Increasing interest in cognitive psychology using scenario-based assessment

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Students often perceive cognitive psychology as an abstract and difficult subject with little intrinsic interest. When student feedback identified problems with the traditional essay assessment in a cognitive psychology module, action research led to the development of a forensic scenario-based assessment which successfully increased student interest in cognitive psychology. Reflections on the meaning of assessment led to a reframing of the purpose of the taught classes to serve the assignment, an approach favoured by students that staff had previously resisted. The focus shifted from delivery of content to facilitating students in the assignment work. The complexity and richness of the scenario guaranteed interesting class discussions, helped students practice applying their knowledge of psychology, and inspired students to explore the literature creatively. Observation and student feedback led to further refinements, eventually generating not just increased student enthusiasm but also a significant increase in performance.
Keywords: *Teaching cognitive psychology; scenario-based assessment.*

The context

IN THE 2009/10 academic year at the University of Sunderland, a post-92 university, students taking British Psychological Society (BPS) accredited degrees were required to take a 20-credit Level 5 undergraduate module in biological and cognitive psychology. For convenience from now on I will use the words 'the module' to refer only to the cognitive half of the module. The module had been running for some years in the same format, as a team-taught module divided into five blocks covering the core areas of attention, perception, memory, language and thinking. Lecturers delivered their own specialised areas, with several research-active staff in the team.

To achieve the learning outcomes of the module students were required to demonstrate knowledge and understanding of theory and method in a range of cognitive domains, to appraise the strengths and weaknesses of alternative explanations of behaviour and to employ evidence-based reasoning to evaluate theories. These learning outcomes were assessed through a coursework essay. A typical essay title was 'Examine the effects of anxiety on attention and consider whether they could be explained by Baddeley's model of working memory'.

The issues

Up until 2008/09 students had been given a choice of essays, with one title from each of the core areas. However, we found that most students would decide early on which essay topic to focus on, and would then only attend the associated teaching block. Staff were concerned that students were not, therefore, gaining a broad knowledge of cognitive psychology. To counteract the problem, in 2009/10 students were told that they would be given only two essay titles to choose from, which would not be revealed until near the end of the module. The essay titles could be taken from any of the five teaching blocks.

The outcome, in retrospect, seems obvious: students were resentful that they had to attend so many sessions of no use to the assessment. They complained that very little of the module was relevant for their essay, illustrating a mismatch between staff and student conceptions of 'relevance'. Staff had made careful decisions about what topics to include and regarded them all as highly relevant knowledge for students graduating with a BPS-accredited psychology degree, as well as being core aspects of human psychology. In contrast most students rated the content as relevant only if it was directly assessed.

Staff worried about how 'assessment-focused' the students were, seeming to show no interest in psychology beyond what they were to be assessed on (a common cry of teachers, noted Biggs & Tang, 2011, p.37). I too was baffled by students' unwillingness to engage or even attend sessions if they were not being assessed. I had started to accept that if there was some content we felt students 'ought' to know, or some class we deemed essential to attend, then we would have to assess it.

However, I was also becoming increasingly uncomfortable with our approach to assessment. By the time I was teaching my block on the module I already knew it was not being assessed, but I had to conceal this knowledge from the students. I found my own enthusiasm dampened, as I too experienced the feeling that my teaching was 'irrelevant'.

Students often perceive cognitive psychology as difficult, dry and abstract, even boring. All of us tried hard to bring the subject to life, however despite our efforts only a minority of students were attracted to cognitive psychology as a subject for further study, with around a fifth of the cohort opting for a final year option in cognitive psychology. As a supervisor of 'cognitive' final year projects I always had more places available than students wishing to study with me.

In early summer 2010, the module team discussed these issues and could find no immediate answer. Initial proposals to broaden the essay so that students would have to look across cognition as a whole were rejected on the grounds that they would only make the essay even more abstract and challenging for students. Some staff thought a solution was impossible.

The development process
I generated ideas by working through the areas of applied psychology students are most interested in, then using my knowledge of the literature in cognition to evaluate whether there would be sufficient connections to draw upon. I decided to ground the assignment in forensic psychology.

The format for the assignment was influenced by the fourth annual Project LeAP Summer Workshop on problem-based learning, which I had attended in 2006. Although I decided not to use a problem-based learning (PBL) approach, I was impressed by the idea of using concrete scenarios in which students were encouraged to approach the problem by assuming the roles of professionals. Moust, van Berkel and Schmidt (2005) argue that the benefits of PBL are sabotaged by omitting any of the essential elements, such as the small group sizes, or steps in the learning process. So it would be unlikely that using a concrete scenario alone would have the same effect as using PBL. However, there is an independent literature on the benefits of using realistic scenarios, or vignettes (e.g. Errington, 2011; Jeffries & Maeder, 2004 & 2005, 2006; Norton, 2004). One benefit is that scenarios can prepare students for employment by requiring them to consider how they can put their academic knowledge to practical use. Mair, Taylor and Hulme (2013) have emphasised the importance of developing such psychological literacy skills, so students can apply their knowledge of psychology within whatever work or personal situations they encounter.

The LeAP Summer Workshop on PBL had mainly focused on engineering and physics, as illustrated in Savin-Baden (2008), but I was struck by the description of the medical school at Manchester (O'Neill, Morris & Baxter, 2000) where PBL was used within a lecture and lab-based teaching environment. The lecture course and laboratory activities were designed to be relevant to the PBL case materials. This gave me a new model for assessment, one where the assignment task is the central defining focus of a module, with the taught classes designed to serve the assignment.

Biggs and Tang (2011) wrote that, 'From the teacher's perspective, summative assessment is at the end of the teaching-learning sequence of events, but from the student's perspective the assessment is at the beginning' (p.198). I had shifted to the student's

perspective. Instead of seeing the assessment of the module as a problem to solve, I began to see the assessment as a solution for the module, as the purpose which would drive decisions about content and delivery.

The design process

I planned that students would be presented with evidence from a criminal trial which would build up throughout the course of the module, filling out the story of an armed robbery and its aftermath. The students would take on the role of an expert witness in cognitive psychology. Students would be immersed in the task from the start, with each taught session providing further resources, ideas, or formative discussions with peers and tutors, to build up a rich understanding of the possibilities available to address the task.

I emphasised to the students how similar an expert witness report is to a scientific essay or experimental report, forms of assessment they were already familiar with. I explained that an expert witness does not have the same role as a lawyer. An expert witness for the defence has a duty to be scientific and objective, not to use persuasive rhetoric. I read to the students parts of Bond et al.'s (2007) guide for expert witnesses, including their suggestion that expert witnesses testify that: 'I understand my duty as an expert witness to the court to provide independent assistance by way of objective unbiased opinion in relation to matters within my expertise' (p.165). Another guide, Hall and Smith (2001), advises expert witnesses to 'provide cross references to […] any publishable material which supports the conclusions' (p.142). This allowed me to insist on the use of APA-style citations and references, while still maintaining the integrity of the scenario.

I believe that good teachers make use of their own individual quirks and skills to enhance their teaching (a view shared by others, see Kane, Sandretto & Heath, 2004, pp.299–300). I have one talent which I had never before applied to my teaching: my

experience as an amateur novelist. I set out to write a fictional case which would be as realistic as possible, so I carried out extensive research into the literature including transcripts of legal cases. Due to the amount of time it took to design the scenario, I was writing the evidence as the module progressed. It was a dynamic process of consultation with the module teaching team, such that they adjusted their teaching to orient towards the scenario, and I edited the evidence to incorporate their suggestions.

The assignment

The trigger for the scenario was a letter from a solicitor in London asking for help in preparing an appeal on behalf of her client (Pedro), who was serving a 20-year sentence for being an accomplice to armed robbery and murder. Pedro had been a ticket-seller at a cinema in 1998. He and four other cinema staff had been in the manager's office counting up the day's takings when a man with a gun burst in and demanded the money. During the process the robber shot the security guard dead. The police later uncovered evidence suggesting that Pedro had been the robber's accomplice. I explained that the solicitor wanted an expert witness to look at five sets of trial evidence, to see whether the police interpretation could be questioned, which might give Pedro grounds for appeal. For each of the five pieces of evidence, the solicitor posed a question, for example, 'How likely is it that the barmaid correctly identified the man she saw talking to the robber?'.

Rather than setting a single assignment, I split it into two half-length assignments, so that students would obtain feedback on this unfamiliar form of assessment before they started the second assignment. For the first assignment students chose whether to answer a question on attention or one on language, and for the second assignment they chose perception, memory or thinking. All the topics were interconnected, and each piece of evidence (outlined below) added more information to the case.

Attention: Pedro's initial description of the robber was so poor that the police believed it was an attempt to divert them to look for the wrong person. The solicitor asked whether Pedro's description could have been that of an innocent eyewitness. This evidence raised questions about the limits of attention, about top-down and bottom-up influences, effects of anxiety, threat and novelty, and the relationship between attention and memory.

Language: Students were presented with a series of text messages in scrambled order. They were told that the messages were retrieved from a mobile phone that the robber had attempted to destroy, but that the timestamp and sender information were missing. I derived this idea from a case investigated by the forensic linguist Olsson (2008). Students worked in groups to decide on a plausible ordering, which they had to justify in the assignment using the psycholinguistic literature on structuring of discourse, use of anaphora, idiolect and adjacency pairs. The text messages clearly implied that the robber had an accomplice among the cinema staff.

Perception: Students were told that a barmaid had seen a man talking to the robber in a pub a few days before the robbery. The police thought her description of this man matched Pedro, and showed her photographs from which she selected Pedro's. She also subsequently picked him out in an identity parade. The question was whether she could have been mistaken in her identification. There were many flaws inserted into this set of evidence, so students could choose which they thought were most significant. To answer the question students were guided to literature on face recognition and identification procedures.

Memory: The solicitor asked students to look at police interviews with the four eyewitnesses, to see if they resembled true memories or showed any evidence of deception. Students were introduced to literature

on autobiographical memory, lie-detection, and reality-monitoring. The extract below, from the interview of the assistant cinema manager, shows the rich and ambiguous nature of the evidence.

> I was customer services manager in Woollies for a while, and we did have some training. Try to burn his image into my brain. Which was going great until he turned and caught me staring. And there I was lying on the floor and him pointing a gun at me. Then it was like… well like it was happening to someone else. Bill jumped him and tried to grab the gun and it was Bill took the shot. They fell against the table which toppled the piles of coins and they came crashing down and I was screwing my eyes up and there was this last one which was just spinning around, it seemed to last hours. Now I only have to hear coins falling and bam, my heart is going 19 to the dozen and I'm breaking into a sweat, it's that shock again. He just jabbed the barrel into Bill and…. I can't think about it, oh man.

This witness tends to report the scene from an observer perspective. Students could use the lie-detection literature to argue that this is a type of distancing or lack of immediacy associated with deception. However, students could show critical thinking by pointing out that observer-perspective is also found in traumatic memory, and that there is some evidence of post-traumatic stress in this account. Alternatively they could point out that the account contains the vivid sensory details typical of autobiographical memory, or they could focus on the small effect sizes found in the deception literature. All these possibilities and more were found in the actual student work, with students differing greatly in their attention to detail and in how many interpretations they considered.

Thinking: This topic was set within the context of rationality and decision-making. The evidence was a series of interviews in which the police questioned Pedro about his movements on the evening that the barmaid

thought she saw him talking to the robber. Pedro denies having met the robber, but claims he suffers from alcoholic blackouts and eventually signs a confession, which he retracts a week later. Students were asked to explore the literature on false confessions and were encouraged to consider biases which might elicit confessions, such as temporal discounting and confirmation bias on the part of the police.

Implementation
Lectures were largely unaltered, as students still needed to be introduced to the five areas of cognition and the lectures would provide the theoretical background which students would draw upon for their assignment. I re-designed almost all the seminars. Each of the five topics had two associated seminars. In the first seminar students undertook activities which consolidated the topic or introduced relevant forensic areas (e.g. weapon focus, false confessions). In the second seminar a group of students delivered a presentation suggesting how they would apply the topic to the assignment scenario, which led to discussion and formative feedback from the tutor.

Evaluation of the assignment
The scenario was very well received: students even debated on Facebook whether Pedro was innocent or guilty. About twice as many students chose a final year option in cognitive psychology, and all my places as a project supervisor were filled for the first time in 18 years.

The success of the assignment was evaluated by looking at student performance and student feedback (both quantitative and qualitative) compared with the previous year. Disappointingly, there was no improvement in student performance, $t(215)=0.94$, $p=.350$, $d=.13$. However, there were striking improvements in student feedback on the module. Nearly all ratings on the module improved, for example, the number of students who felt they had a reasonable grasp of the module topics rose from 70 per cent to 85 per cent. Seventy-five per cent of students felt that there were sufficient opportunities for formative assessment, up from 40 per cent. However, the percentage of students who felt that the assessment task was clear dropped from 85 per cent to 79 per cent, and there was also a slight drop in ratings on the clarity of assessment criteria. The main comment from students was that they would have liked more guidance on the assignment.

The overall impression was that the students enjoyed the scenario and felt that it was relevant, but had not entirely understood what I wanted them to do in the write-up. This corresponded with the impression from the marking: many students had described theory and empirical work, and had also attempted to interpret the evidence to answer the solicitor's question, but there was no real link between the two. This was clearly a challenging task for them, perhaps more than they realised.

Iterations
In the 2011/12 academic year I included more explicit written guidelines and more formative work in seminars.

Feedback ratings improved even more, but there was a negligible improvement in performance from the previous year (less than two per cent), $t(196.31)=2.29$, $p=.023$, $d=.31$, which was not significantly different from performance in 2009/10, before the scenario was introduced, $t(208.75)=1.28$, $p=.203$, $d=.17$. This time the main student complaint was that the group presentation work was stressful. We observed that groups often arrived poorly prepared, or some members simply did not attend.

In 2012/13 a new seminar tutor joined the module team, who was very enthusiastic about the assignment. We redesigned the seminars so that they were tutor-led and students could prepare for them with individual study. Group work activities took place within the scheduled classes. Student feedback was very good, with student representatives commending the assessment.

In 2013/14 we made a change to the assessment. We had noticed that some students appeared to be strategically attending, perhaps because they knew they only had to write up two of the five topics, and as a result they had an incomplete understanding of the scenario. We decided to set a single assignment at the end of the module with a 2000 word limit. The task was for students to advise the solicitor which evidence would provide the best grounds for appeal.

Performance was significantly better on the single assignment than it had been on the split version, as shown by the final analysis in the next section. The students showed imaginative critical thinking, synthesis of large amounts of primary-source literature, good understanding of cognitive psychology and ability to apply it very well in a forensic context. These students had flourished.

Final evaluation

This section provides an overview of the findings from the quantitative measures of student feedback and performance. To compare student feedback across years, I calculated a mean rating from 12 of the 17 questions on the module feedback questionnaire, covering teaching, learning and assessment. Three questions (on quality of feedback on assessment and tutor approachability) were excluded because I felt that they were unrelated to the type of assessment. One question was excluded due to missing data for one year. I also excluded a question on how well students could spread the workload because I thought it might say more about the spacing of assignments than about their content. Combining ratings for the 12 remaining questions gave a very rough idea of how 'positive' students were about the module. The ratings from the biological half of the full module are used as

Figure 1: Mean student ratings of the cognitive and biological components.
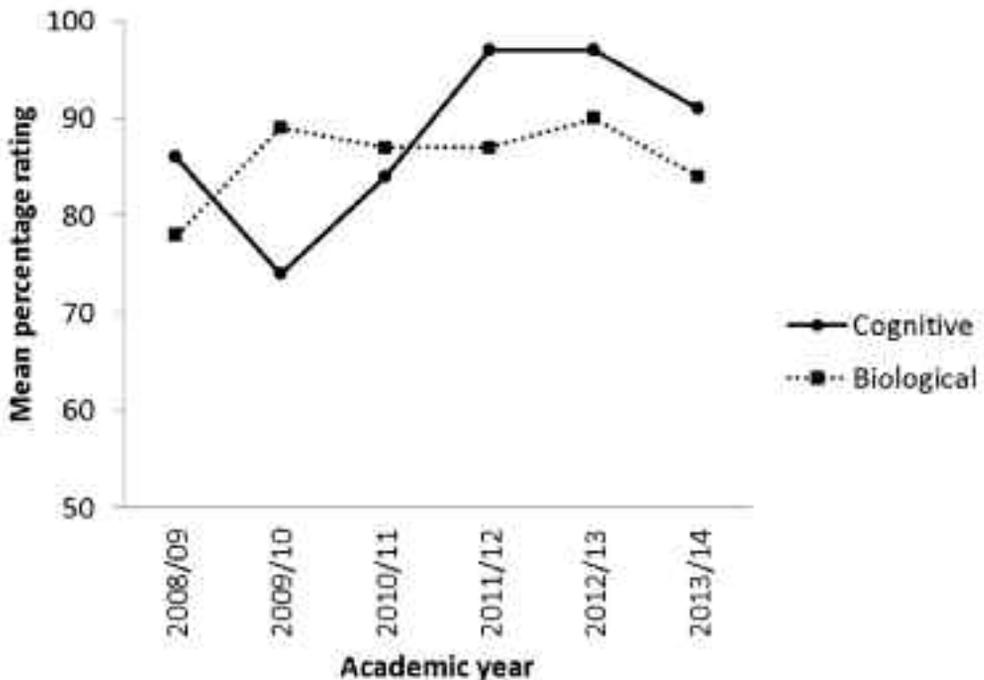
a comparison, as the content area is comparably difficult for students. Figure 1 shows how the ratings for the two subjects have fluctuated over the years. The rating represents the mean percentage of students who gave positive ratings across each criterion.

The scenario was introduced in the 2010/11 academic year. Figure 1 reveals that in the wider timescale, the increase in ratings the year the scenario was introduced actually only served to return ratings to their 2008/09 levels, and the actual gain was only made in 2011/12, after more guidance had been introduced. The lower ratings on the biological content in 2008/09 are probably because it was assessed by an exam: since 2009/10 it has been assessed by a coursework essay.

To calculate student performance, the mean mark for the biological psychology essay was compared with the mean mark on the cognitive half of the module (in the first three years of the scenario the cognitive

mark was the mean of the two half-size assignments). Students who obtained zero (usually a non-submission) in any unit of assessment were not included. The total numbers of included and excluded students can be seen in Table 1 (overleaf). In most years the cognitive half of the module ran after the biological half, which is why non-submissions were higher, as cumulatively more students had dropped out.

Figure 2 shows student performance across the timescale of the study, with marks from 50 to 59 per cent representing lower second class attainment.

Analysis of variance was carried out but due to violations of the assumption of homogeneity of variance, results must be interpreted cautiously. The interaction between subject and year was significant, $F(5,647)=7.73$, $p<.001$, $\eta_p^2=.056$. Tests of simple effects using the Bonferroni correction showed that in 2013/14 the cognitive

Figure 2. Mean student performance on the cognitive and biological components.
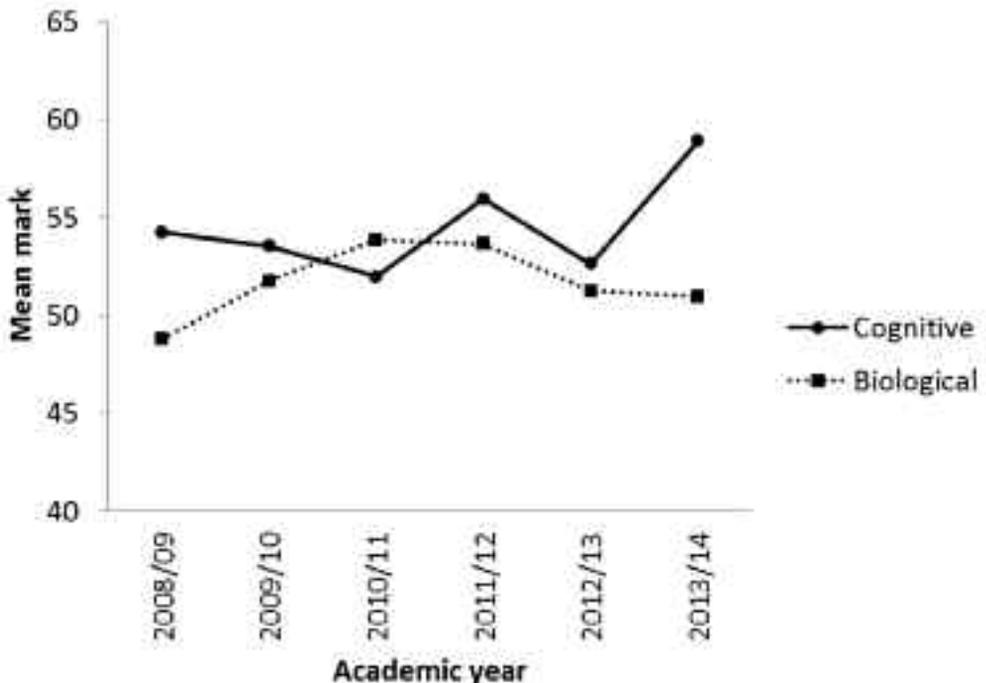
Table 1: Number of students included in performance data analysis, by year.

Academic year	Total students on module	Number of students included in analysis	Number of students excluded		
			Non-submission in both areas	Non-submission biological	Non-submission cognitive
2008/09	109	85	8	5	11
2009/10	146	112	20	8	6
2010/11	120	105	8	6	2
2011/12	115	107	1	0	7
2012/13	175	154	12	0	9
2013/14	113	90	14	1	8

Note that four students across the years have been categorised as 'non-submissions' who submitted work marked at zero for reasons such as plagiarism or submitting the wrong assignment. Some of those recorded as non-submissions for the cognitive assignment submitted one of the two assignments but not the other. The figures for non-submission vary from year to year partly due to varying practices on recording data from students who withdrew.

assignment resulted in significantly higher marks than in the previous year, an increase of over six per cent ($p<.001$, $d=0.55$), and also significantly higher marks than in 2008/09 ($p=.009$, $d=0.40$). In 2013/14 students also obtained significantly higher marks (by eight per cent) on the cognitive assignment than they did on the biological essay ($p<.001$, $d=0.72$).

Reflections

Implementing the scenario generated many surprises. The first surprise was that some students believed the scenario was real, so we had to emphasise its fictional nature. It was the first time I had put so much of myself into an assignment, which made me feel a little vulnerable. But learning is all about taking risks and being creative, and I was very happy to see the students showing the same characteristics in their assignment answers. The module team were careful to align the teaching and assessment, yet the exact alignment was actually left for the students to create for themselves. While we encouraged students to find some of the connections we saw, many students ingeniously found links that I had not made myself. This is the advantage of using a realistic, ambiguous and open scenario.

Kane, Sandretto and Heath (2004) advise inexperienced lecturers to 'try and be yourself… you've got to teach it your way and there are lots of different ways' (p.304). Likewise for students I encouraged them to be themselves and emphasised that there were many ways to answer the assignment. I found it hard as a storyteller not to give them closure by telling them if Pedro was guilty or innocent, but I wanted it to resemble real life, where the truth can only be guessed at, and I did not want to give the impression there was a 'right answer'. Some students found this frustrating, as they wanted to 'solve' the crime.

I was also surprised that ever since I introduced the scenario, I have been oversubscribed for project students. It is as if the assignment produces a halo effect which not only produces more positive ratings of the teaching and the topics, but also of the teacher. I am perceived differently as a person because students enjoyed the module.

Another surprise was that the popularity of the assignment did not immediately cause an improvement in performance. Deci et al. (1991) argued that to support intrinsic motivation students need a feeling of competence and control, which may have been

impaired by their lack of experience with the format and the constraints of the word count.

I was also surprised that using one long assignment rather than two short ones had such a positive effect on performance. This may have been due to the greater freedom it offered students. However, another hypothesis is that dividing the assignment into two short halves devalued it for students, such that they put more effort into full-size assignments on other modules. Wormald et al. (2009) and Cohall and Skeete (2014) found that when assessment weightings in a module are changed, performance on newly higher-weighted assessments is higher and performance on lower-weighted assessments is lower. It makes strategic sense that students would apportion their effort more to assessments with a higher weighting (those worth 50 per cent of a module rather than 25 per cent of a module, for example), and it is also possible that the weighting of an assessment affects perception of its value.

This action research has not only changed the student experience, but it has also changed me. I used to believe that I chose interesting and intellectually challenging essay titles which would lead students to experience the excitement of recent research in my topic area. I was deluded. I was projecting my own interests onto students. It led me to devise assessments of the type Biggs and Tang (2011) called 'decontextualised', those which assess declarative knowledge but are not related to a real life context.

I believe that it is a priority to find assignments which are intrinsically interesting to as many students as possible, which means choosing an assignment with value for them. This also usually means giving them freedom, within clearly defined bounds which give them enough direction to set their own goals to reach the learning outcomes. Students can be inspired by the module content, or by the teaching, but most powerful is to inspire them with the assessment, where the concentration of effort gives such potential for deep learning.

Looking back I can see that I have progressed through a series of different views. I began with the view that 'students shouldn't be so assessment-focused', which I attempted to correct by trying to convey my own views to them. Then I came to accept that 'students are assessment focused so we have to design that in'. Recently I have shifted to a 'systems' view, where I think 'of course students are assessment focused – it is the rational outcome of the system they exist in' and indeed that this is the way it should be, that assessment is the vision of what we want them to achieve, the representation of what we value, the embodiment of the learning outcomes. Assessment is the starting point for motivation.

Acknowledgements

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