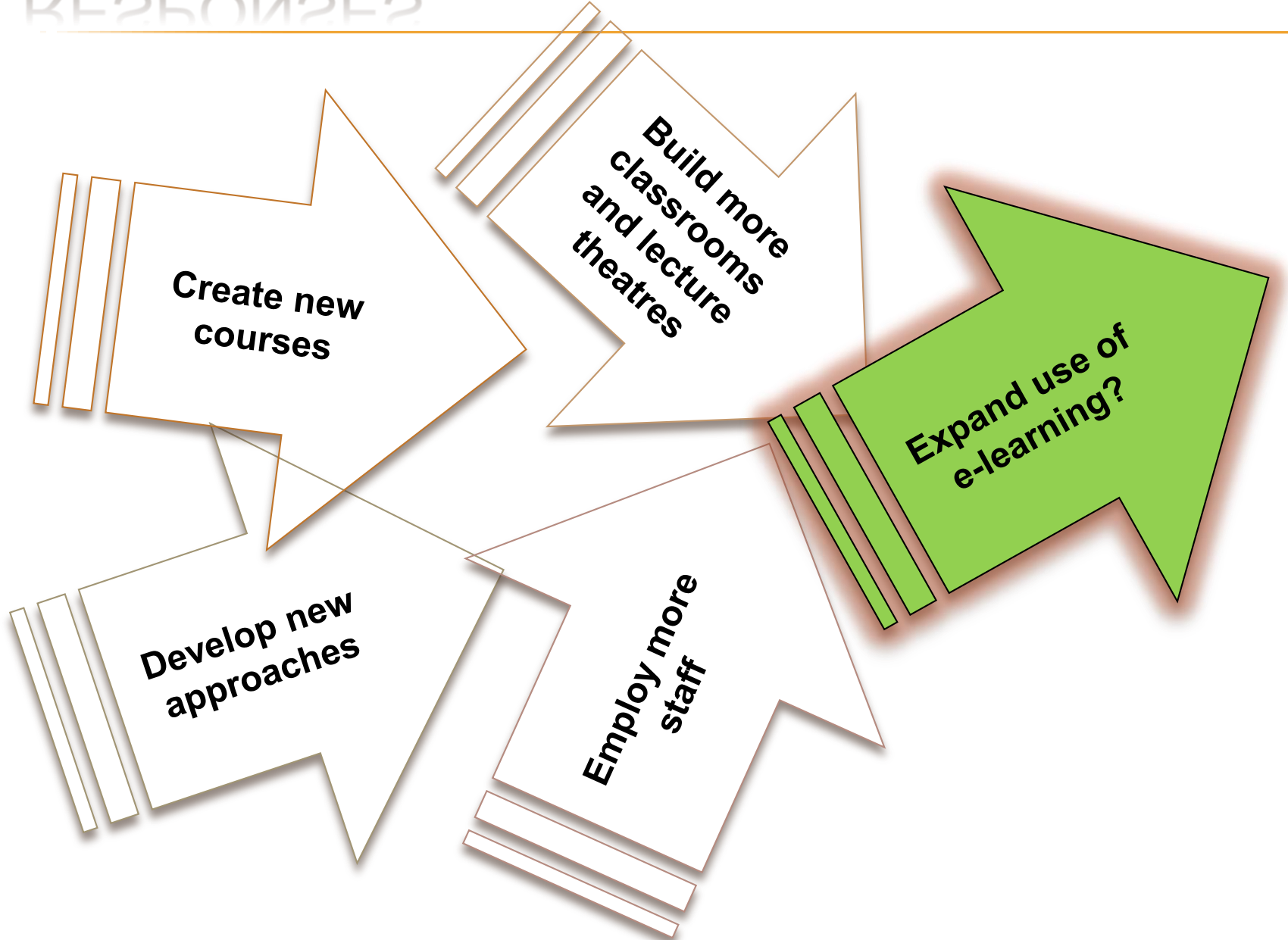
THE CONTEXT

- ✖ Academic reform in Hong Kong
- ✖ From 3-4-3 to 3-3-4
- ✖ Hong Kong Diploma of Secondary Education
- ✖ 4 year undergraduate degrees
- ✖ 8 UGC-funded institutions of higher education
- ✖ Double cohort entry – begins Sept. 2012

CHALLENGES



RESPONSES



AMA PROJECT@ POLYU

- ✖ Dept of Applied Mathematics (AMA)
- ✖ Broad Discipline Requirement (BDR) subjects across University (5 Faculties/I School)
- ✖ Approx 3300 students annually
- ✖ Largest cohort Engineering students c.800
- ✖ “Development of blended learning packages to assist learning and teaching of basic Mathematics and Statistics for the 4 year undergraduate curriculum”

THE PROJECT TEAM

- ✖ Dept of Applied Mathematics = 4
- ✖ Applied Biology & Chemical Technology = 1
- ✖ Faculty of Engineering = 1
- ✖ Hong Kong Community College = 1
- ✖ Educational Development Centre = 2

- ✖ Project Associate (Project Manager) = 1
- ✖ Project Assistants = 2

DELIVERABLES

- ✖ Blended learning packages for basic Mathematics and Statistics
- ✖ Focus – e-assessment activities
- ✖ Broad approach
- ✖ Summative, formative and diagnostic assessment

APPROACHES TO ASSESSMENT

Diagnostic

Assessment of pre-learning and readiness for study.

Formative

Assessment FOR learning which supports the learning process.

Summative

Assessment of learning which measures learning outcomes

SUMMATIVE E-ASSESSMENT

Summative

Assessment
of learning
which
measures
learning
outcomes

- ✘ Time saving and cost-effective for staff.
- ✘ Consistency and quality in standards.
- ✘ Rapid processing.
- ✘ Requires institutional commitment for large scale implementation.

FORMATIVE E-ASSESSMENT

Formative

Assessment
FOR
learning
which
supports the
learning
process.

- ✗ Enables student-centred independent study outside classroom.
- ✗ Facilitates group learning, peer assessment and self-assessment.
- ✗ Engaging and challenging. Interactive e-textbook use.
- ✗ Provides timely feedback at the learning moment.

DIAGNOSTIC E-ASSESSMENT

Diagnostic

Assessment
of pre-
learning and
readiness
for study.

- ✘ Will allow rapid assessment of level and range of knowledge of new intake of students.
- ✘ Can reveal areas of strength and weakness and development of appropriate personal study plans.

THE DIAGNOSTIC PILOT

× Aim

- + Test the logistics and the content
- + Also acts as 'real' streaming test for FENG students

QUESTION BANK DESIGN

- ✗ Over 300 questions
- ✗ 4 subjects: Algebra, Linear Algebra, Calculus, Statistics
- ✗ 4 levels of difficulty (matching with syllabus)
- ✗ Different combinations of subjects and difficulties according to student's chosen undergraduate course
- ✗ Randomised to students

TEST MODE

- ✗ Do at home or on site? All together or 'come & go'?
 - + Main constraint: inability of Blackboard timer to STOP the test, Save and Submit attempts after allocated time [fixed in later service pack]
- ✗ All-together on-site tests on mainly 2 days

LOGISTICS PLANNING

- ✘ Venue – crowd control; emergency procedures; rearrangement for ordinary users of Student Computer Centre
- ✘ Invigilators – recruit from 3 faculties; compulsory briefing
- ✘ IT – seed testing; computer facilities; disable internet access; block saving to USB
- ✘ Admission & security – invitation letters to students with usernames and passwords
- ✘ Contingency & disabled students

ATTENDANCE RATES

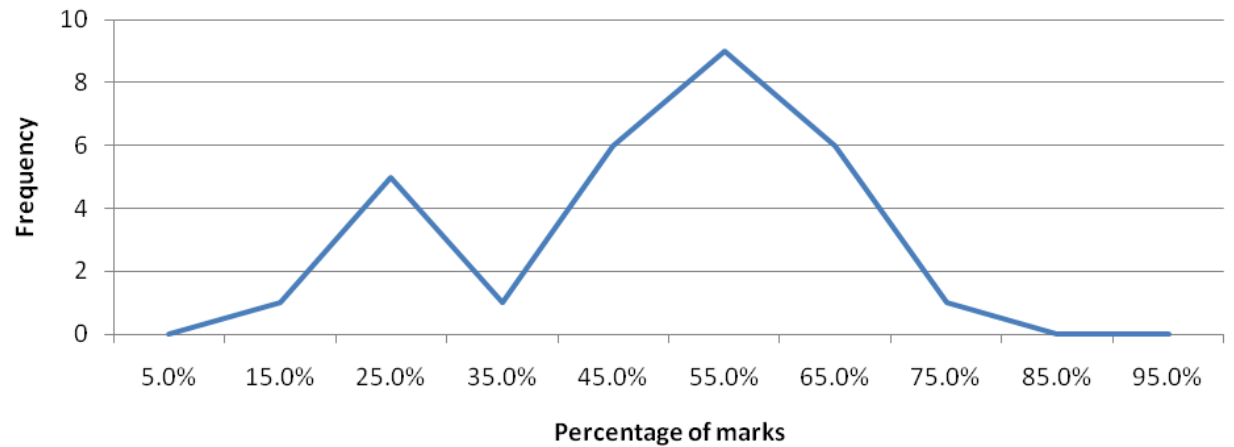
	ABCT	HKCC	TOTAL DAY 1	FENG (TOTAL DAYS 2 & 3)	TOTAL
Total Invited	31	132	163	257	420
Present	29	100	129	106	235
Absent	2	32	34	151	185
Attendance Rate	94%	76%	79%	41%	56%

RESULTS

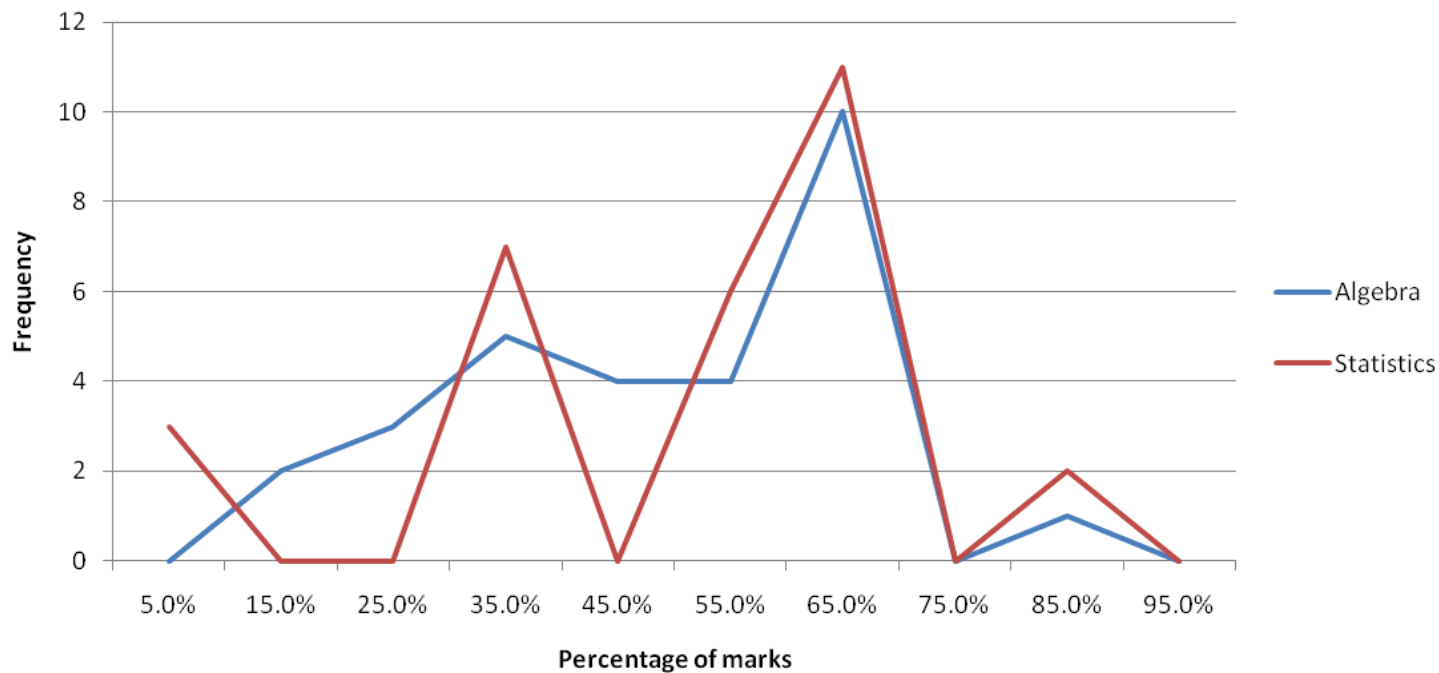
	ABC T	HKC C	TOTAL DAY 1	FENG (TOTAL DAY 2 & 3)
Present	29	100	129	106
Very Good	0	1	1	
Good	10	29	39	
Satisfactory	12	43	55	
Weak	7	25	32	
Very Weak	0	2	2	
Pass				18
Fail				88

ABCT

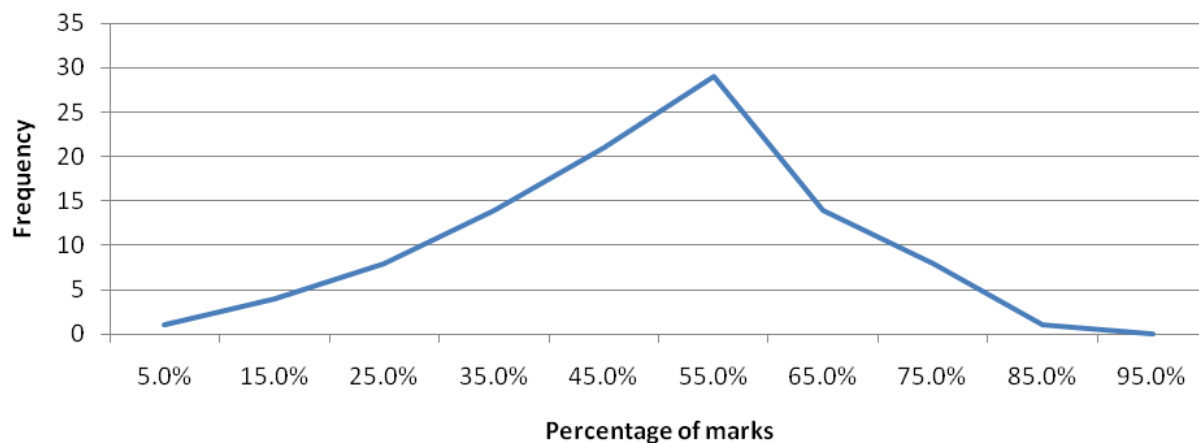
Frequency against percentage of marks



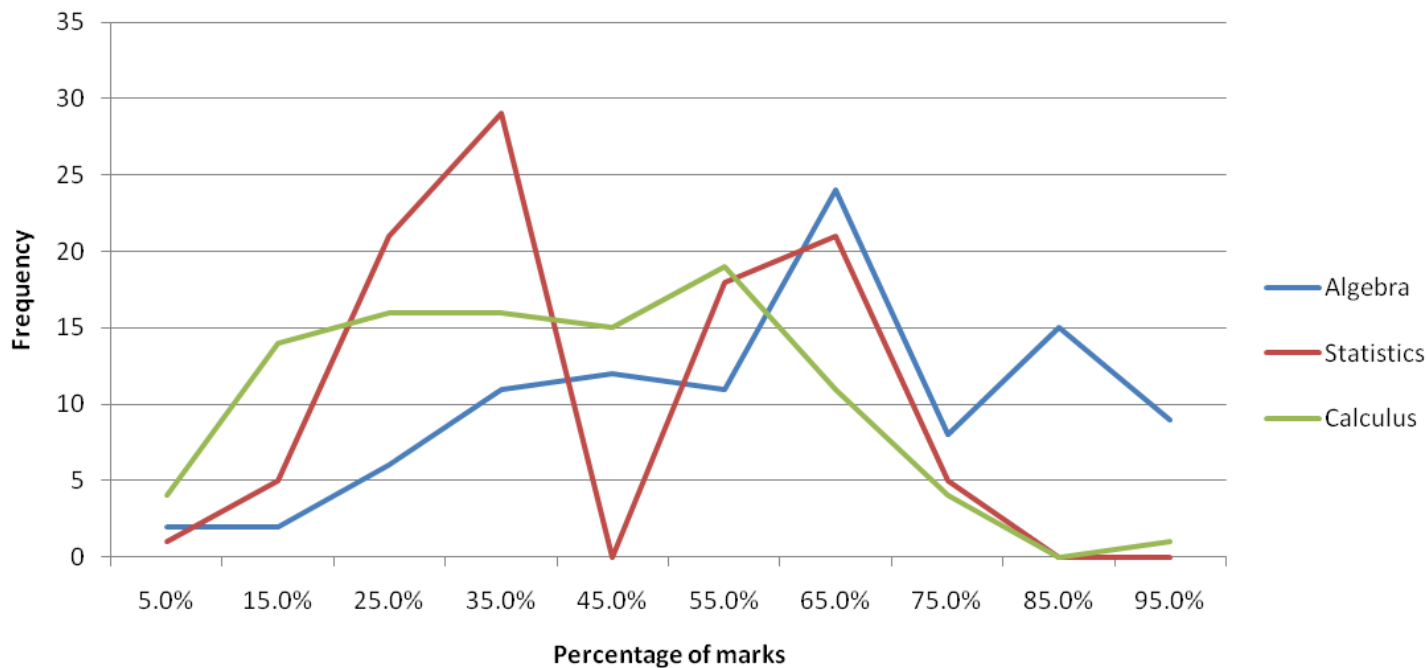
Frequency against percentage of marks (2 topics)



Frequency against percentage of marks

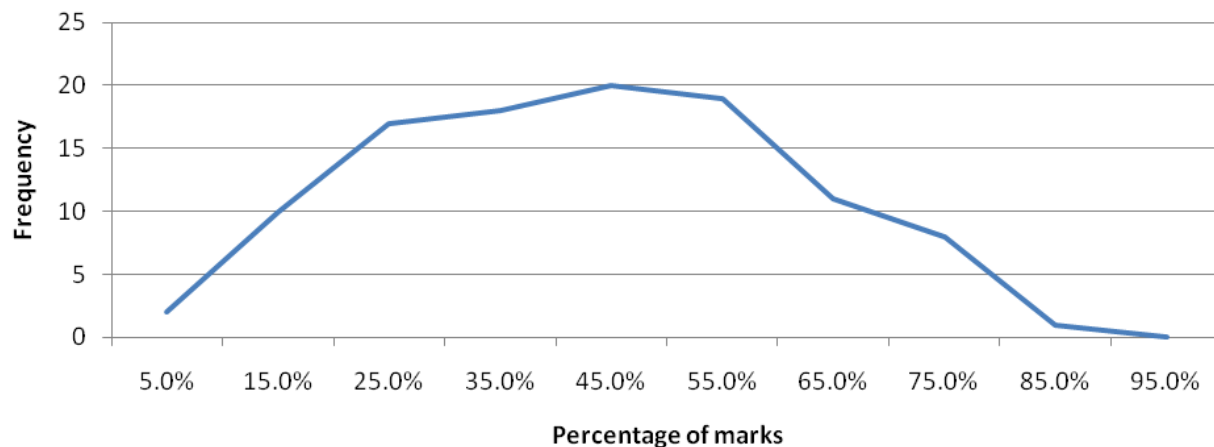


Frequency against percentage of marks (3 topics)

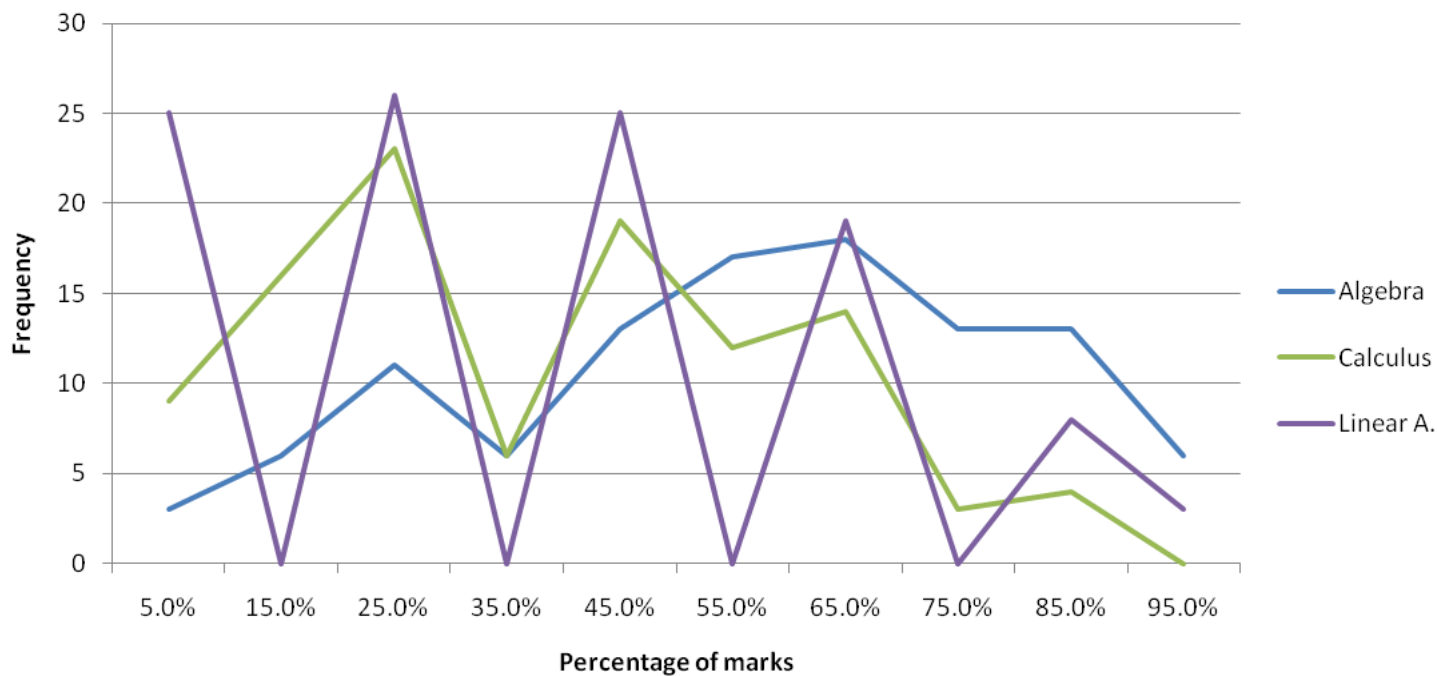


FENG

Frequency against percentage of marks



Frequency against percentage of marks (4 topics)



WORKED WELL

- The 2-hour briefing session enabled most invigilators to handle the system.
- Students admittance check flow was smooth.
- Procedure for solving problems worked well, e.g. students who forgot invitation letters, IT problems, etc.

PROBLEMS ENCOUNTERED

✗ IT (minor)

+ IP address	+ “Access Denied”
+ Hard disk failure	+ ENTER key submits test
+ Screen resolution	+ Slow login and logout
+ Password choices e.g. I and 1	

- ✗ 1-2 students submitted early by mistake?
- ✗ Wrong use of test passwords by invigilator

STUDENT SURVEY

- ✗ Main conclusions about computer-based assessment:
 - + Mostly no technical problems
 - + Test system is easy to use
 - + Students prefer computer test to paper multiple-choice test
 - + More students think they are slowed down by using a computer than speeded up
- ✗ Likes:
 - + “Status bar is very useful.”
 - + Countdown clock is helpful for keeping track of time.
- ✗ Concerns / improvements:
 - + Level of difficulty and syllabus
 - + Test system restrictions, e.g. ENTER key, Save answer pop-up
 - + “The size of the numbers is not big enough.”
 - + Should be allowed to leave early

STAFF SURVEY

- ✖ Blackboard test system is easy to use.
- ✖ The test ran smoothly.
- ✖ Logistics was smooth, but heavy manpower (~30 invigilators + 4 coordinators + 3 IT).

FUTURE LOGISTICAL IMPROVEMENTS

- ✗ Allocate computers on arrival
 - + More efficient resourcing in case of high absences
 - + Requires bigger question bank
- ✗ Allow to leave early
- ✗ More than one, or flexible, time-slot
 - + Fewer rooms ↔ fewer invigilators with experience
- ✗ Students do Trial Input at home before test?
- ✗ Provide Announcements crib sheet to all invigilators
- ✗ IT: resolve Blackboard issues + IP address issues

QUESTION BANK IMPROVEMENTS

- ✗ Blackboard does not provide enough analysis according to 4 subjects, 4 levels of difficulty, and 3 student groups
- ✗ Manually analysed by Excel with self-written macros
- ✗ Amend the hardest and easiest questions
- ✗ Increase question bank size

THE DIAGNOSTIC PILOT

- ✖ Continue to do computer-based Diagnostic Tests for next academic year(s)
- ✖ Work with Blackboard provider for improved functions
- ✖ Use another (new) Math browser display technique: Mathjax
 - + Work with Blackboard to integrate Mathjax into Bb

PROJECT NEXT STEPS

- ✕ BDR prototypes developing
- ✕ Interactive e-Textbook
- ✕ E-learning packages with formative assessment
- ✕ Extension of project – time and funding

STUDENT LEARNING OUTCOMES

- ✘ Recognise own level of Math ability through diagnostic e-assessment
- ✘ Gain basic Math skills at required level
- ✘ Take greater control over own learning → more independent learning
- ✘ Become adaptable to new learning and teaching methodologies → more flexible ways of thinking and handling mathematical issues

CONCLUSION

