The COMP1120 Experiment in ’Fast-track’ First Year CS Teaching

or

And then there were twelve.

Peter Strazdins,
Department of Computer Science,
Australian National University,

http://cs.anu.edu.au/~Peter.Strazdins/seminars/comp1120

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1 Talk Outline

• overview and objectives of COMP1120
• organisation of COMP1120 in 2003
• some details in running the course
• entry into COMP1120
• course results and their analysis
• strengths and weaknesses of the COMP1120 model
• suggestions for improvement
• other models for achieving the same objectives
• conclusions
2 Objectives and Overview of COMP1120

- we now have a diverse range of experience (and potential ability) in our 1st year CS intake, who do the following courses:
  1. COMP1100: Introduction to Programming and Algorithms
  2. COMP1110: Foundations of Software Engineering
- (anecdotally) the more experienced students:
  - got bored with the slow pace, esp. of COMP1100
  - often sidetracked tutors & intimidated less experienced students
  - a 2002 survey indicated about 50 COMP1100 students regarded themselves as ‘highly experienced’

idea: identify these and put them in a combined 1 semester course:
  - COMP1120: From Programming to Software Engineering

to solve these problems

- motivations include separating these students and giving them something more challenging (Honours potential?)
- see entry web page for elaboration
3 Organization of COMP1120

- COMP1120 incorporated the Curriculum Development Workshop 12/02 proposed changes to COMP1100 & COMP1110
- course divided into 3 sequential modules:
  1. IP: Introductory Programming (COMP1100), weeks 2–6, Richard Walker & Malcolm Newey
  2. DA: Data Structures and Algorithms (COMP1110), weeks 7–9, Peter Strazdins
  3. SE: Software Engineering (COMP1110), weeks 9–13, Carol Edmondson
- had 31 lectures and 12 2-hour combined tutorial/laboratories (tutor John Uhlmann)
- one assignment per module; DA & SE assignments based on a UBoat simulation theme:
  - high potential for illustrating OO concepts, highly challenging and fun!
4 Entry into COMP1120

- promotion (PEA day, O-week lect, COMP1100 lect 1 & 4)
  - with web page for more info
- weeks 0–1: prepare for application and entry Quiz
- Friday week 1: introductory lecture & Quiz (19 applicants)
  - had repechage Quiz in early week 2 (6 more applicants)
  - informed the 18 successful applicants by end of week 2
- week 7: notification of formal permission to enrol
  - based on IP module’s programming assignment (due mid week 6), and a 2 hour mid-semester exam (end week 6)
  - effectively withdraw from COMP1100 and enrol in COMP1120
  - ‘drop-back’: 4 candidates did not reach this stage; 2 then opted out
- week 11–12: ANU system actually accepted the enrolments!
- had considerable staff workload implications (lucky not > 50 applicants!)
5 Status of COMP1120 Materials and Workload Issues

- in principle, all materials already in those of COMP1100 and COMP1110
  - compression and re-organization factors however made preparation significant
  - COMP1110 materials: overly elaborate & have too many internal constraints; however excellently archived!
- sources for most lectures, and all other documents, similarly archived
- providing interesting/challenging practical work took considerable extra effort
  - chose UBoat simulation theme, used in sem. 1 2nd year, 1993–5
  - ‘port’ (of large complex system) from Modula-2 to Eiffel was no joke:
    - cumbersome for calculations, too strictly OO, some bits were beyond current DCS experience, no co-routine support
    - don’t anyone try to tell me that Eiffel has no gotchas!
    - old X-windows code is now broken; only partially fixed
- in general, a course with 2 courses material has more than one course’s workload
  (may be better 2nd time though...)
6 COMP1120 results

- **COMP1120 students:**

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- **drop-back COMP1100 / not offered COMP1120**

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- *all* were male!
7 Analysis of COMP1120 results

- **UAI**: quite a good predictor of final marks
- **Quiz**: week 1–2: predict final values in (tricky) SALTY code
  - tested narrow and specific skills; could be broadened
- **Programming Experience**: based on description + code samples (if any); subjective ratings $\leq 3$ often had voluminous but shallow code
- **‘1100’ result**: (week 6–7): based on 1st assignment & 2 hour exam
  - several students clearly had trouble with the fast pace
- could maybe have given another 4 offers (promising UAI)
- note that 1120 results and 1100 results are not directly comparable
  - many students lost marks in the SE exam questions
- **COMP1120 would have made an IT degree at ANU more attractive**: 
  - 0.52 (self), 0.73 (acquaintances), 1.43 (in general)
  - 2 = ‘strongly agree’, 1 = ‘weakly agree’, 0 = ‘neutral’
  - 1 student comments: “most of my friends went to UCan because [their degree] is more fast-track”
8 Strengths and weaknesses of the COMP1120 model

√ students got privileged, interesting tuition; high satisfaction ratings
  • Richard’s OO expertise, tutor & assignment theme got good raves!
√ assessment issues easier with a separate course
√ opportunities to pursue another course (BSEng students can do a proper major)
√/× easy drop-back into COMP1100
  × few enrolments despite efforts; possible reasons include:
    • looked too daunting, too fast-track;
      much risk and extra effort to get same marks; timetable clashes
  × high staff resources required
  × crossing enrolment boundaries proved to be a significant barrier . . .
    • also had problems in enrolling in COMP2600 in semester 2
  × no follow-up for the next 5 semesters . . .
9 Suggestions for Improvement

- entry into course: make more light-weight, ‘at-your-own-risk’
  - still have a (diversified SALTY Quiz, but use results in a more advisory way
- IP module too fast for some (esp. if no prior OO experience)
  - could be at a slightly slower pace, more emphasis on the basics
  - also could be more structured
- UBoat codes could have a better (more ’OO correct’) design
- find some way of emphasising the importance of SE
10 Alternative Models

- **0-unit crash-course in Programming in Eiffel (or current intro. language)**
  - √ less expensive; could be run in both semesters (facilitates mid-year entry, transfers from other unis)
  - × loses *more* EFTSUs; timescale would be very problematic

- **Advanced Stream in COMP1100/10 (and perhaps beyond)**
  - need not attend lectures if find boring
  - separate tutorials/labs: quickly get through basics, then do more advanced exercises / assignments
  - × still some extra effort, and some problems in equating assessment
  - √ more flexible, and more sustainable; more potential for follow-up
11 Conclusions

- despite the low enrolments, COMP1120 ran successfully
  - the team of 4 lecturers worked, but fewer maybe more efficient
  - most materials are well-developed
- are we getting any marketing advantages from COMP1120?
  - is there any real economic payoff for running it?
- should we continue to run it?
  - IMHO no: not cost-effective
    - feel unlikely that completions could get to 35–40: simply not attractive enough!
  - but if DCS insists, let me do it! (it was fun!)
    - and the UBoats are seaworthy for at least another year . . .
- if not, should we seek an alternate model?
  - feel the priority is to consolidate the mainstream (COMP1100/10) first
  Or consolidate our resources elsewhere?
- (sorry, this seminar has fewer than 16 slides . . .)