



**Peer Assisted Study Sessions (PASS)**

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**in first year chemistry and statistics courses:  
insights and evaluations**



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**Scope of PASS: first year BACS courses**

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- Six Biology, three Chemistry and one Statistics based courses
- 3 000 – 4 000 students per semester, 100 – 150 groups per week
- Voluntary attendance: 15 – 25 students per group
- Attendances average 60 – 80% of enrolled numbers
- Leaders are 2<sup>nd</sup> or 3<sup>rd</sup> level undergraduate students
- Mainstream service – proactive not reactive
- Active and small group based collaborative learning environment

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**In <Social>Constructivist Teaching and Learning...**

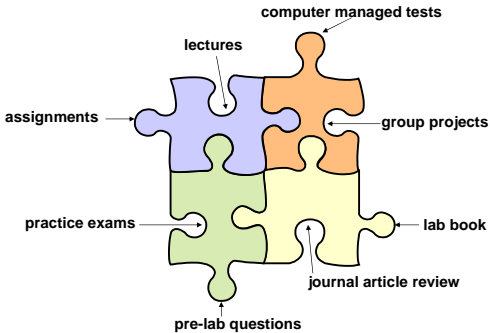
“Learning situations, environments, skills, content and tasks are relevant, realistic, authentic and represent the natural complexities of the ‘real world’” (Murphy, 1997)

...mediated by interactions with more competent peers who are at a level of understanding just beyond that of the students themselves, so that learning can occur within a student’s “zone of proximal development” (Vygotsky, 1978)

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**PASS is a study session  
for any instructional mode of learning**


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**What we try to encourage**

- is a happy, productive team spirit
- with groups of students working together
- inquiring
- creating
- solving problems
- achieving meaning 😊



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**Student enrolment, assessment & performance: CHEM112/1012 1999-2003**

Category	1999	2000	2001 #	2002	2003
No. enrolled	1279	1066	1040	1118	1131
% Attrition	4.3*	3.1*	3.9	3.7	3.8
% Grades 1-3	15.2*	16.0*	6.7	11.4	5.1
% Grades 4-5	61.8*	62.7*	70.5	62.5	62.0
% Grades 6-7	18.7*	18.2*	18.8	22.4	29.1
GPA	4.34	4.34	4.63	4.61	4.91
% Practical	92.3	93.7	88.8	91.9	92.0
% CMT	71.6	72.4	76.0	75.5	80.0
% MCQ	52.1	50.4	50.2	52.1	55.9
% Total	63.9*	63.5*	63.1	64.8	67.9

\* amended to align with 2001-2003 marking scheme  
# pilot PASS program

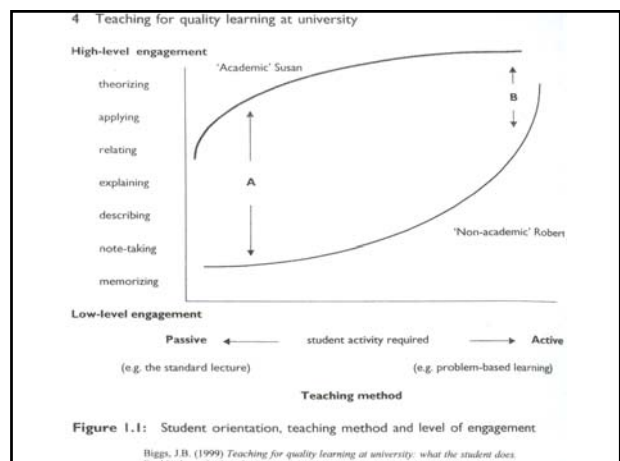
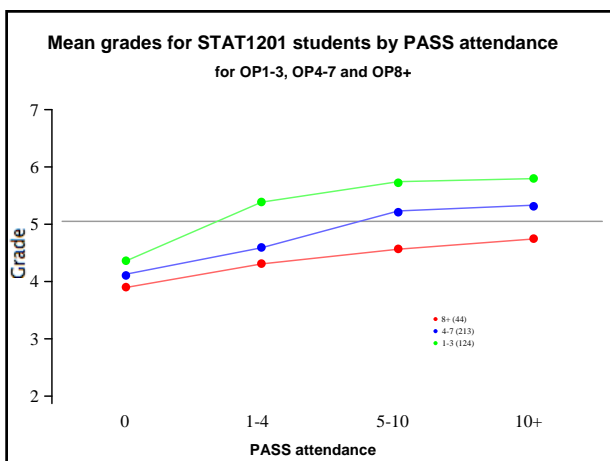
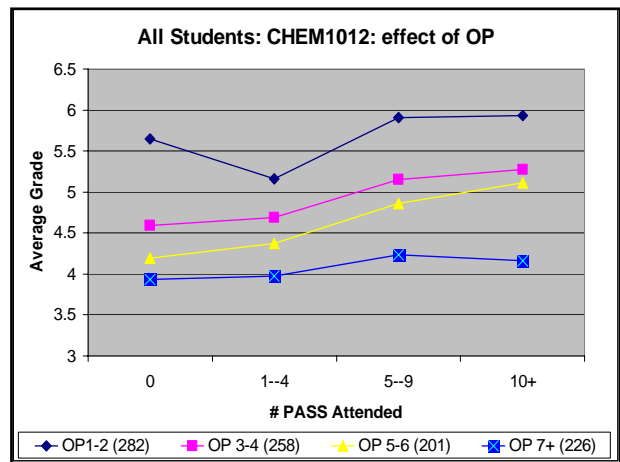
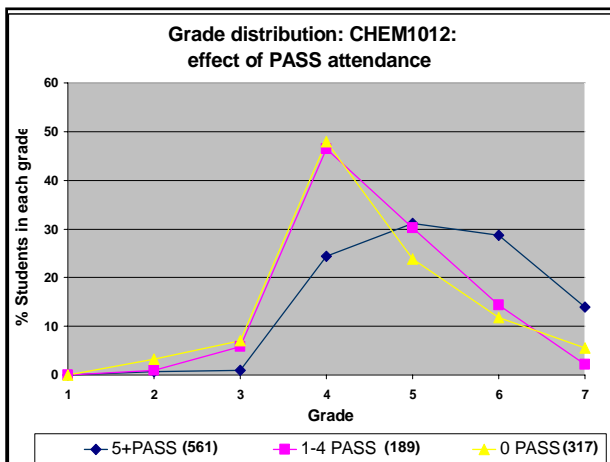
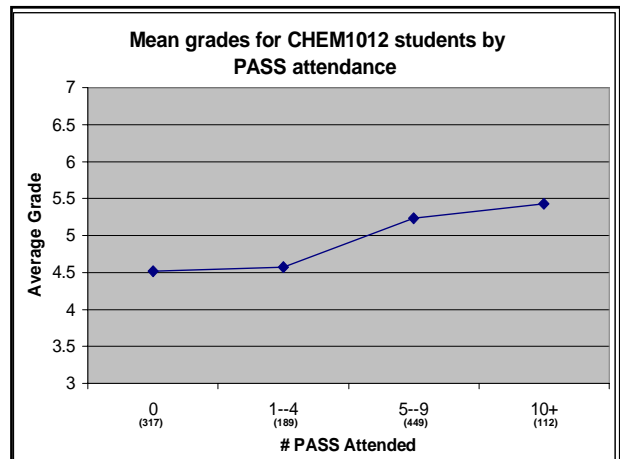
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**Effect of PASS attendance on student performance: CHEM1012\_03**

Category	% Average result for each category			
	All students	0 PASS	1- 4 PASS	5+ PASS
Practical	92.0	90.6	92.3	93.2
CMT	80.0	74.3	76.8	83.9
MCQ	55.9	50.2	50.3	61
Total	67.9	63.1	64.1	71.8
Grade	4.91	4.51	4.57	5.29
OP*	4.5*	5.3*	4.2*	3.9*

\* OP range for all students was 1 – 16

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Recruitment of Science students: 2 <sup>nd</sup> , 3 <sup>rd</sup> level Chemistry 1999-2004												
# Students in 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> level Chemistry courses												
Chemistry level	1999		2000		2001		2002		2003		2004	
	1	2	1	2	1	2	1	2	1	2	1	2
1 <sup>st</sup> /Semester	1279	1029	1165	874	1126	973	1125	1073	1228	1106	1160	1074
1 <sup>st</sup> /Year	2308		2039		2099		2353		2334		2234	
2 <sup>nd</sup> /Semester			110	95	87	106	148*	177*	173*	178*	200*	169*
2 <sup>nd</sup> /Year			205		193		325*		351*		369*	
3 <sup>rd</sup> /Semester					109	108	138	86	122*	145*	161*	160*
3 <sup>rd</sup> /Year					217		214		267*		321*	

\*2<sup>nd</sup> and 3<sup>rd</sup> level students who were offered PASS in 1<sup>st</sup> level Chemistry

### ...and other contributing factors

- Biochemistry & Chemistry in one school
- BBiotechnology introduced, 1999
- Nanotechnology Fields in BSc, BBiotechnology introduced 2002
- Guest lecturers for Chemistry stream C, 2001
- CMTs become compulsory, 2001 (non-compulsory from 1996)
- Advanced study program for u/grads, 2001
- Career advice on vocational value of Chemistry
- Greater perception of ability to combine Chemistry with other Fields
- Identification of PASS Group Leaders with Discipline
- Newer Generation of Young, Enthusiastic Lecturers

Studying Chemistry: survey for 2 <sup>nd</sup> level chemistry (CHEM2041) students, 2002			
Category: Impact of PASS in 1 <sup>st</sup> level chemistry on future intentions	Non-intending students in 1 <sup>st</sup> level chemistry		Intending students in 1 <sup>st</sup> level chemistry
	Current intention to = level 2 only	Current intention to > level 2	
Belief in their ability to succeed in chemistry	70 - 92% positive		
Attended PASS	93%		72%
Worthwhile part of 1 <sup>st</sup> year	88%		65%
Help adjust from secondary to tertiary education	59%		40%
Sense of belonging as chemistry students	60%		83%
Quality of learning and understanding of chemistry	72%		92%
Continue studying chemistry in 2 <sup>nd</sup> year	25%	60%	69%
Become a professional working in the field of chemistry	7%	40%	42%
Imagine themselves as chemists in the future	8%	44%	52%

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### PASS leaders: role



- help students adjust to university life
  - align study activities to course learning objectives
  - encourage students to adopt productive study habits
  - provide interdisciplinary overtones to authenticate new knowledge
  - create a social constructivist-based forum for critical appraisal and knowledge building
  - provide scaffolding for a non-judgmental learning environment
  - allow students freedom to explore the realm of their discipline while they practise applying knowledge to "real life" situations
  - support and motivate students to research and communicate personally meaningful scientific projects
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### PASS leaders: selection & skills development

- academic performance and love of discipline
- enthusiasm and communication skills
- modes of facilitation
- principles of active learning (Biggs, 1999)
- dialogue not monologue
- strategies to foster communication
- learner centred teaching, not teacher centred teaching
- the "big picture", the "eureka" moment, the "light bulb" switches on!



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A Leader is best

When people barely know he exists

Not so good when people obey and acclaim him

Worst when they despise him

"Fail to honour people

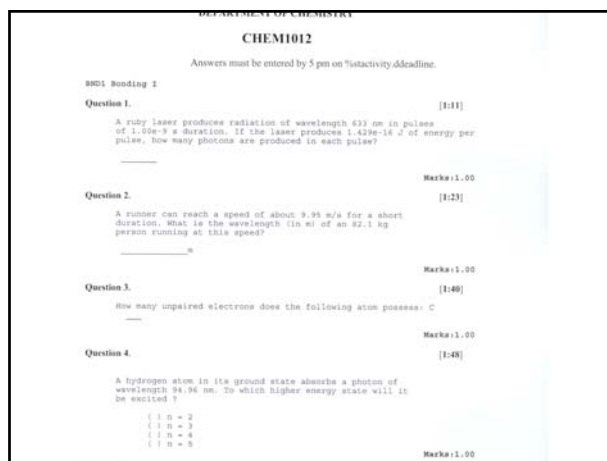
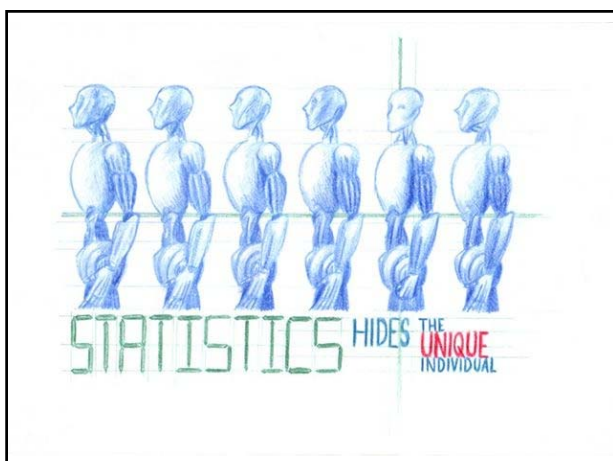
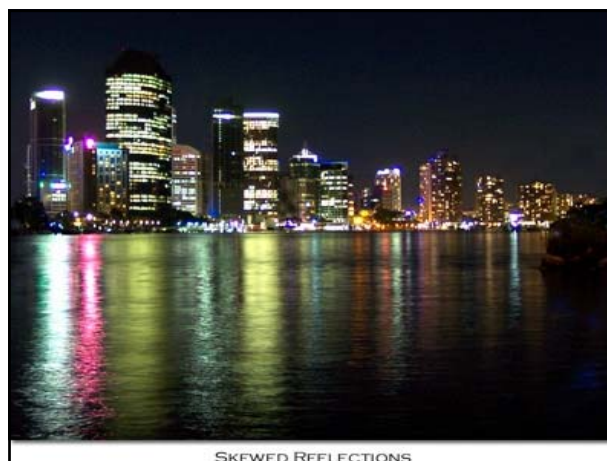
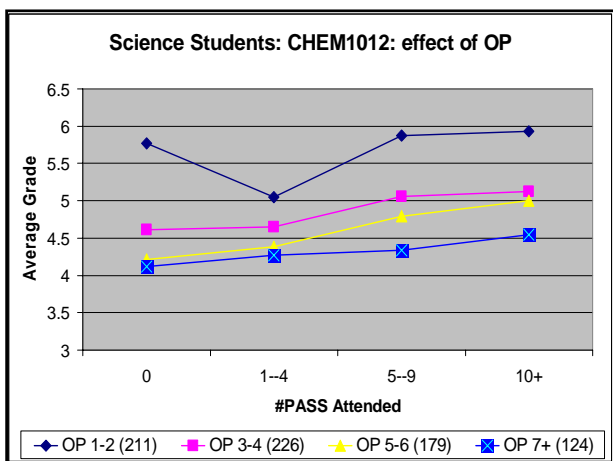
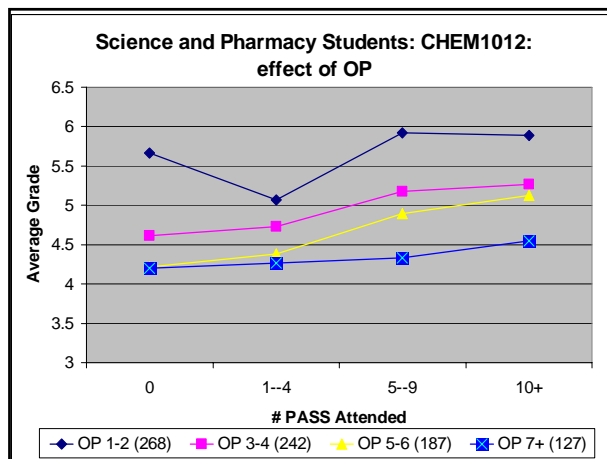
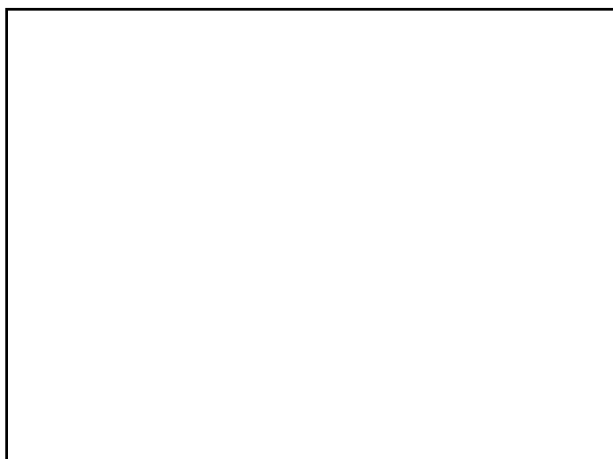
They fail to honour you."

But of a good leader, who talks little,

When his work is done, his aim fulfilled,

They will say, "We did this ourselves."

Lao Tzu describes the best PASS leaders



Question 6. [1:54]

Which of the following statements is/are FALSE?

- (a) An orbital can accommodate at most two electrons.
- (b) The spin quantum number of an electron must be either +1/2 or -1/2.
- (c) A 2p orbital is more penetrating than a 2s orbital.
- (d) According to the Aufbau principle, the 4s orbital is filled before the 4f orbital.
- (e) If both electrons in helium have the same spin then the atom must be in an excited state.

[ a ] [ b ] [ c ] [ d ] [ e ]  
(Select ALL false statements)

Marks:1.0

Question 7. [1:45]

Consider the first ionisation energy (IE) of the magnesium atom. Which of the following statements is/are FALSE? (Select ALL false statements).

- [ ] The IE of Mg is lower than that of neon.
- [ ] The IE of Mg is lower than that of calcium.
- [ ] The IE of Mg is lower than that of beryllium.
- [ ] The IE of Mg is lower than that of sodium.

Marks:1.0

802 Reading 11 [1:12]

Question 8. [1:12]

Click on an  $sp^2$  hybridised carbon atom in the following molecule.

CH3COOH

