Can Multiple Choice Exams Be Used to Assess Legal Reasoning? An Empirical Study of Law Student Performance and Attitudes

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CAN MULTIPLE CHOICE EXAMS BE USED TO ASSESS LEGAL REASONING? AN EMPIRICAL STUDY OF LAW STUDENT PERFORMANCE AND ATTITUDES

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I   INTRODUCTION

Legal reasoning is a valuable skill that all law students must master. Given the importance of legal reasoning to law students and legal practitioners, educators should be interested in how legal reasoning is assessed. The purpose of this article is to examine whether legal reasoning skills can be appropriately assessed using multiple-choice question assessment.

This article builds on the existing literature about the appropriateness of multiple-choice assessment to measure information recall at university generally,[1] and at law school in particular.[2] The authors question whether legal reasoning is amenable to summative assessment through multiple-choice questions, noting that this mode of assessment is used more frequently in other jurisdictions (particularly

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[1]   See generally Edwina Higgins and Laura Tatham, 'Exploring the Potential of Multiple-Choice Questions in Assessment' (2003) 2(1) *Learning and Teaching in Action* 1-12.

[2]   Vicki Huang, 'An Australian Study Comparing the Use of Multiple-Choice Questionnaires with Assignments as Interim, Summative Law School Assessment' (2017) 42(4) *Assessment & Evaluation in Higher Education* 580; Erik Driessen, Cees Van Der Vleuten and Henk Van Berkel, 'Beyond the Multiple-Choice v. Essay Questions Controversy: Combing the Best of Both Worlds' (1999) 33(2) *The Law Teacher* 159; Eileen Fry, Jenny Crewe and Richard Wakeford, 'Using Multiple Choice Questions to Examine the Content of the Qualifying Law Degree Accurately and Reliably: The Experience of the Qualified Lawyers Transfer Scheme' (2013) 47(2) *The Law Teacher* 234; Felicity Deane and Danielle Bozin, 'Using Guiding Principles to Construct Effective Multiple Choice Exams to Assess Legal Reasoning General Issue' (2016) 26(1) *Legal Education Review* 1; Greg Allen, 'The Use of Multiple-Choice Questions as a Form of Formative Assessment on an Undergraduate Law Module' (2008) 42(2) *The Law Teacher* 180; Susan M Case and Beth E Donahue, 'Developing High-Quality Multiple-Choice Questions for Assessment in Legal Education Assessments in Legal Education' (2008) 58(3) *Journal of Legal Education* 372.

US law schools) compared to Australian law schools. A case study of a unit called Regulation of Business, within the Queensland University of Technology undergraduate law degree, is used to examine whether the incorporation of multiple-choice exam questions into the assessment regime of a law school unit is beneficial, when questions are carefully drafted in accordance with guiding principles so that they assess legal reasoning ability.[3]

To determine whether multiple-choice questions are an appropriate addition to the assessment tools available to assess law students, three questions were considered. First, will multiple-choice questions and problem-solving questions that test equivalent subject matter and legal reasoning abilities lead to the same or similar results for students? To answer this question, the authors ran a bivariate Pearson's correlation to assess the relationship between scores on the problem-solving questions and the multiple-choice questions in the unit's final exam. The purpose of running a bivariate correlation was exploratory. Given that the skill of legal reasoning was being assessed using equivalent legal subject matter, the authors predicted a positive correlation between results on the multiple-choice questions and the problem-solving questions. The authors were less sure about the strength of that correlation, and that is consequential because the correlation strength between the results can provide guidance as to whether legal reasoning can sensibly be assessed through multiple-choice questions.

To explain further, if there is a very strong correlation (and subsequent strong coefficient of determination) between the results, this would suggest that multiple-choice questions can be used to assess legal reasoning skills (and differentiate student performance) in a similar fashion to problem solving questions. The high correlation may also suggest some redundancy in using both assessment formats to test the same skill, so a legal academic might choose to assess legal reasoning through problem-solving questions, or multiple-choice questions, but not both. Conversely, if there is no correlation (or very low correlation) between the results, this might suggest that either (1) multiple-choice question assessment of legal reasoning skills is not an appropriate proxy for assessing legal reasoning through problem-solving, or (2) there is a problem with the way the multiple-choice questions are authored, so that they are not actually assessing legal reasoning.

The middle ground may be that a moderate to strong magnitude of correlation suggests that multiple-choice questions can assess legal reasoning skills, but that reasons exist as to why multiple-choice assessment does not produce highly similar results to problem-solving questions assessing legal reasoning. The authors' intuitive sense was

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[3]   Ethical clearance for the study was obtained from the Queensland University of Technology Human Research Ethics Committee. The study complied with State, national and international guidelines, regulations and legislation concerning the ethical conduct of research involving students. Project title 'Examining the utility of multiple-choice question exams and workshop activities to assess and teaching legal reasoning skills'. Ethics number: 1600000842. The case study's research participants were students enrolled in the law elective unit Regulation of Business in semester 2, 2016. There were 539 students enrolled in the unit.

that these reasons for difference may provide a justification for why multiple-choice assessment, and problem-solving assessment focussed on legal reasoning, could be complimentary modes of assessment within the same unit. The benefits of this complimentary scheme of assessment will be discussed later in this article.

The second question the authors considered was whether students believe that multiple-choice questions provide benefits when they are used as summative assessment. Student opinions of assessment legitimacy can be important drivers of learning outcomes,[4] and, therefore, this information is crucial in designing effective assessment. Law student views on summative multiple-choice assessment were gathered using an anonymous online questionnaire with the option of a follow-up semi-structured interview. The third question the authors asked was whether unit coordinators consider that incorporating multiple-choice exam questions into the suite of assessment tools available to law teachers provides benefits when they are drafted in accordance with guiding principles. The unit coordinators documented their reflections on the efficacy of multiple-choice questions, informed by peer review.

Despite the potential benefits that multiple-choice questions could provide if they can assess legal reasoning, currently, their use in Australian law degrees is minimal. This article contributes new ideas towards the design and implementation of assessment for large student cohorts in the law discipline. This article suggests that multiple-choice questions, when properly constructed using identified guiding principles, are an *efficient* and *effective* way to assess legal reasoning abilities. The qualification to this statement is that multiple-choice questions assessing legal reasoning must act as a compliment, and not a replacement, for other unit assessment involving legal reasoning in extended written form.[5]

The authors consider an assessment item to be *efficient* when the authorship, moderation and feedback related to that assessment is connected to unit learning outcomes, and free from unnecessary duplicity or wasted effort. Multiple-choice assessment can be *effective* where the considered authorship of questions and answers lead to a testing vehicle that: is valid and reliable; is differentiated from other types of assessment; motivates and rewards student learning; is perceived as fair by students; and is considered intellectually rigorous by unit coordinators and academic moderators/peer reviewers. Incorporating multiple-choice questions into the suite of assessment tools available to law teachers can facilitate a more balanced approach to assessing law students' skills and knowledge. The more detailed application of legal reasoning skills to a problem scenario can be

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[4]   Katrien Struyven, Filip Dochy and Steven Janssens, 'Students' Perceptions About Evaluation and Assessment in Higher Education: A Review' (2005) 30(4) *Assessment & Evaluation in Higher Education* 325.

[5]   Moragh Paxton, 'A Linguistic Perspective on Multiple Choice Questioning' (2000) 25(2) *Assessment & Evaluation in Higher Education* 109, 113.

complimented with multiple-choice questions that assess legal reasoning skills across a broader doctrinal coverage of the course.[6]

II   BACKGROUND AND CONTEXT

A   *Case Study*

The study was an initiative arising from the authors' development of a new law elective unit, Regulation of Business, offered within the Queensland University of Technology law degree. Five hundred and fifty-three students were enrolled in the unit's first offering in 2015. Students generally undertake this unit in their first year of study if they are undertaking a straight law degree (i.e. an LLB), or their second year if they are undertaking a double degree (i.e. they combine an LLB with a degree in another discipline). Most students enrolled in the unit are recent high school graduates. Regulation of Business provides students who have an interest in commercial law with the opportunity to complete an introductory elective prior to undertaking one of the foundational courses in the law degree, Corporate Law.[7]

There were three items of assessment in the unit: a critical essay (worth 20% of the marks for the semester), a mid-semester online quiz (worth 20% of the marks for the semester) and an end-of-semester exam (worth 60% of the marks for the semester). Three assessment items were selected to allow students to demonstrate their existing skills initially in the semester, and to utilise newly developed skills in the later assessment items. This scaffolding strategy can improve student performance and retention.[8]

The case study focused on the final exam because it included a combination of multiple-choice and problem-solving questions. The final exam included 20 multiple-choice questions and 8 problem solving questions. There were no marks deducted for incorrect responses. Students were given 2 hours and 10 minutes to complete the exam with a 30-minute perusal period. All students were required to sit the exam in an invigilated, open-book environment. The multiple-choice questions were positioned first in the exam paper, but there was no expectation that these would be completed first. Because the exam was open-book, it was likely the students completed the multiple-choice questions and the problem-solving question on the same topic at the same time, rather than completing all 20 multiple-choice questions at once.

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[6]   Herbert T Krimmel, 'Dear Professor: Why Do I Ace Essay Exams but Bomb Multiple Choice Ones' (2014) 63(3) *Journal of Legal Education* 431, 431.

[7]   A set of core subjects that cover the compulsory areas of knowledge for admission to legal practice in Australia, known as 'the Priestley 11'; Donna Cooper et al, 'The Emergence of the JD in the Australian Legal Education Marketplace and Its Impact on Academic Standards' (2011) 21(1) *Legal Education Review* 23.

[8]   Cassandra Star and Jacquelin McDonald, 'Embedding Successful Pedagogical Practices: Assessment Strategies for a Large, Diverse, First Year Student Cohort' (2007) 3(2) *International Journal of Pedagogies & Learning* 18.

A combination of problem-solving and multiple-choice questions was used for three reasons. First, the inclusion of multiple-choice questions enabled the marking allocation assigned to the large cohort unit to be satisfied. Using multiple-choice questions reduced the marking time for the quiz and exam, which enabled us to assign additional marking time to the critical essay. Comprehensive feedback on written communication early in the semester is a vital component of students' learning as it helps establish expectations and foster greater understanding of performance and progress.[9]

Second, given that multiple-choice questions test students' comprehension but not the discipline-specific skill of legal writing, the unit coordinators felt that these questions gave a balanced approach to the assessment. It is widely accepted that legal writing must be taught within the degree curriculum,[10] and first year students have not had adequate time to develop disciplinary styles and norms associated with legal writing. The unit's critical essay and its preparatory workshop were designed to develop their fledgling legal writing skills. The time saved by not having to manually mark multiple-choice exams, allowed for a greater focus on mentoring and feedback related to student writing and communication skills on other assessment items.

Third, adopting multiple-choice questions for at least a portion of students' assessment minimised claims of bias or inequality in marking. Anecdotally, the authors have observed diversity in marking averages when multiple academic staff complete a marking allocation. For cohorts exceeding 200 students, marking requirements are often met by four or more academics and despite quality control measures, some personal bias almost always exist;[11] idiosyncratic marking styles are inevitable. Myyry et al. have investigated teachers' emotions associated with assessing student performance. [12] They found that assessors showed compassion when talking about assessment in interviews and that compassion could be triggered by views about the validity of assessment and whether the assessment accounted for different life situations. These emotions trigger personal judgements that influence how a marker applies marking criteria. Multiple-choice removes subjectivity in the marking process.

Stage One of the case study required application of established principles for designing effective multiple-choice questions for the law discipline specifically, and identifying guiding principles for writing

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[9]   Rachael Field and Sally Kift, 'Addressing the High Levels of Psychological Distress in Law Students through Intentional Assessment and Feedback Design in the First Year Law Curriculum' (2010) 1(1) *The International Journal of the First Year in Higher Education* 65, 66.

[10]   Jennifer Jaff, 'Frame-Shifting: An Empowering Methodology for Teaching and Learning Legal Reasoning' (1986) 36(2) *Journal of Legal Education* 249.

[11]   Pinchas Tamir, 'Multiple Choice Items: How to Gain the Most Out of Them' (1991) 19(4) *Biochemical Education* 188; Magnus Bygren, 'Biased Grades? Changes in Grading After a Blinding of Examinations Reform' (2020) 45(2) *Assessment & Evaluation in Higher Education* 292.

[12]   Liisa Myyry et al, 'Experienced Academics' Emotions Related to Assessment' (2020) 45(1) *Assessment & Evaluation in Higher Education* 1.

multiple-choice questions that assess legal reasoning. [13] These principles are discussed in detail in the next section. The authors developed these principles after an extensive literature review[14] and they were subsequently supported by peer review. These principles move beyond a focus on drafting traditional multiple-choice questions that simply assess students' abilities to remember and comprehend.[15] Instead, when these principles are strictly adhered to, they may be used to draft multiple-choice questions that assess the higher-order skill of identifying and articulating legal issues and applying the core skill of legal reasoning. These drafting principles recognise that legal reasoning requires recall of a legal rule, application of the rule to a given set of facts, [16] consideration of exceptions to the rule, and drawing a conclusion. The guiding principles were used for drafting the multiple-choice questions for the quiz and exam in the unit Regulation of Business.

Following the design of these principles, quantitative analysis of students' end-of-semester exam results was undertaken to determine whether summative results on the multiple-choice component of the final exam were related to results on the problem-solving component. The focus of this article is to report on these findings. Ethical clearance for the study was obtained from the Queensland University of Technology Human Research Ethics Committee. The study complied with state, national and international guidelines, regulations and legislation concerning the ethical conduct of research involving students.

The unit's two designers and Unit Coordinators (full-time academics who teach the unit) collaborated to write both the multiple-choice questions and problem-based questions. The design of the exam meant a cluster of multiple-choice questions were effectively assessing the same content as a problem-based question. Care was taken to ensure that the comparable multiple-choice and problem-solving questions were of equivalent difficulty. To provide an example of how this was achieved, when assessing students' understanding of the legal characteristics of two business entities (partnerships and joint ventures), they were asked to respond to several multiple-choice questions and one corresponding problem-solving question, requiring application of the legal principles about the legal characteristics of both types of business entity to a factual scenario. As such, students were required to engage in the same legal reasoning process to reach a conclusion for each question presented in a different format.[17] Examples of questions can be found in Appendix A.

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[13]   Deane and Bozin (n 2).
[14]   See generally Eileen Fry, Jenny Crewe and Richard Wakeford (n 2), Greg Allen (n 2), and Susan Case and Beth Donahue (n 2).
[15]   Deane and Bozin (n 2).
[16]   Edwin Scott Fruehwald, *Think Like a Lawyer: Legal Reasoning for Law Students and Business Professionals* (American Bar Association, 2013) 49.
[17]   Note that, although the legal principles assessed were the same, the factual scenario differed between the multiple-choice question and problem-solving question assessing the same content. Also, the sequence in which students completed

If student results on both parts of the exam were strongly positively correlated, that might suggest that the multiple-choice questions were redundant in assessing and discriminating between student legal reasoning ability.[18] If there was no correlation between results on the different type of questions, this would raise more complex questions about the discrepancy of results based on testing of the same subject matter.

The authors also elicited student views about both the mid-semester quiz and end-of-semester exam through a questionnaire. This was done to investigate student perceptions about the use of multiple-choice questions in the unit, on topics such as difficulty level, fairness in assessment, and achievement of learning outcomes. Three students agreed to sit a semi-structured interview after completing the questionnaire. Student perceptions of assessment can drive learning outcomes,[19] and, therefore, this part of the study was crucial to determine whether multiple-choice questions provide benefits as an adjunct to more traditional forms of assessment in the undergraduate law degree.

B   *Guiding Principles for Designing Effective Multiple-Choice Questions That Assess Legal Reasoning*

The development of the principles that the authors propose draw upon pedagogical principles of assessment design and the skills associated with legal reasoning. The authors suggest that when multiple-choice questions are drafted using these guiding principles, they can effectively assess legal reasoning abilities,[20] rather than simply assessing a students' ability to recall information.[21] These principles were applied when drafting the multiple-choice questions for both the mid-semester quiz and end-of-semester exam in Regulation of Business. These principles were conceptualised with the view to move beyond a focus on drafting multiple-choice questions that only assess students' abilities to remember and comprehend.[22] Not all multiple-choice questions are going to provide the same utility in terms of testing. Regardless of the discipline in which they are employed, it is important that multiple-choice questions are drafted using well-defined guidelines or principles such as those conceptualised here. Poor drafting can mean students are inherently disadvantaged, which can have

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questions was randomised. If a student completed the multiple-choice question first, then, in theory at least, they may find the problem-solving question easier if completed second as they had already been exposed to engaging in legal reasoning about the applicable legal principle. Randomisation minimised the risk of this occurring.

[18]   Krimmel (n 6) 440.

[19]   Struyven, Dochy and Janssens (n 4).

[20]   Deane and Bozin (n 2).

[21]   Julie E Yonker, 'The Relationship of Deep and Surface Study Approaches on Factual and Applied Test-Bank Multiple-Choice Question Performance' (2011) 36(6) *Assessment & Evaluation in Higher Education* 673.

[22]   Deane and Bozin (n 2).

negative impacts on results, regardless of student knowledge and ability.[23]

The authors' reflections have taken place over several years since the commencement of the study. This has included meetings between the authors on a regular basis where the results from final exams have been analysed, and discrepancies between student results on the multiple-choice questions versus problem-solving questions noted. A peer review process took place through two feedback sessions. The first, at an interdisciplinary Higher Education Research Network Conference where the principles for drafting multiple-choice exam questions were presented. The methodology for the empirical research was also discussed at the conference, and feedback sought. In a second peer review session, the principles for drafting multiple-choice exam questions were presented to a group of Law School colleagues. The feedback received from the peer reviews was incorporated into the design principles.

The following are guiding principles for writing effective multiple-choice questions that specifically assess legal reasoning skills.[24] First, the questions must reflect an appropriate balance between difficulty and fairness. The difficulty of a given question enables discrimination between students who have engaged with and understood the subject matter and legal principles and those who have not. Fairness is also important to ensure the exam requirements are achievable within the exam working time,[25] whilst maintaining the required difficulty.[26] Fairness is promoted where students feel they get equal opportunity to demonstrate their competences.[27] Thus, multiple-choice questions must be based on information that has been widely disseminated, and the students will also have sufficient time to read and respond to the questions as posed.

The remaining principles first require that an author of a multiple-choice question understands the importance of considering the two components of any multiple-choice question: the stem (or the question) and the alternative answers. Each component should be drafted in accordance with the guiding principles. The stem must be focused and contain all the relevant information for students to be able to engage in legal reasoning to address each of the options provided and choose the most appropriate answer.[28] Stems are usually in one of two formats: a full sentence question or a phrase that requires sentence completion.

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[23] Krimmel (n 6) 433 notes that student performance can be impacted by the validity of the testing vehicle.

[24] Deane and Bozin (n 2).

[25] Maria Assunção Flores et al, 'Perceptions of Effectiveness, Fairness and Feedback of Assessment Methods: A Study in Higher Education' (2015) 40(9) *Studies in Higher Education* 1523.

[26] Janet W Fisher, 'Multiple-Choice: Choosing the Best Options for More Effective and Less Frustrating Law School Testing' (2008) 37(1) *Capital University Law Review* 119, 125.

[27] Liesbeth Baartman, Judith Gulikers and Asha Dijkstra, 'Factors Influencing Assessment Quality in Higher Vocational Education' (2013) 38(8) *Assessment & Evaluation in Higher Education* 978, 988.

[28] Fisher (n 26) 128.

However, some evidence suggests that the sentence-completion method is more difficult to understand, thus, sometimes resulting in an error even when the student has the requisite knowledge and reasoning abilities.[29] For similar reasons, the stem should not be negatively stated unless there is a significant reason for this. Negative wording has been shown to increase strain on student short-term memory.[30]

There are fewer constraints in the development of good alternative answers, although answer construction is every bit as important as that of the stem. Implausible answers should be avoided, in order to eliminate the likelihood of success where students use a random selection method. This ensures students' legal reasoning ability is measured at a complex level so that this assessment format appropriately measures both the school-based graduate learning outcomes and the applicable Threshold Learning Outcome (TLO).[31] Given this, there should also always be one most correct answer, or best practice response, however, all the alternatives should ideally have a degree of similarity so that any students who attempt to guess will have a more difficult task.[32]

The above principles can be applied to multiple-choice questions in a general sense. However, the authors suggest that it is important to tailor these principles to multiple-choice questions with the purpose in mind. Here, the purpose is to assess legal reasoning skills, which requires students: to recall a legal rule; apply the rule to a given set of facts;[33] consider if an exception to the rule applies; and, finally, form a conclusion. As such, robust multiple-choice questions drafted to assess the skill of legal reasoning should include:

- Stem - A meaningful stem that ideally includes a factual situation (scenario) that is analogous to either a known case or invokes the need for a rule or legislative requirement to be applied.
- Stem - The factual scenario should be complex enough to incorporate the possibility of an exception to the rule or require sufficient knowledge of the rule so that more than information recall is required (this is particularly important for open book exams).
- Answers - An answer that requires that a legal rule be applied, which hasn't been provided in the question, so that students must demonstrate their ability to identify which rule is applicable as part of the legal reasoning process. This means that if a student employs legal reasoning and is able to identify

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[29] Ibid.
[30] Tamir (n 11) 191.
[31] Australian Qualifications Framework Council, *Australian Qualifications Framework 2nd Edition January 2013* (Publication, January 2013) <https://www.aqf.edu.au/sites/aqf/files/aqf-2nd-edition-january-2013.pdf/>.
[32] Martin Bush, 'Reducing the Need for Guesswork in Multiple-Choice Tests' (2015) 40(2) *Assessment & Evaluation in Higher Education* 218.
[33] The English common law is based on reasoning by analogy; Fruehwald (n 16) 49.

the applicable rule, then the correct answer will be obvious but not if the student is less familiar with the rule.[34]

- Answers - Alternative answers that are clearly and concisely stated, which reflect a sufficient amount of similarity to the correct response. The alternatives can contain irrelevant information, but this information must still be plausible and convincing.
- Process - Collegial collaboration in the drafting of stems and alternative answers to ensure error-free questions and to test the fairness and accuracy of the principles tested in each question.
- Process – Adequate student exposure to enable realistic expectations.

III   MATERIALS AND METHODS

A   *Research Questions*

In order to determine whether multiple-choice exam questions are an appropriate addition to the assessment tools available to assess law student legal reasoning, the authors posed the following research questions:

1. Will multiple-choice questions and problem-solving questions that test equivalent subject matter and legal reasoning abilities lead to the same or similar results for students?
2. Do students consider that multiple-choice questions provide benefits when multiple-choice exam questions are used as summative assessment?
3. Do unit coordinators consider that incorporating multiple-choice exam questions into a suite of assessment tools, provides benefits when they are drafted in accordance with guiding principles?

B   *Research Methods*

The quantitative component of the study involved analysis of students' end-of-semester exam results. This exam included a combination of multiple-choice questions and problem-solving questions designed to assess students' legal reasoning skills in relation to the same subject matter. These were presented as 20 multiple-choice questions followed by eight problem solving questions, with each multiple-choice question worth one mark and each problem-solving question worth five marks. No marks were deducted for incorrect answers. The students had two hours and 10 minutes to complete the exam, with 30 minutes perusal.

The qualitative component of the study included a student questionnaire with follow-up semi-structured interviews, and unit

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[34]   Mark L Campbell, 'Multiple-Choice Exams and Guessing: Results from a One-Year Study of General Chemistry Tests Designed to Discourage Guessing' (2015) 92(7) *Journal of Chemical Education* 1194.

coordinator reflections. Each method addressed a particular research question:

- Analysis of student performance in the end-of-semester exam through bivariate correlation to inform research question 1.
- An anonymous online student questionnaire to investigate student views regarding multiple-choice assessment, with the option of a follow-up semi-structured interview to inform research question 2.
- Unit coordinator reflections to inform research question 3.

1   *Questionnaire and Interview*

The students surveyed in this study ranged in age and experience in higher education but were predominately recent school leavers,[35] in the first or second year of their law degree.[36] All students in Regulation of Business were English speakers studying at an undergraduate level and only 5% identified as coming from a non-English speaking background.

Students were invited to complete an anonymous online questionnaire comprised of Likert-type scale questions, asking them to indicate the extent to which they agreed or disagreed (a five-point scale was used). The questionnaire was administered after the students had completed the end of semester examination but prior to the release of their results. Given that their responses were anonymous, there was no risk that they would perceive that their decision whether or not to participate, or their answers, could affect their grade in the unit. The questionnaire was administered using KeySurvey software and sent to each of the 553students enrolled in the unit. Seventy-six students completed the questionnaire; a response rate of 14%. Nulty has written about the adequacy of student response rates in respect to teaching evaluations and the authors adopt the position that without any theoretical justification for the adequacy of a response rate in a particular context, a more pertinent question is often whether an adequate sample size is present.[37] The authors cautiously make claims about how well the questionnaire respondents represent the views of the entire cohort.

Students could also elect to participate in a follow-up semi-structured interview following the completion of the final exam if they wished to elaborate on their answers in the online questionnaire. This interview was conducted two months following results finalisation and the completion of the unit. Three students chose to have follow-up interviews and their responses were de-identified. This data is incorporated into the discussion in section V.

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[35] 70%.
[36] 61%.
[37] Duncan Nulty, 'The Adequacy of Response Rates to Online and Paper Surveys: What Can Be Done?' (2008) 33(3) *Assessment & Evaluation in Higher Education* 301, 306.

IV   RESULTS

A   *Analysis of End-of-Semester Exam Results*

Results were analysed using the Statistical Package for the Social Sciences (SPSS, version 25). Pearson's correlation coefficient was used to assess the relationship between multiple-choice exam results (out of 20) ($M = 13.22$, $SE = 0.10$) and problem-solving exam results (out of 40) ($M = 25.10$, $SE = 0.29$). Figure 1 displays a scatterplot showing individual student results ($N = 492$) on both the multiple-choice questions and problem-solving questions in the end-of-semester exam.

Figure 1
Scatterplot of student exam results on multiple-choice and problem-solving questions
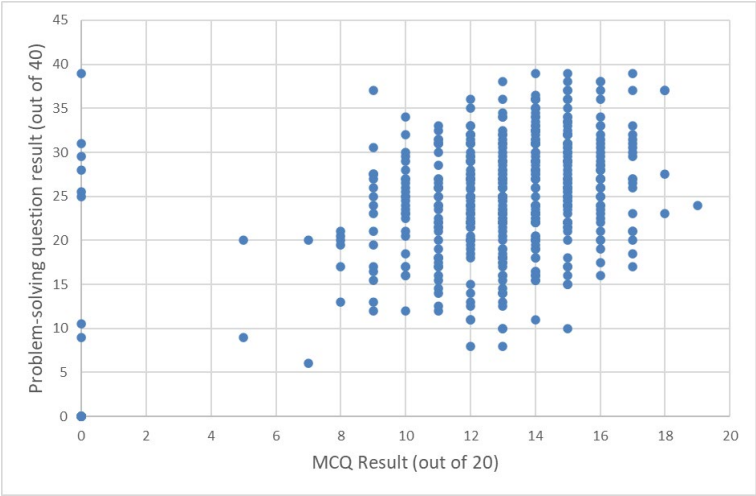
1   *Assumptions*

Visual inspection of the scatterplot suggests an approximately linear relationship between the two variables without any problems of heteroscedasticity. Both multiple-choice question results and problem-solving question results are measured as ratio variables. Twelve student results were removed where they scored 0 for both the multiple-choice question and problem-solving question components of the end-of-semester exam. Eight student results were removed where they had a 0 score for all multiple-choice questions, but a mark for the problem-solving questions in the exam. The concern was that these data points would operate as outliers and distort the descriptive statistics and population parameter estimates involved in the correlation. The distribution of multiple-choice scores in the sample was negatively skewed [-0.44] and leptokurtic [0.37]. The distribution of problem-solving question scores was negatively skewed [-0.23] and platykurtic [-0.23]. Given the sample size of the data after removal of outliers ($N =$

472), the correlation was considered to be robust to these breaches of normality.[38]

There was a moderate, [39] positive, statistically significant relationship between scores on the multiple-choice question part of the exam and scores on the problem-solving question component, r (470) = .30, 95% BCa CI [.21, .38], p < .001 (two tailed), r^2 = .09. Higher scores on the multiple-choice questions were associated with higher scores on the problem-solving questions, and 9% of the variability in multiple-choice question scores were shared with problem-solving question scores.

B   Questionnaire and Interview

The questionnaire investigated student perceptions about the use of multiple-choice questions and problem-solving questions as summative assessment in the unit.

Student responses to the Likert-type questions are displayed in Figures 2 – 8:

Figure 2
The multiple-choice questions were harder than the problem-solving questions


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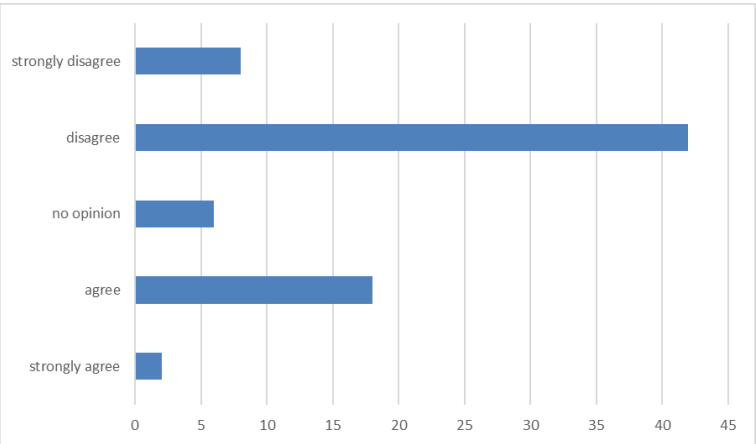
38   Thomas Lumley et al, 'The Importance of the Normality Assumption in Large Public Health Data Sets' (2002) 23(1) *Annual Review of Public Health* 151.
39   Jacob Cohen, *Statistical Power Analysis for the Behavioral Sciences* (Lawrence Erlbaum Associates, 2nd ed, 1988).
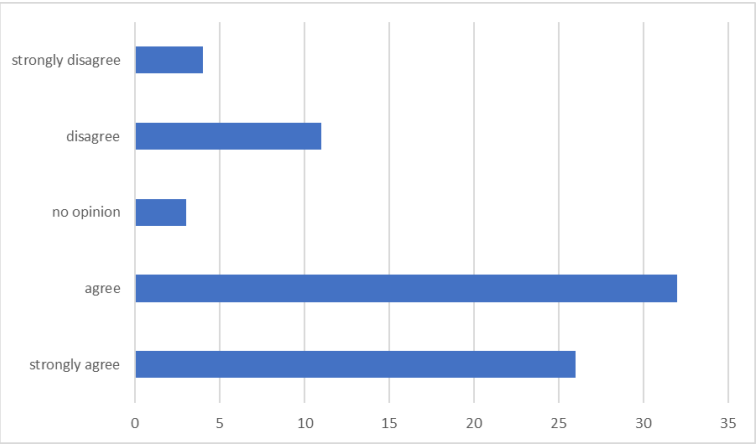
Figure 3
The multiple-choice questions tested my abilities regarding the unit learning outcomes better than the problem-solving questions
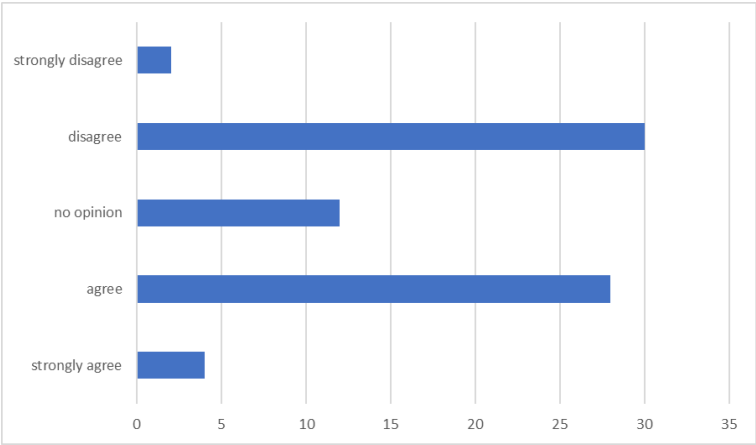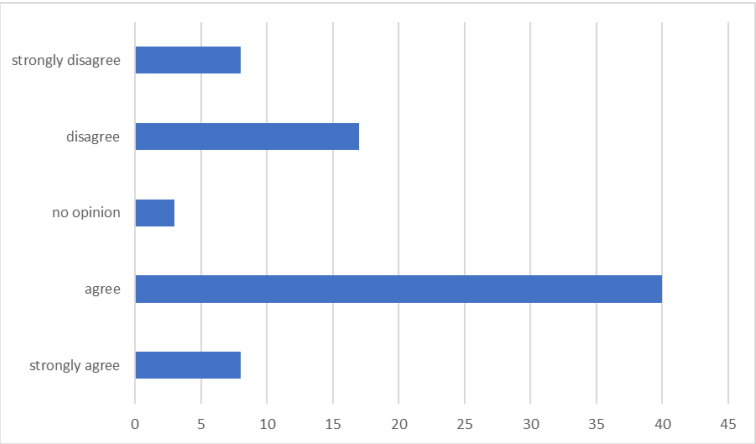

Figure 4
I feel that the multiple-choice questions were a fairer and more equitable way of assessing my knowledge of the subject matter compared to the problem-solving questions
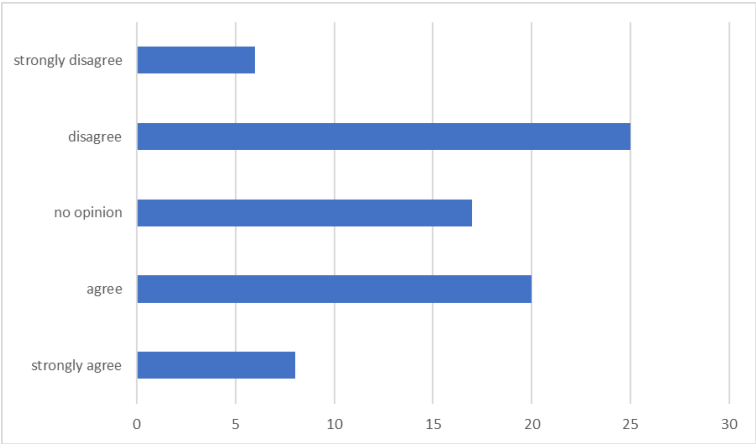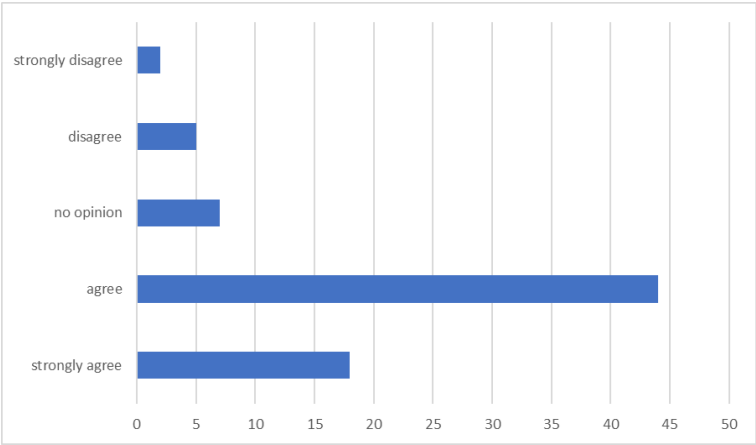
Figure 5. I felt less stressed about answering multiple-choice questions compared to problem-solving questions


Figure 6
I feel that the multiple-choice questions enabled me to show off my learning in the unit

Figure 7
I feel that the problem-solving questions enabled me to show off my learning in the unit

Figure 8.
I feel that I learnt more about the subject matter through multiple-choice question workshop activities and exam questions compared to the problem-solving question workshop activities and exam questions
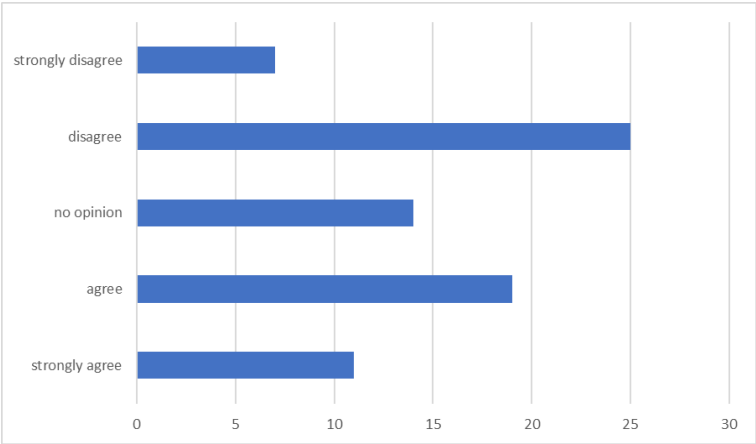
V   DISCUSSION

The quantitative results indicate a moderate positive correlation between student results on the multiple-choice and the problem-solving questions in the end-of-semester exam. This result differs slightly from previous research where strong positive correlations (between .5 and .6 on three different final exams) were found between multiple-choice and essay questions on the same exam. [40] One difference between the current study and previous studies is the authors' specific focus on assessing legal reasoning skills. Another difference is that this case

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[40]   Driessen, Van Der Vleuten and Van Berkel (n 2).

study's exam was composed of 20 multiple-choice questions and 8 problem-solving questions, whereas the Driessen study exams comprised 40 multiple-choice questions and only one essay question.

One initial conclusion drawn from the strength of the correlation, is that the use of multiple-choice questions in addition to problem-solving questions on the exam was not redundant. With only a moderate correlation between the multiple-choice and problem-solving exam scores, there were obviously other factors aside from content similarity and differing question formats that explain these results. One factor may be that students can earn marks in the multiple-choice section for guessing answers, but this is very difficult to do in problem-solving questions. Also, a student's writing abilities may hinder their ability to display their legal reasoning skills when answering problem-solving questions. Legal reasoning is a process that occurs within the mind, but its translation onto an exam paper through writing may cause difficulties for some students. One student response from the semi-structured interviews supported this conclusion. When asked which type of questions they preferred, they stated, 'I would say the short problem response [*problem-solving question*] only because I'm someone who logically steps through, so as I write something I kind of go, "oh", so this goes with that and I start visualising how it all fits in place.' This comment raises the interesting possibility that students with different learning styles and preferences may prefer to answer legal reasoning questions in different formats.

A comparison of the mean scores for the multiple-choice questions (66%) versus the problem-solving questions (63%) illustrate that multiple-choice questions assessing legal reasoning can be drafted in a way that does not make them too simple for students. Visual inspection of the distribution of marks across the multiple-choice questions and problem-solving questions shows that multiple choice assessment can differentiate good and bad student performance in a similar way to problem-solving questions.

Problem-solving questions may be perceived as a fairer method of assessment compared to multiple-choice questions, given that part marks can be obtained when writing a response to a problem-solving question and may allow students to get some marks where they are unsure of the correct response. In an interview, one student remarked, 'I feel that I would be able to get more marks in a short response [*problem-solving question*] than a multiple-choice because there is a risk in a multiple-choice that you will select the wrong one because there are generally two that it could be…but in a short response [*problem-solving question*], I don't know how people mark, but I assume that as long as you can demonstrate that you understand and can identify the issues you should be able to pick up half the marks.' This comment supports a legitimate concern that knowledge of content and possession of legal reasoning skills are not phenomena that you perfectly possess, or do not. These are concepts and skills that admit to gradation, and the binary correct or incorrect answer to multiple questions may not capture the subtlety of a student's ability.

Students provided feedback about the effectiveness of multiple-choice questions and problem-solving questions on the exam. Thirty-two students agreed or strongly agreed that multiple-choice questions were a better test of their ability than the problem-solving questions (Figure 3). An identical number of students (32) disagreed or strongly disagreed with the same statement. A similar pattern of agreement and disagreement between students was also found in response to the question of whether multiple-choice questions were a fairer and more equitable way of assessing their legal knowledge compared to problem-solving questions (Figure 4). This result may reflect the fact that a mode of final exam that best assesses a student's ability (according to the student) is a mode of exam that is viewed as fair and equitable.

Students had generally favourable responses as to whether the multiple-choice questions (63% agreed or strongly agreed) and problem-solving questions (82% agreed or strongly agreed) allowed them to show off their learning. If the multiple-choice questions were too difficult, the authors suspected that many students would disagree (or strongly disagree) that this exam format allowed them to show off their knowledge. Many students are critical of multiple-choice exams, where they perceive that they could justify their answers to questions if they could just write a few words to explain their answer, rather than selecting one answer amongst viable alternatives. Conversely, students may appreciate the breadth of content that may be assessed through multiple-choice questions and perceive that their study of all weeks of a unit is well reflected in a final exam that assesses all weeks of a unit. In their interview one student said that multiple-choice assessment 'was a good way to retain the knowledge because you couldn't really avoid not studying anything.' Another student explained how the addition of multiple-choice questions in the final exam changed their approach to the unit: 'It definitely changed how I studied. I felt that I studied more in this unit than in any other unit. In a normal exam you can have five [*problem-solving*] questions and you [*get to*] pick three. So, you can say I'll leave that and go onto the topics that I am really confident on. With the multiple-choice exam there was a risk that even if I study everything, I may still not know the answer, so I have to be across everything.'

There is the possibility that students believed the multiple-choice questions allowed them to show off their learning because the questions were too easy. In this scenario, students attribute their success on the multiple-choice questions to hard work and innate intelligence, rather than the degree of difficulty of the exam. Students certainly perceived that the problem-solving questions were harder than the multiple-choice questions on the exam (Figure 2). Interestingly, this perception was not strongly supported by student results on the final exam. The percentage average for the multiple-choice component of the exam was 66% and the percentage average for the problem-solving component was 63%. This discrepancy between the perception and reality of multiple-choice assessment has been noted by Fisher and Nixon and Kennedy who

suggest that students frequently underestimate the requirements necessary to perform well on multiple-choice exam questions.[41]

Whilst the student voice is only one consideration in determining the appropriateness of multiple-choice questions to assess legal reasoning, the authors argue that this voice speaks favourably towards their assessment choices. A significant percentage of the cohort felt that multiple-choice questions enabled them to show off their learning in the unit, and that they learnt more about the unit subject matter through multiple-choice question workshops (compared to problem-solving question workshops).[42] The fact that a significant percentage of the cohort believed that they learnt more from the unit through engagement with problem-solving activities and assessment, and that problem-solving questions better allowed them to show off their knowledge, was not viewed as a major hurdle to assessment through multiple-choice questions. The simple reason for this is that multiple-choice questions that assess legal reasoning are an adjunct to other assessment modalities which assess content and legal reasoning in extended written form. These multiple-choice questions cater to the learning styles and abilities of some, but they do not need to reflect every student's preferred learning and assessment needs.

Whilst the quantitative analysis of student results, coupled with the student voice, give some clues about the effectiveness of multiple-choice questions in assessing legal reasoning, the unit coordinators' reflections additionally considered the efficiency of such assessment. The authors consider an assessment item to be *efficient* when the authorship, moderation and feedback related to that assessment is connected to unit learning outcomes and free from unnecessary duplicity or wasted effort. Marking and moderating exam responses presents a substantial challenge across a large cohort, where reliability of marking and consistency of feedback across multiple markers are key issues.[43] The efficiency of multiple-choice assessment is delivered through well authored question and answer options, machine marked answers and the elimination of subjectivity or bias in marking. Given a law school budget of approximately one hour of marking time per student across all items of assessment in an elective unit, multiple-choice assessment allows markers to give more dedicated feedback to written expression and legal reasoning in the context of problem-solving and essay question assessment. This is no attempt to subvert good pedagogy to the payslip; merely an acknowledgment that

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[41]   Fisher (n 26); Chan Nixon and Peter E Kennedy, 'Are Multiple-Choice Exams Easier for Economics Students? A Comparison of Multiple-Choice and "Equivalent" Constructed-Response Exam Questions' (2002) 68(4) *Southern Economic Journal* 957.

[42]   We incorporated practice multiple-choice question and problem-solving questions into the unit's weekly workshops to assist students to prepare for their mid-semester online quiz and end-of-semester exam and also manage their expectations regarding their assessment.

[43]   John M Malouff et al, 'Preventing Halo Bias in Grading the Work of University Students' (2014) 1(1) *Cogent Psychology* 988937:1-9.

assessment choices are not unconstrained, and the efficiency of assessment should be a consideration.

Figures 9 and 10 below provide details of the time taken to draft and mark five multiple-choice questions (5 marks) involving legal reasoning skills, compared to one problem-solving question worth 5 marks given a cohort of 500 students. These statistics indicate a time-saving of approximately 31 hours for five marks of multiple-choice assessment compared to five marks of problem-solving assessment. This finding is supported in a previous study which demonstrated a significant time-saving (drafting and marking), when comparing a combined multiple-choice and essay exam with a pure essay exam.[44]

Table 1
Average time required for unit coordinators to draft five multiple-choice questions and have them marked

Activity	Time per question	Total for 5 questions
Original Draft	20 minutes	100 minutes
Proof	5 minutes	25 minutes
Revised Draft	10 minutes	50 minutes
Second Proof	5 minutes	25 minutes
Head of School Proof	5 minutes	25 minutes
Total time for drafting	45 minutes	3 hours 45 minutes
Marking time	0 minutes	0 minutes
Total assessment time	**45 minutes**	**3 hours 45 minutes**

Table 2
Average time for unit coordinators to draft and mark one short answer question worth five marks (500 students)

Activity	Time	Total for 500 students
Drafting	45 minutes	45 minutes
Answer Guide	20 minutes	20 minutes
Sessional Communication	15 minutes	15 minutes
Sessional Marking Time	3 minutes	25 hours
Moderation and Review	1 minute	8 hours 20 minutes
Total		**34 hours 40 minutes**

Future research might consider the extent to which assessment at the tertiary level is associated with student psychological distress and what (if anything) should be done about this.[45] Law students in this case

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44   Driessen, Van Der Vleuten and Van Berkel (n 2).
45   Helen M Stallman, 'Psychological Distress in University Students: A Comparison with General Population Data' (2010) 45(4) *Australian Psychologist* 249; Wendy Larcombe, Sue Finch and Rachel Sore, 'Who's Distressed? Not Only Law Students: Psychological Distress Levels in University Students Across Diverse Fields of Study' (2015) 37(2) *Sydney Law Review* 24; Helen M Stallman and James Duffy, 'Beyond

study's questionnaire have clearly indicated that they feel less stressed by the prospect of answering multiple-choice questions on a final exam, compared to short answer questions (Figure 5). Given that students performed similarly on the problem-solving questions compared to the multiple-choice questions, what is the reason for this student response? Are student stress levels brought on by university assessment at a level that warrants intervention? If so, is making changes to assessment modality an appropriate response to the problem?

VI   CONCLUSION

Multiple-choice assessment can be used in law school to assess legal reasoning skills. Multiple-choice assessment, when properly constructed using identified guiding principles, is an *efficient* and *effective* way to assess legal reasoning abilities. It is efficient, as the authorship, moderation and feedback related to multiple-choice assessment carries significant time and cost advantages, compared to essay and problem style question assessment. Multiple-choice assessment is effective where the considered authorship of questions and answers leads to a testing vehicle that is valid and reliable, differentiated from other types of assessment, motivates and rewards student learning, is perceived as fair by students and considered intellectually rigorous by unit coordinators and academic moderators/peer reviewers. There are too many shortcomings associated with assessing legal reasoning through multiple-choice questions alone, and the authors stress that this mode of assessment (if used) must act as a compliment to other assessment in a unit which assesses legal reasoning in extended written form.

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the Curriculum: The wellbeing of Law Students Within Their Broader Environment' in Rachel Field, James Duffy and Colin James (eds), *Promoting Law Student and Lawyer Well-Being in Australia and Beyond* (Routledge, 2016) 192.

APPENDIX A

Example: Multiple choice questions 1 and 2 correspond with problem-solving question 3 in terms testing the same legal content.

QUESTION 1

Flex Bods Pty Ltd ('FB') owns and operates a chain of Pilates studios. Its Pilates classes are taught by qualified physiotherapists who provide personalised rehabilitation programs for clients who have suffered injury. Dean is a director of FB as well as a qualified physiotherapist. Sarah and Lisa are also directors of FB. FB's constitution provides that any company purchases from trade suppliers over $20,000 must have the unanimous approval of the board. Sarah and Lisa attend an annual fitness fair to meet potential suppliers. Sarah and Lisa have a conversation with Ben, the head sales representative for EasePain Pty Ltd ('EP'), about EP's revolutionary pain gel. Sarah and Lisa tell Ben that Dean looks after all of FB's ordering of physiotherapy equipment and products. They say 'Dean is our fellow director and a qualified physiotherapist, so we leave all of the ordering decisions up to him when it comes to choosing supplies for our studios'. One week later, Dean places a $30,000 order with EP without Sarah and Lisa's knowledge. A month later when Sarah sees the $30,000 invoice from EP, she calls EP and says that FB is not prepared to pay as Dean does not have authority to enter into a transaction of this amount without FB's board's unanimous approval. Can EP enforce its contract with FB?
   a) No, because Dean did not have express actual authority
   b) Yes, because Dean had implied actual authority
   c) <u>Yes, because Dean had ostensible authority</u>
   d) B and C

QUESTION 2

Lucy is the head salesperson for Fromage Frais Pty Ltd ('FF'). FF sells fine cheeses to retail outlets throughout South East Queensland. Lucy has authority to sell FF's products and to negotiate deals with clients as she considers appropriate. Lucy negotiates to sell FF's assortment of cheeses to Olive's Deli in Ashgrove. Olive operates Olive's Deli as a sole trader. During her sales pitch, Lucy tells Olive that she is acting as agent 'for a fine cheese company' but she does not disclose the name of FF. Lucy guarantees that Olive's first order of $20,000 worth of cheese will be delivered within 48 hours. Olive stresses that this is a very important term of the contract as Olive's Deli is catering for an extravagant wedding in 72 hours which is worth $50,000 to her business. Olive tells Lucy that 'the client's reception theme is a cheese buffet and without the cheese there will be no reception'. Olive places her order with Lucy and awaits the delivery of cheese. 75 hours later the cheese has not arrived. Olive incurs financial losses as a result of the non-delivery of cheese. Who is liable for the damages that Olive suffers?

a)   <u>Fromage Frais (FF)</u>
b)   Lucy
c)   Olive cannot recover for this loss as the damages are too remote
d)   A and B

QUESTION 3

Bikes for Hire Pty Ltd operate a business hiring out bikes for tours along the Brisbane river. The three directors of Bikes for Hire Pty Ltd are Chris, Brad and Vince. At the last board meeting Chris proposed expanding into bike maintenance and sales. Vince and Brad are reluctant. However, they tell Chris that he can make some initial enquiries as to what the company might need to do to expand. The meeting finishes with Vince saying, 'whatever you do, don't sign us up to anything yet'.

On the following Friday night, Chris is at a party and meets Rob who is trying to sell his bike maintenance and sales business. Chris introduces himself as a Director of Bikes for Hire Pty Ltd. Over the course of the night, Chris and Rob agree to the terms by which Bikes for Hire Pty Ltd will acquire Rob's business. On Saturday morning Rob's wife Mandy happens to go for an early morning bike ride with Vince, who is her old high school friend and cycling buddy. During the bike ride Mandy tells Vince about the previous night's discussion between Rob and Chris. Vince says to Mandy, 'oh yeah that's great, we are thinking about expanding Bikes for Hire Pty Ltd's operations into bike maintenance and sales'. Mandy doesn't mention her conversation with Vince to her husband Rob. Rob calls his lawyer on Saturday afternoon, and by Sunday evening a contract has been prepared and signed by Rob and Chris who purports to sign on behalf of Bikes for Hire Pty Ltd.

On Monday morning Chris gives Vince and Brad the news. Vince and Brad are upset and tell Chris that he had no authority to bind the company like that.

Advise Vince and Brad about whether Chris had ostensible authority to bind Bikes for Hire Pty Ltd to the contract.