

---

## INTRODUCING MULTIPLE CHOICE ALONGSIDE SHORT ANSWER QUESTIONS INTO THE END-OF-YEAR EXAMINATION: THE IMPACT ON STUDENT LEARNING IN FIRST YEAR ECONOMICS

*Nicola Reimann, University of Durham/Open University*  
*Rui Xu, University of Edinburgh*

---

### Abstract

The study investigates the impact of a change to the format of the examination of a large module in introductory Economics, where essay questions were replaced by multiple choice questions (MCQ). The paper explores the impact of the examination on the quality of student learning and students' experiences and perceptions of the new format. The data comprised questionnaire data, semi-structured group interviews with students, interviews with teaching staff, documentary data and students' grades. Students regarded understanding, both breadth and some depth, as well as critical thinking as important for the examination. Within the exam, MCQ and short answer questions (SAQ) seemed to fulfil different functions. MCQ led students to focus on coverage and factual knowledge and were perceived as requiring memorisation as well as some understanding. One main problem was described as their potential for being ambiguously worded. SAQ, on the other hand, focused on the application of theory to cases and were perceived as requiring understanding. They appeared to be crucial for students' developing sense of the Ways of Thinking and Practising (WTP) in Economics, for which diagrams emerged as a core component. Students' grades for MCQ and SAQ were correlated, and students who were doing well in the examination were more likely to take a deep approach and less likely to take a surface approach. However, when comparing their approaches to Economics as elicited at the beginning of the module with their approaches to studying for the module investigated, the deep approach had decreased and the surface approach had increased. The introduction of MCQ into the examination also seemed to have stimulated staff to redesign the entire exam as well as rethinking certain elements of the teaching-learning environment, which contributed to making the environment more congruent. The findings of this study highlight the disciplinary purposes of assessment, the close relationship of memorisation and learning as well as the process aspect of congruence.

---

### The ETL Project

#### *Research design*

The *Enhancing Teaching-Learning Environments in Undergraduate Courses* (ETL) Project was a 4-year research project, funded as part of the Economic and Social Research Council's *Teaching and Learning Research Programme* (TLRP) which is intended to strengthen the research base informing the quality of teaching and learning in the UK. Members of the project team worked collaboratively with departments in several contrasting subject areas, of which Economics was one. The research was rooted in the very specific disciplinary and institutional contexts investigated and provided collaborating partner departments with rich quantitative and qualitative data on first and final year undergraduate course units or modules. These data were used as a basis to identify the strengths of the modules under investigation as well as discussing

possible changes in the way in which they were organised, taught, supported or assessed which had the potential to enhance further the quality of student learning. Once such a collaborative initiative had been negotiated and implemented, the impact of the change(s) on student learning was evaluated through a second round of data collection. The case study reported in this paper was the result of one of such collaborations in Economics.

### *Instruments*

For the purposes of the research, the project team developed two questionnaires, which were also used in this case study. The *Learning and Studying Questionnaire* (LSQ) was completed by the students at the beginning of the module and focused on the subject as a whole, asking about their reasons for taking the degree course as well as the module in question and their approaches to learning and studying the subject in general. The *Experiences of Teaching and Learning Questionnaire* (ETLQ) was administered towards the end of the academic year and focused more specifically on the module investigated. It elicited the students' views on their experiences of various aspects of the teaching-learning environment as well as on the demands of the module and the learning achieved. It also comprised questions on their approaches to learning and studying the module specifically, repeating some of the items which had been included in the LSQ. The questionnaires were complemented by semi-structured interviews with groups of students and members of the staff team.

### *Core concepts*

Biggs' notion of *constructive alignment* (Biggs 1996, 2003) is one of the core concepts which informed the ETL Project's initial understanding of high quality teaching-learning environments. Biggs starting point is a constructivist understanding of the nature of learning. In an effective teaching-learning environment, all components (most notably constructivist learning outcomes, teaching methods and assessment procedures) are aligned and mutually supportive to achieve maximum consistency through the system. As the ETL research progressed, constructive alignment was replaced by the notion of *congruence*. This allowed a broader, more encompassing view of contemporary teaching-learning environments (including congruence with students' backgrounds and aspirations, learning support, course organisation and management and feedback) and moved away from the linear connotations of the relationship between learning outcomes and specific teaching-learning and assessment strategies which constructive alignment evoked (Hounsell and McCune 2002, McCune and Hounsell 2005, Reimann in press).

Another concept arising from the ETL research is *Ways of Thinking and Practising* (WTP) in a subject area which describes:

the richness, depth and breadth of what students might learn through engagement with a given subject area in a specific context. This might include, for example, coming to terms with particular understandings, forms of discourse, values or ways of acting which are regarded as central to graduate-level mastery of a discipline or subject area. (...) WTP can potentially encompass anything that students learn which helps them to develop a sense of what it might mean to be part of a particular disciplinary community...

(McCune and Hounsell 2005: 257)

WTP provides a perspective on teaching-learning environments which enables us to focus specifically on the ways in which a teaching-learning environment engages students with a particular discipline, in this instance Economics. In the context of this paper, we will look more closely at those components of the specific environment investigated which contributed to students' developing sense of what being an economist entails.

## **The case study**

### *The context*

The module under investigation in this case study was a first year introductory Economics module located in the Economics Department of an old, established university with a high research profile. The department offered mainstream Economics programmes and catered for large numbers of students who tended to be

traditional students of school leaving age. Previous knowledge of Economics was not a requirement for Economics degrees, but all students majoring in Economics had to have Mathematics A grade at GCSE, or higher level Mathematics, and one A and two Bs at A-level. There were over 200 students on the module, of whom a proportion were not majoring in Economics and were either on a Combined Programme or took the module as an option on another degree programme. Microeconomics was taught by one lecturer in semester 1, macroeconomics by a second lecturer (who was also the module leader) in semester 2. 1-hour lectures were held twice a week, complemented by a 1-hour tutorial every fortnight, for which the students were split into groups made up of students exclusively with or without A-level in Economics. The two lecturers complemented by up to three tutors delivered the tutorials. The students were recommended two introductory Economics textbooks and also had access to module information, lecture slides, multiple choice questions (MCQ) and other materials in a Virtual Learning Environment (VLE). In the first year of the collaboration, the assessment consisted of a formative test on microeconomics at the end of semester 1, a formative essay on macroeconomics in semester 2 and a summative examination at the end of the academic year. The examination, which counted for 100% of the final mark awarded, comprised both essay questions and one question consisting of six parts requiring short answers.

### *The collaborative initiative*

The collaboration started in the academic year 2002/3, during which the baseline data were collected. These served as a basis for a report in which the ETL Project team brought various issues to the attention of the module leader which had been identified as having an impact on the quality of student learning on the module. However, none of the changes proposed were considered possible nor fully embraced by the staff team. At the same time and unrelated to the collaboration with ETL, the department decided to introduce changes which were going to have a substantial impact on the module in question. It was recommended that assessments should include MCQ with a view to decreasing the marking load for staff. Based on our understanding of the literature (see below), we warned the module leader of the possible negative consequences for student learning, but despite a considerable degree of scepticism, the staff team decided to introduce MCQ into the examination of the introductory Economics module. As a consequence and in line with these unexpected developments, we proposed to conduct an investigation of the way in which the new examination would impact on the quality of student learning. This investigation is the focus of this paper.

### *The changes to the teaching-learning environment*

The assessment strategy for the module was changed in the academic year 2003/4, involving a complete redesign of the examination. MCQ were introduced and essay questions no longer featured in the examination. Short answer questions (SAQ) were now the core element, and considerable attempts were made to make the questions more problem-solving. Various measures were also taken to ease the transition from the old to the new assessment strategy since, for instance, previous exam papers could not be used any more to provide guidance and practice material for students. The table below gives an overview of the changes which were made in relation to the assessment.

### *Research questions and data used*

As explained above, the aim of the ETL Project was to stimulate the enhancement of student learning on the basis of empirical evidence about students' experiences and perceptions of a teaching-learning environment. In this specific instance, however, the situation was reversed since, based on our understanding of the literature on student learning and assessment, we expected a *negative* effect of the changes which were going to be made to the examination. The aim of the research was therefore to evaluate the impact of the new examination format on the quality of student learning as well as gaining an in-depth understanding of students' perceptions and experiences of the new assessment. For this purpose, we concentrated on the data collected during the second year of the collaboration. We analysed the relevant LSQ and ETLQ items and scales on approaches and on students' perceptions of the assessment, comparing the data collected at the beginning of the module with those collected at the end. We also analysed students' grades obtained, differentiating between grades for the MCQ and the SAQ components of the examination. The quantitative data were complemented by semi-structured interviews, which were conducted before and after the examination and asked very specifically about students' perceptions of the assessment, including questions about the formative test, the sample exam paper, the examination itself, the different question types (SAQ and MCQ) and students' approaches to revision. On the basis of the interviews conducted before the

Table 1  
Assessment before and after changes were implemented

	2002/3	2003/4
<b>Formative components - do not contribute to final grade</b>	1-hour in-class formative test on microeconomics, modelled after the examination comprising: <ul style="list-style-type: none"> <li>• 1 question comprising 3 sub-questions requiring short answers</li> <li>• 1 essay question from a selection of 3</li> </ul>	1-hour in-class formative test on microeconomics, modelled after the examination comprising: <ul style="list-style-type: none"> <li>• 10 MCQ</li> <li>• 3 SAQ from a selection of 6</li> </ul>
	1 essay of 1,500 words on macroeconomics, from a choice of 9 topics, exact format dependent on tutor	Macroeconomics exercise: tutors are recommended to ask students to hand in answers to 2 SAQ, exact format dependent on tutor
<b>Summative examination - 100% of final grade</b>	2 hours	2 hours
	1 question comprising 6 sub-questions requiring short answers (33.3%)	20 MCQ (30%)
	Choice of 2 short essay questions from a selection of 6, testing both micro and macroeconomics (each question 33.3%)	Choice of 5 SAQ from a selection of 8, testing both micro and macroeconomics (70%)

examination, we developed a short questionnaire with 12 items asking students more specifically about their perceptions of and attitudes towards the examination and the two different question types and their intended revision strategies. This was administered as an insert of the ETLQ, i.e. during one of the last lectures before the examination.

## Review of the literature

The literature considered relevant for this study comprised both generic research into student learning as well as research into Economics Education carried out by economists. When discussing assessment, experts in Economics Education tend to highlight that MCQ offer reliability and validity, absence of scoring bias, ease and speed of marking as well as content coverage (Walstad 2001, 1998). The use of MCQ, which is particularly widespread in the US, also seems to reflect the way in which economists think about the curriculum. The assumption that "(s)tudents first need to show a certain degree of mastery of basic economic concepts because that knowledge and understanding lay the foundation for higher-ordered thinking about economics" (Walstad 2001: 290) is the underlying rationale for the choice of MCQ for the assessment of introductory Economics. Paxton (2000) challenges this assumption by pointing to research which shows that even learning simple concepts involves higher level skills, such as organising knowledge, forming networks of connections and creating mini-theories.

Many of the concepts of Economics learned in the first year of studies are complex, and students relying on memorisation strategies will not fare well. They will need to learn to organise the information they have gathered and to build conceptual models for themselves so that they can understand the logic of economic theory. (Paxton 2000: 112)

The nature of the discussion of assessment-related issues in the Economics Education literature and the research questions arising from this discussion may be considered as typical for the way in which economists



think. Decisions about assessment are conceptualised as economic problems. Several studies conducted by economists compare the relative costs and benefits of different assessment formats, most notably MCQ and open-ended essay questions (Chan and Kennedy 2002, Krieg and Uyar 2001, Becker and Johnston 1999, Heck and Stout 1998, Walstad and Becker 1994). It is argued that if there is a significant correlation between the scores produced by the two types, they are likely to measure the same dimension of knowledge.

If a multiple-choice and an essay test that cover the same material measure the same economic understanding, then the multiple-choice test would be the preferred method for assessment because it is less costly to score and is a more reliable measure of achievement in a limited testing period. (Walstad and Becker 1994: 193)

While Walstad and Becker (1994) find no or only slight differences between what MCQ and essay questions measure, Becker and Johnston (1999) and Krieg and Uyar (2001) come to the conclusion that there are differences and recommend to incorporate both MCQ and open-ended questions into Economics examinations. Krieg and Uyar show that student characteristics also have a bearing on performance in the different question types. Other authors investigate whether MCQ produce higher scores than open-ended questions so that MCQ may give a misleadingly positive impression of student performance. When comparing scores for MCQ and equivalent open-ended questions, Chan and Kennedy (2002) find that the scores for certain types of open-ended questions were significantly lower, which may be due to the fact that the alternatives provided in MCQ prompted students. In Heck and Stout's (1998) study, higher scores were obtained by students whose examination had included MCQ only, than by those whose examination had also included open-ended questions, but the difference disappeared when this was corrected for guessing. Other issues investigated by economists are the impact of gender on MCQ scores (Walstad and Robson 1997), item sequencing in MCQ tests (Carlson and Ostrosky), alternative ways of scoring MCQ (Reid 1976), scoring MCQ by including an explanation of the selected answer (Maunder 2002), the impact of MCQ on attitude towards Economics and course completion (O'Neill 2001). O'Neill's (2001) study showed that students performed better in a standardised MCQ test of College Economics if they had used questions in MCQ format during the year instead of open-ended questions.

Whether MCQ and essay questions assess and encourage a different *quality* and cognitive *level* of learning and lead to students using qualitatively different approaches to learning and studying appears to be of much less concern to many economists. Although Walstad (1998, 2001) argues that MCQ can be designed to assess higher order thinking, there is relatively little critical discussion in the actual studies investigating MCQ of the kind of knowledge, understanding and thinking skills required to answer the questions which are used in the tests and examinations concerned. While the speed of marking is often cited in favour of MCQ, the time involved in constructing more complex MCQ does not feature very frequently. There are, of course, some exceptions. In a book chapter guiding economists in the use of essay questions and tests, Welsh and Saunders (1998) state:

The greatest strength of the essay exam is that, if carefully constructed, it permits us to assess and develop higher level cognitive skills such as synthesis and evaluation in ways that are not possible in multiple choice examinations. (Welsh and Saunders 1998: 306)

Generic research into student learning in higher education, on the other hand, is much less narrowly focused on issues related to measurement and employs a broader conception of validity which takes into account the effect of assessment on perceptions of educational goals and on the way in which students construct their understanding (Paxton 2000: 110). The crucial role of assessment for learning processes has been highlighted, in particular that of students' perceptions of assessment requirements. Ramsden (2003) and Biggs (2003), for instance, stress the limitations of MCQ, their potential to encourage surface strategies and the difficulty of constructing MCQ which tap into higher cognitive levels of understanding. Several studies confirm that MCQ are more likely to encourage students to adopt a surface approach (Thomas and Bain 1984, Scouller 1998), while open-ended assignments are more conducive to the employment of a deep approach than short tests or MCQ examinations (Thomas and Bain 1984, Scouller 1998, Tang 1994). Scouller (1998) also highlights the impact of students' perceptions of the level of skills and abilities which they see as being assessed by different methods. In her research MCQ were perceived by the students as assessing lower levels skills and abilities and these perceptions were associated with higher grades for the MCQ

examination. Scouller asserts the powerful role which perceptions of assessment play in the learning process and identifies them as an area in which more systematic research is needed.

Syllabus coverage is one of the reasons cited by economist for employing MCQ. Tang (1994) found that a focus in the assessment on syllabus coverage encouraged a surface approach. In her study she identified a *deep-memorisation* strategy used by deep-oriented students in response to their perceptions of the task demands of a test which comprised short essay questions. These students were intrinsically motivated to understand, but since they perceived the test as rewarding memorisation, they memorised facts after having understood them, in order to do well in the test. In order to address the dilemma of focussing the assessment on either depth or coverage, Tang recommends looking more broadly at the *system* of assessment and the sequencing of different assessment types rather than considering exclusively the strengths and weaknesses of individual assessment methods.

In the context of this case study, the student learning literature on assessment was the basis upon which we tried to discourage the module team from abolishing essay questions and introducing MCQ. The research which was undertaken, however, has had a somewhat different focus to the majority of the studies reported above. We did not study MCQ and SAQ separately, but as they were used *alongside each other in one single examination*. In addition, the examination and students' perceptions thereof were not investigated as a discreet, separate phenomenon, but within the context of the wider teaching-learning environment of the module. In order to understand fully the nature and students' perception of the redesigned examination, we considered the module as a whole and the relationship between the examination and other components of the environment. We were interested in the way in which the entire teaching-learning environment affected study processes and students' approaches to learning and revising and regarded the examination as one crucial, but not the only component of this system.

## Samples and data

Table 2 below provides an overview of the sample and the data used for this paper. The data were collected during the academic year 2003/4, except the initial staff interview which was conducted at the beginning of the two-year collaboration. All other data collected during the first year of the collaboration between the department and the ETL Project were not included this particular case study.

Table 2: Data used for case study

no. of students in 2003/4	227
no. of staff	5
LSQ	194 (85%)
ETLQ	136 (60%)
LSQ & ETLQ returned by same student	116 (51%)
ETLQ insert	118 (52%)
grades	111 (49%)
staff interviews	3
no. of staff interviewed	2
student group interviews	9
no. of students interviewed	45

For the quantitative analyses presented in the next section only a proportion of the entire sample was used. This was the data obtained from individuals who completed all of the LSQ, ETLQ as well as the ETLQ insert and whose grades we had received. This enabled us to make comparisons between the beginning and the end of the module, thus providing more accurate insight into the impact and the process of change.

## Quantitative data

The first section of this paper will discuss the insights gained from the quantitative data. These comprised relevant items and scales in the LSQ, the ETLQ the ETLQ insert as well as students' grades.

### Quantitative data used

#### LSQ and ETLQ data

The LSQ was completed at the beginning of the academic year, i.e. at a stage when the students were unlikely to have had much detailed knowledge of the examination format. The LSQ obtained from 99 students were used for this analysis. The ETLQ, along with the ETLQ insert, was completed towards the end of the academic year. At this stage, the students already had a reasonable idea of the nature of the examination and the specific types of questions which would be included. Their impressions had been shaped by the formative test which they took after the first semester and which was modelled on the examination, and by the sample exam paper which had been made available to all the students and been used in some tutorials. The ETLQ and ETLQ inserts obtained from 111 students were used in the analysis.

We explored students' approaches by comparing the scores for items which were included in both the LSQ and in the ETLQ. It has to be borne in mind, however, that the LSQ asks about students' approaches to learning and studying Economics *in general*, whereas the ETLQ asks them about the way in which they approached *this particular module*. The scales used to make comparisons are deep4 and surface4 of the LSQ, and the corresponding edeep4 and esurface4 of the ETLQ. Deep4 and edeep4 contain nine matching items, surface4 and esurface4 contain four matching items. It must also be noted that, although these two scales were used in our analysis as they were considered to be relevant to the research question, they had not been designed for this particular case study, i.e. to investigate the effect of particular types of exam questions on students' approaches to learning and studying.

#### ETLQ insert

The 12 items in the ETLQ insert were designed in order to obtain quantitative information on students' perceptions of and attitudes to the new examination. They were based on interview statements made by the students, but without a conceptual framework linking them together so that there is no conceptual relationship between the individual items.

The ETLQ insert asked the students to rate each statement on a 1-7 scale, while the LSQ and ETLQ use a 1-5 scale. For reasons of consistency, the ETLQ insert data was changed to a 1-5 scale, transferring the data as follows: (1,2)=1, (3)=2, (4)=3, (5,6)=4, (7)=5.

#### Grades

For both years in question, we obtained the students' examination grades. For 2003/4, scores for the MCQ and the SAQ sections were recorded separately in addition to the overall examination grade. To allow us to conduct our analyses, the grades were converted into scores on a 1-5 scale. Since the full score for the MCQ was 20, a 1-5 scale was created converting the scores as follows: (0-4)=1, (5-8)=2, (9-12)=3, (13-16)=4, (17-20)=5. An equivalent conversion was carried out for the SAQ scores, for which the full score was 50: (0-10)=1, (11-20)=2, (21-30)=3, (31-40)=4, (41-50)=5. The overall examination score was converted as follows: (30-)=1, (30-40)=2, (40-50)=3, (50-60)=4, (70+)=5.

#### Summary

Although considerable amounts of quantitative data were available for analysis, only a small proportion had actually been designed with the requirement of this very specific case study in mind. This made it imprudent, to some extent, to carry out complex statistical analyses. Most of the analyses reported in this section were therefore carried out at item level by looking at some descriptive feature of the scores on individual items, like means and agreement percentage (i.e. the percentage of those who agreed or strongly agreed with a statement within the whole sample). Scales were only used to look at the correlations with students' performance on exam questions.

## Tentative findings on the basis of the quantitative data

### *Perceptions of the kind of learning required by MCQ and SAQ*

The data suggest that both MCQ and SAQ required understanding. 75.7% of the students disagreed or strongly disagreed that in-depth understanding was not needed for MCQ (ETLQ insert item 8), and 76.6% agreed or strongly agreed that understanding was needed for SAQ (ETLQ insert item 11).

Figure 1

ETLQ insert item 8: *I won't need much in-depth understanding to work out the answers to the MCQs.*

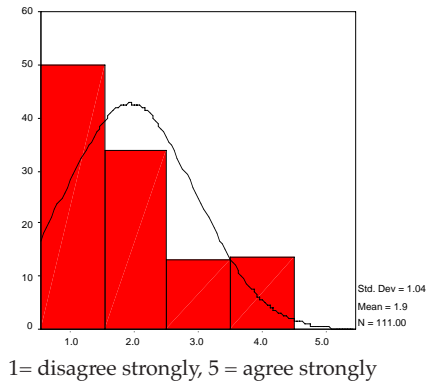
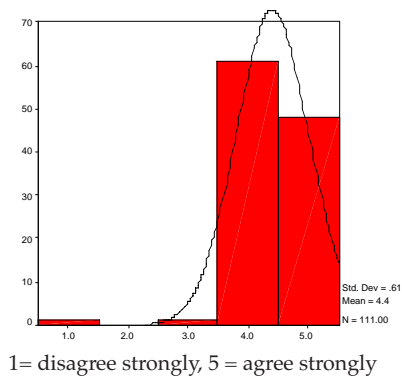


Figure 2

ETLQ insert item 11: *Answering the SAQs will depend on how much I've understood for myself.*



Making connections between theories and the real world is an important aspect of *ways of thinking and practising* (WTP) in Economics and was described by the module leader as a core learning outcome for the module. 98.2% students agreed or strongly agreed that linking theories to cases is required by SAQ (ETLQ insert item 10). In contrast, 91.9% students agreed or strongly agreed that MCQ required them to know details (ETLQ insert item 9).

Figure 3

ETLQ insert item 10: *Answering the SAQs will depend on me being able to link theories to the cases.*

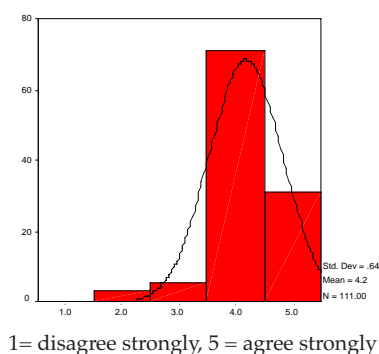
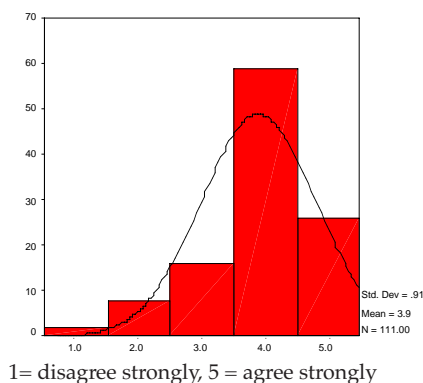




Figure 4

ETLQ insert item 9: *To answer the MCQs, I think I'll need detailed knowledge of specific information.*



On the basis of the above data, it therefore seems possible to argue that the students perceived the *level* of understanding required by MCQ and SAQ as relatively similar, while the *kinds* of understanding required by the two types of questions were regarded to be somewhat different, with SAQ focusing on application and MCQ on specific information.

#### Perceptions of the examination as a whole

The answers to ETLQ items on assessment showed that the students perceived the examination as a whole as being of a high quality. The students generally agreed that it required understanding (88.3% agreed or strongly agreed with ETLQ item 34) and critical thinking (73.9% agreed or strongly agreed with ETLQ item 38), although they knew that it would contain MCQ and thought that MCQ would require detailed knowledge of specific information (see above, ETLQ insert item 9).

Figure 5

ETLQ item 34: *You had really to understand the subject to get good marks in this course unit.*

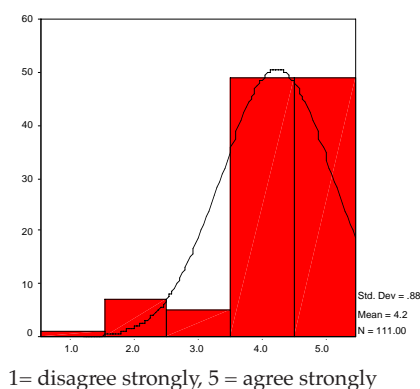
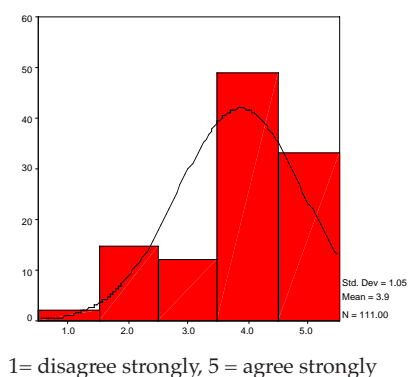


Figure 6

ETLQ item 38: *To do well in this course, you had to think critically about the topics.*

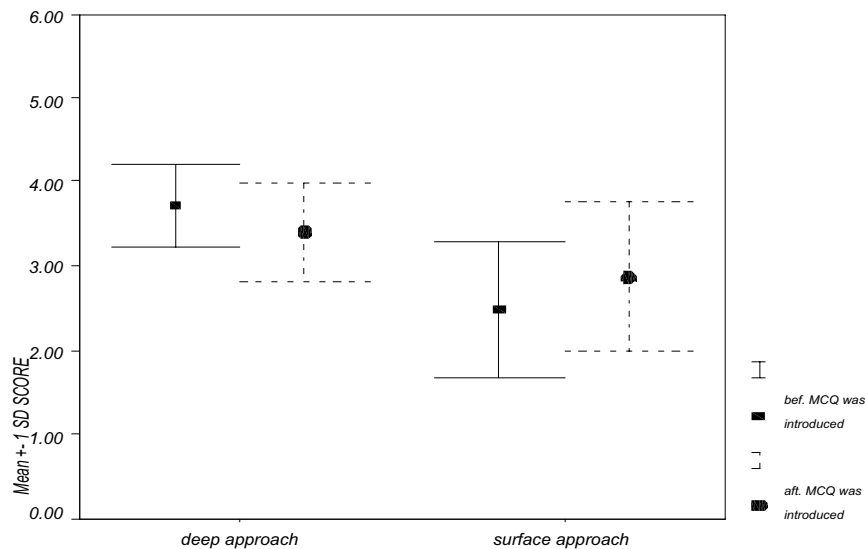


### Students' approaches to learning and studying and intended approaches to revision

Scores on the LSQ and ETLQ approaches scales (deep4 and edeep4, surface4 and esurface4) suggest that in the course of the module, the students' approaches to studying had moved into a less desirable direction. The deep approach declined (-.33), while the surface approach increased (.38), and the changes were both statistically significant ( $p < .05$  in t-test). This may have been influenced by students' perceptions of the examination.

Figure 7

LSQ and ETLQ scales on deep and surface learning



Quite a different picture emerges when looking at four items in the ETLQ insert that were written to elicit students' intended way of revising for the examination. Although the students tended to agree that their exam revision would require memorising facts and details as well as coverage, i.e. strategies which reflect a surface approach and are likely to be linked to MCQ, they also agreed or strongly agreed that revising for the examination required understanding of main ideas as well as diagrams. The latter two items reflect a focus on understanding which is characteristic of a deep approach. Means and agreement percentage for these four items are listed below.

Table 3

Means and percentage agreement for ETLQ insert items 2, 3, 5 and 6

	Means	Percentage of students who agreed and strongly agreed
2. I'm going to try to cover the whole syllabus as far as I can.	4.11	90.1%
3. I'll be trying to memorise a lot of facts and details to make me more confident.	3.89	81.1%
5. I think understanding the diagrams is going to be a high priority for me.	4.42	94.6%
6. I won't happy until I feel I've really understood the main ideas we've covered.	4.37	94.6%

A possible explanation of the somewhat conflicting findings suggested by these two clusters of inventory data might be that the LSQ and ETLQ items and scales, which painted a more negative picture of students' approaches, were written in order to access students' approaches to learning and studying the module in general rather than to access their revision strategies in relation to this specific examination. Other components of the teaching-learning environment, in addition to the new exam format, may have influenced their approaches.

### Relationship between exam scores

When considering the students' grades for the exam as a whole and for the two types of exam questions separately, those doing well on MCQ also did well on SAQ and vice versa. This also means that students' grades for MCQ and SAQ respectively correlated with their overall exam grades. In addition, doing well in MCQ and SAQ was positively related to the deep approach used to study the module and negatively related to the surface approach used to study the module. The result of Spearman's correlation analysis is presented in the table below.

Table 4

Correlations between exam scores and approaches to studying the module

	Scores on MCQ	Scores on SAQ	Scores on Exam	Deep approach on course studying	Surface approach on course studying
Scores on MCQ	1.00	.463**	.536**	.164	-.140
Scores on SAQ		1.00	.824**	.161	-.185
Scores on Exam as a whole			1.00	.228*	-.297**
Deep approach on course studying				1.00	-.493**
Surface approach on course studying					1.00

\*\* correlation is significant at 0.01 level \* correlation is significant at 0.05 level.

### Other issues related to perceptions of MCQ and SAQ

A considerable proportion of the students perceived the potential of MCQ to be ambiguously worded as problematic. 82.9% of them agreed or strongly agreed with the relevant statement (ETLQ insert item 7). SAQ were perceived more positively, as illustrated the fact that only 30.6% students agreed or strongly agreed that SAQ did not give them enough time to show what they really knew (ETLQ insert item 12).

Figure 8

Item 7 ETLQ insert: One problem I find with MCQs is that they can seem to be ambiguously worded.

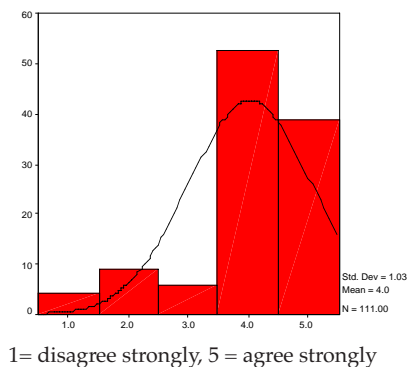
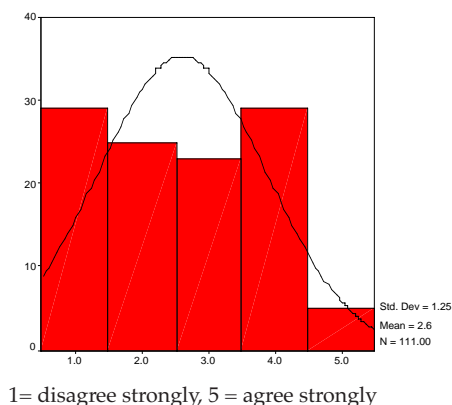


Figure 9

Item 12 ETLQ insert: SAQs just don't give you enough time to show what you really know.



### Summary of findings

Based on the evidence discussed above, it seems possible to argue that our expectations of a negative impact of MCQ on student learning in the module concerned, as suggested by the literature, were not fully supported by the data. Although students' approaches to learning and studying reported at the end of the module (ETLQ data) were not as positive as their approaches to the discipline as a whole (LSQ data), both MCQ and SAQ were perceived as requiring understanding, albeit different in kind. The main problem of MCQ was seen as their potential for being ambiguously worded. Understanding and critical thinking were regarded as important for the exam as a whole. Overall, MCQ seemed to work surprisingly well when used in conjunction with SAQ.

### Interview data used

Table 5 gives an overview of the interviews which were used for this study. They were conducted at various points during the course of the module, so that the timing of each interview influenced the experience of the assessment which the interviewees could refer to.

Table 5  
Interview data used for case

		No. of interviewees <sup>1</sup>	Timing
<b>Staff interviews</b>	Sta1	1 Module leader	First year of collaboration
	StaA	2 Module leader Second lecturer	End of term 2, before students sat examination
	StaB	1 Module leader	End of academic year, after marking examination
<b>Student interviews</b>	StuA	6	Beginning of term 2: after sitting formative test and after sample paper had been made available
	StuB	7	Beginning of term 2: after sitting formative test and after sample paper had been made available
	StuC	6	Beginning of term 2: after sitting formative test and after sample paper had been made available
	StuD	10	Beginning of term 2: after sitting formative test and after sample paper had been made available
	StuE	5	Beginning of term 2: after sitting formative test and after sample paper had been made available
	StuF	2	After sitting examination
	StuG	3	After sitting examination
	StuH	2	After sitting examination
	StuI	5	After sitting examination

<sup>1</sup> Two students were interviewed twice, hence the overall no. of interviewees is 45.



The interviews were complemented by informal meetings with members of the staff team, e-mail correspondence and telephone conversations. This allowed us to gain additional insight into the context and the way in which the changes to the assessment were implemented. It is also important to note that more questionnaire and interview data were collected during the first year of the collaboration. Although these data were not specifically used within the context of this particular case study, they may additionally have influenced the interpretations made here.

## **Tentative findings on the basis of the interview data**

### **Perceptions of MCQ**

#### *Purpose of MCQ*

The dominant purpose of MCQ as seen by staff was to ensure coverage.

- L: The thing with short question answers is, you could probably get away with learning perhaps two thirds of the course really well and, given the nature of choice available, you could get almost all the marks that you could get. I guess what we were also looking for was a compulsory question which tested an entire range of the subjects we taught.  
(staA)
- L: The multiple choice by their very nature cover a wider range of the syllabus. (...) Although there are only 20, at least you can attempt to cover the entire syllabus.  
(staA)

The way in which student interviewees perceived the main purpose of MCQ was congruent with staff intentions. Many of them stated that MCQ would make or had made them revise the entire module rather than concentrating on selected topic areas.

- S: I reckon it's probably harder this year than in previous years, because in other years you had to do two essays in two hours or something, so you could afford to not revise a couple of topics if you wanted, but because we had twenty multiple choice, then five short questions to do, you had to know pretty much everything to be able to be confident.  
(stuF)
- S: The multiple choice really for me effectively test just as well as the essay questions, because with the essay questions (...) you can learn two elements and you can ignore the rest of the syllabus, and in multiple choice you can't.
- I: So the multiple choice force you to revise more?
- S: Revise more generally, I think.
- S: It won't make you go into so much depth because, hey, if you don't know one question multiple choice, then so be it. That's what the essay question does.  
(stuB)

This was also confirmed by students' responses to ETLQ insert item 2 which asked them about their intention to cover the whole syllabus when revising and for which a large level of agreement had been obtained.

#### *Knowledge and learning required by MCQ*

Opinions varied somewhat regarding the kind of revision and the amount of depth required to answer MCQ. A large proportion of the interviewees stated that MCQ mainly relied on memorisation, factual knowledge and not a great deal of understanding. The interviewees frequently referred to prior experiences with MCQ which, in conjunction with the impressions gained from the formative test and the sample exam paper, appeared to influence their perceptions of MCQ on the module in question. The perceived importance of recalling very specific details as well as the clues provided by the answers made some students think that revision for MCQ was neither necessary nor possible.

- S: It is easy marks for you if you can understand what you're doing and do a lot. It is not very taxing to choose multiple choice.  
(...)

- S: (...) Anyone can just learn stuff. What it is actually testing is like someone has spent hours learning it.  
 I: It's about memorisation, is that what you mean?  
 S: (...) I did some exams last year with them, and (...) if you'd happened to have read that sentence then, whereas some people would have read every sentence and every sentence (...) Well, that's great, but where's that going to get you? Anywhere? Apart from if you were doing a job which was like a professional reader (...).  
 S: But also, you can't even have quite a good understanding of the concept as a whole. You have to have read THAT sentence, and memorised THAT sentence. Because I think they are that specific. Or that's what I found. There is almost no-one, unless they spent their whole life revising, (who) could have got everyone of those right. It would have been really difficult. Because you had to know that in-depth, and you had to know it absolutely perfectly.  
 (stuI)
- S: Either you know it all or you don't. But even if you don't, you could still get the answer to it.  
 S: Yeah, you can't revise for multiple choice really. (...) You either know your multiple choice or you don't.  
 (stuG)
- S: You can learn definitions, and things are always defined in multiple choice exams.  
 I: So that's one thing you would do?  
 S: Yeah, I would go through and learn definitions, I'd (...) go through diagrams and learn where points cross - (...)  
 S: Because if you got enough of a general idea, with multiple choice you can usually at least cross off two of them and just guess.  
 S: Because there's always like a stupid jokey one there.  
 S: Yeah, you've got a one-in-three chance of getting the right answer.  
 S: Yeah, there is always something that jogs your memory.  
 (stuB)

The interview findings do not fully confirm the responses to ETLQ insert item 8, which demonstrated that many of the respondents thought that they needed in-depth understanding to answer the MCQ. However, there is also evidence in the interviews that the MCQ used in the test and the examination were perceived by some students as requiring *some* in-depth understanding, in particular in relation to diagrams.

- S: I had to draw diagrams for quite a lot of them. You couldn't just think it through in your mind. They were actually referring to specific diagrams or you had to write it out and really think about it. It was quite complex.  
 (stuI)

One interviewee even indicated that the focus on breadth which the MCQ provided, brought the module together for him/her. Making connections is normally associated with the deep approach.

- S: For some of them I had to draw a bit of a diagram (...), do some maths or something. The advantage (...) was it did force me to revise the whole course, which meant that the whole course makes a lot more sense to me now that it did two months ago.  
 (stuH)

### *Design of MCQ*

Several of the points raised in the student interviews were related to the design of MCQ, in particular to the way in which the actual wording had the potential to cause confusion.

- S: It comes back to that whole point about the ambiguity of the questions, which is (...) frustrating and it makes you panic in an exam and it's just generally very unfair.  
 (stuB)
- S: They're a little bit vague, yeah, a couple of words or something. It's more to do with the English of the question rather than the actual knowledge of Economics, I think. Sometimes it's kind of they throw in triple negatives just to really mess (with your head). I find it quite annoying.  
 (stuE)

It has been shown already that many respondents also agreed or strongly agreed with ETLQ insert item 7 which raised the issue of ambiguity. Other issues related to the design of MCQ were brought up in the student interviews, such as two answers being extremely close to each other, the choices provided putting ideas into people's heads as well as the absence of recognition of partial understanding.

Staff acknowledged the importance of designing MCQ which were neither badly worded nor conducive to surface approaches to learning and revision and tried to overcome these problems by making the MCQ 'analytical'. Having experienced the difficulties of writing good MCQ and the amount of time and effort involved, made them realise that MCQ were perhaps less economical than had been expected.

L: All of them are really analytical in the sense that you've got to understand Economics theories to understand the question and to select the right answer. A couple of them require calculations of one sort or another, based on whether you, hopefully, understood theory.  
(staB)

L: [MCQ] are quite time consuming, costly to set up and they can be multi-guess, so you have to be very careful in selecting questions that have got plausible wrong answers. They have got to think and calculate something to get the right answer. That's very time consuming to get together.  
(staA)

L: One of the reasons for introducing them, the original reason I was pushed to do it is because it saves on staff time.  
(...)

L: (...) The only thing, of course, is, it doesn't save time, you spend hours –  
(...)

L: - on this particular paper –  
(...)

L: - staff costs are enormous.  
(staB)

## Perceptions of SAQ

### *Purpose of SAQ*

In relation to SAQ, staff emphasised their potential to test the application of theory to specific real-world problems and cases. An appreciation of the relationship between theory and real world also lies at the heart of WTP in Economics.

L: When we set about changing them, we decided that the questions that we would ask would be short questions. They would perhaps require half a page of explanation, but only if you knew what you were talking about, and it would require them to apply a concept to a specific situation. So it was not just reduction of whatever they learnt, but an application in a sense.

L: Yeah, that was a much better exam in that case. They were problem-solving questions.  
(staA)

As a result, one of the main challenges of SAQ as described by the students was in fact the *application* of their theoretical knowledge to the scenario presented in the question, i.e. making a link between the real world and economic theory. As had already been suggested by the quantitative data (ETLQ insert item 10), many of the interviewees regarded linking theories to cases as crucial for answering SAQ.

S: You need to know the theory, but you need to be able to apply that theory, and I think it's that application bit that will get you the decent marks.  
(stuG)

### *Knowledge and learning required by SAQ*

The majority of the students interviewed seemed to think that SAQ tested their understanding of the subject matter, rather than low level surface knowledge, and this had also been suggested by the quantitative data (ETLQ insert item 11).

S: Trying to answer the short answer question, it's a case of applying understanding. It's not just knowledge, but understanding, drawing a diagram and explaining it which requires understanding. It's not just what you can learn, but what you can actually understand, to show that you understand.  
(stuB)

- S: I find the multiple choice, you don't need to understand it, you just need to know it. Short answer questions test your understanding of the topic and the application of what you've learnt.
- S: Yeah, I think so, yeah, you can get by by just learning facts for the multiple choice, but when it comes to the short answers you've got to know a little bit more, the application of it.
- S: You don't need to know why –
- S: Understanding.
- S: - (for) the multiple choice, but you do for the short answer.
- .....
- I: Right. So they test quite different kinds of things?
- S: There's no explanation needed for multiple choice, it's just more recalling facts. (...) The short answer questions, we have to actually explain and analyse and it's a different skill I think.
- (stuC)

The interviews also provided details about students' perceptions and experiences of the process involved when answering SAQ and its core ingredients. First of all, they interpreted the question and decided which topic, theory or concept it implicitly or explicitly referred to. They then recalled (an) associated diagram(s) and considered the way in which both the theory and the diagram applied to the question. This resulted in a short explanatory text accompanied by a sketch of the diagram(s).

- S: I think you had to kind of (...) find out what the question is actually asking rather than –
- S: They are usually about a concept.
- S: - yeah, which graph they are looking for, what you have to use.
- I: So they are referring to a concept, a graph?
- S: Yeah, and (...) it's trying to work out from the question which graph you're meant to use. Not particularly looking at the question, that's almost like a minor detail. What you have to do is (...) get the right graph down.
- S: They always said in the tutorials that to get marks you'd have to draw a diagram and then talk about the diagrams.
- S: It is basically just (...) illustrate a concept, explanation.
- S: And very short.
- S: Yes, just, you couldn't write your way out of it. You have to hit the point dead-on to get the marks.
- (stuI)

### *The role of SAQ for students' developing sense of WTP*

What emerges from the interviews is that the SAQ contributed considerably to students acquiring an acute sense of the way in which economists think and represent their understanding. This is illustrated by the following quote:

- S: Yeah, I think if the exam had all been the short answers, where you were having to follow through your own working and reasoning, based on what you've learnt in your lectures or reading or whatever, I mean, that's really the point of Economics. (...) You've got to follow through and derive things, using all the sort of different tools from whatever you've learnt.
- (stuG)

While SAQ appeared to be in line with students' perceptions of WTP in Economics, some students felt that MCQ contradicted them.

- S: Mainly when I have done it [MCQ] in physics, the stuff is pretty straightforward, this is that. With economics questions, it's sort of –
- (...)
- S: - a matter of opinion in what you're answering.
- S: It's not an exact science.
- S: Yeah, that's true, because (...) sometimes you don't get the chance to explain why you put what you put, because there's something else very similar. (...) And if you're not sure, you want the chance to justify what you said, but obviously you don't get that.
- S: So I have never really thought about exam questions in terms of specific answers for certain things, things like that.
- S: Yeah. Likewise, I'd say the same thing. Physics is exact. You know there's one answer, that's it, whereas Economics at times you can argue about either way to an extent, or things are very similar. But one is supposed to be right and one is not.
- (stuB)



### *The role of diagrams for SAQ*

There was a large degree of similarity between what students regarded as the main purposes of Economics, of the module and of SAQ. Diagrams in particular were regarded as a core component of all three. They also featured in relation to MCQ, but to a much lesser extent.

S: I think it [the module]'s quite logical. It teaches you how to think. (...) There's an awful lot of diagrams involved so it is all quite, I don't know, quite conceptual,. You have to be able to understand and interpret diagrams, so I think that's quite an important skill. Most of the lectures, I just had notes of virtually diagram after diagram with very little writing in them. I think even that was brought forward in the exam as well, sort of a focus for the longer questions with diagrams important, very important.  
(stuI)

S: I think that's part of bringing everyone up to the same standard, people who haven't done A-level before. Getting people familiar and comfortable with using the diagrams and being able to show on the diagram why what's happening.  
(stuG)

S: (...) The interpretation of the graphs (...). I do Politics as well. With the way of thinking there, basically nothing's true, you can argue either way and that's how you do an essay. But Economics, it is kind of a theory, kind of assert something they believe that happens. So that's a difference. You don't argue for and argue against and then sum up, but never actually conclude something. You do make definitive conclusions, and there is a different way of thinking. (...) You need to know how to read the diagrams, what they mean, to get the conclusion.  
(stuH)

There is considerable evidence in the interviews of the perceived importance of diagrams for SAQ and the fact that the students had focused, or were intending to focus, on diagrams in their revision. Diagrams were also key to the way in which they approached answering SAQ in the actual examination.

S: The short essay questions, they said, oh just do a diagram, and then give a paragraph of explanation. So I always just did the diagram first. Then even if I wasn't entirely sure what I should say, I could usually improvise an explanation from that and just apply it to whatever the situation was that they were asking. And I got through it all right I think.  
(stuF)

The guidance the students had received had stressed that each SAQ would require a diagram, and the interviews showed that this advice had been fully taken on board. The quantitative data had already highlighted the perceived importance of diagrams for the examination (ETLQ insert item 5), and this was confirmed by the interview analysis.

S: You always need to know diagrams. If you learn diagrams, you can explain things from them anyway. If you understand the diagram, you could write a whole essay on the diagram, which is basically what the exam's asking.

S: Yeah, it does just come down to your ability to be able to remember how to draw a curve and understand what you're doing with that.

S: So as long as you can understand what you draw, then you can write about it, I think.  
(...)

S: Then again, to some extent, because there are so many diagrams, you have to know the theory behind the diagrams so that you, you know this is how it fits together. You can't sit down and write, this is how this diagram fits together, just learn it parrot-fashion, but it just doesn't work, you don't understand why the line is there.

S: Anyone can learn the shape of the diagrams –

S: It's not really just about diagrams, is it? You have to know various facts to deal with diagrams, it is just easier to do with diagrams.–

S: You get marks for diagrams, though, don't you, so you learn them.  
(stuB)

Knowing a diagram was described by the students as involving a *mental model or image* of what a curve looks like and being able to draw it, knowing where the lines are, what they represent and the way in which the curve shifts and moves, an understanding of the theory or concept underpinning the diagram as well as being able to apply and relate it to the cases and scenarios featuring in the SAQ. Although the

interviewees stressed that an understanding of what the diagram represented was necessary, knowing a diagram also seemed to comprise an element of memorisation. Some of the interview statements about diagrams contained references to memorisation as well as understanding.

S: Sometimes you do just have to memorise the way it looks like when you are doing budget lines and stuff, the specific slope of the curve can affect what is the outcome of a shift or something and you just have to, well I just had to remember the exact way that the curve looked because if you drew it a little bit to the side, then it would come out different, so you had to get all the relative places the same. But in other types you probably didn't have to memorise it completely, you could put it together from other stuff that you knew. But I found it more helpful to try and memorise them all.

(stuF)

S: If you can remember the diagrams, you can usually get the explanation from it. ... I think.

I: How do you remember the diagrams?

S: Just keep drawing them over and over again.

I: Is that the same for you, just remembering the diagrams?

S: I'd see that as being the key, because to get sort of, I would say, about half the marks you need, (...) the question requires it that you need the diagram, and as I say, if you can draw the diagram, you're bound to understand it and then can explain it and answer the questions.

(stuF)

S: It is very good to have a picture up here about what the diagram looks like, but I think that in order to learn it in the best way, we need to have some kind of background to the behaviour. (...) What if this happens, will this go down, will this go up? So as far as just learning the diagram by itself, that is very useful in itself, but (...) it's not just used to learn it by rote, you need to think about the wider implications.

I: So you can't learn it by rote?

S: Well, you can, but it is much more useful if you can –

S: You can learn a basic diagram and then, but you do have to know how it changes, because you're very rarely asked to produce just the one diagram that the textbook gives you. They'll say take this diagram, and if this happens, (...) then show this on the diagram. So you do need to know how they adjust within themselves.

(stuA)

S: You just had to learn, there was sort of particular sets of graphs (...), just learnt that. And if you do that, then if you get enough to pass (...), that was kind of what I went for. (...) I thought there were a few and we'd done them in tutorials. They were kind of obvious, well relatively obvious that some of them would come up, so if you just learnt –

I: Yes.

S: - kind of damage limitation type.

I: So subjecting them to memory, the graphs?

S: Yeah, because I just find it really easy just to. It's quite easy to learn a graph because it's quite straightforward.

(stuD)

S: Because I know people who learn ten or fifteen diagrams off by heart, they got those ten or fifteen diagrams, and once they've got those in their memory, you can just draw them out, draw them out, draw them out. You can go into the exam, draw the diagram and then extrapolate an answer from that, rather than apply your theory to your diagram, more than just pulling it off what you've drawn.

(stuG)

Although a diagram is a remembered image which not been constructed by the student, it still shares some of the features of a knowledge object, namely its visual, quasi-sensory nature, the fact that it represents understanding in a condensed format and its potential to serve as a trigger (Entwistle and Entwistle 2003). Knowing a diagram as described in the interviews tended to include a visual representation of the curve. The ability to recall the relevant diagram seemed to trigger an answer to the SAQ, rather than the diagram being used in order to illustrate an answer. When answering the question, it was the diagram which was recalled first and, as exemplified by the last interview excerpt, this then enabled the student to "pull off" an answer.

As illustrated by the quotes above, the interviewees tended to recognise the limitations of memorising diagrams, if such memorisation was not coupled with an understanding of what they represented. While learning diagrams by heart might help to obtain a few marks or scrape through the exam, most interviewees realised that this was not really what was required. They also recognised that memorising the details of a

set of important graphs without understanding the underlying theory would be a very difficult task to be accomplished in practice.

The different aspects of knowing a diagram within the context of SAQ, i.e. memorisation, understanding and application, may be responsible for the conflicting picture which arose from the ETLQ insert, where items referring to memorisation and coverage (items 2 and 3) obtained similarly high scores to items referring to understanding (items 5 and 6). The following section will show that this seemingly contradictory combination of memorisation and understanding may in fact be typical of the entire examination.

## Perceptions of the examination as a whole

### *Combination of MCQ and SAQ*

The overall picture of the examination which emerges from the student interviews is one which combines the assessment of breadth with that of depth. There seemed to be agreement among the interviewees that a good understanding of the entire syllabus was necessary in order to do well. This could not be achieved by memorisation and rote learning alone.

S: You did have to understand to an extent because they put a certain question towards you which you obviously wouldn't have seen before. So you had to make sure you could apply the knowledge that you had to that specific question, you couldn't just write down what you knew, you had to apply it to the question. Maybe some slight memorising, but at the same time you also need to understand it.  
(stuF)

Only students with previous knowledge of Economics who already had an understanding of some of the concepts and theories concerned, were in a position which allowed them to limit their revision to certain areas of the curriculum.

I: Did the fact that you had A level economics have an impact on your revision?

S: Yeah, the stuff at the start of the module I didn't really look at.

S: Uhum. You concentrated more on macro.

I: You did that from memory because you knew you knew it?

S: It' just drilled into your brain already.  
(stuF)

S: I think A-level meant that you're quite acquainted with basic concepts of economics. You didn't have to bother to revise what somebody means by supply and demand analysis because you already know that. So you could get on with the more advanced stuff.  
(E3F-stuI)

The impact of different levels of prior knowledge among the students on the module may be an additional explanation for the conflicting picture which arose from the quantitative data, where scores for the deep approach had decreased and scores for the surface approach had increased, while understanding and critical thinking were still perceived as important for doing well on the module.

The combination of SAQ with MCQ appeared to be responsible for the link between depth and breadth, understanding and (some element of) memorisation. The perceived necessity to revise the entire syllabus seemed to be a direct consequence of the use of MCQ. However, the students' comments conveyed a strong sense of SAQ being what the module, the examination and, ultimately, Economics were *really* about. This was likely to be due to the way in which SAQ reflected WTP in Economics.

S: I didn't revise with the multiple choice questions in mind, I was mainly revising with the short answer questions and what they'd be looking at there. With the way I set out my revision, with a diagram and then explaining what it meant, and then any derivatives of the diagram, and then just as short an answer (with?) the theory behind it.  
(stuH)

### *Amount of depth required*

Although understanding and some depth were regarded as important, there were limits to the *amount* of depth which the students considered necessary. Since the purpose of the module was seen as providing a solid introduction and consolidation of core economic concepts as a basis for further study, a considerable proportion of the interviewees regarded the examination as not requiring “anything particularly profound”, as one of them put it. They assumed that additional depth would be achieved later-on in the degree programme, once the foundations had been established in this introductory Economics module. The notion of the examination as assessing “basic understanding”, as opposed to considerable depth and detail, is expressed in the following interview excerpts:

- S: If you don't understand anything when you go into that exam, you can't really answer the questions. (...) If you understand the principles, then they are quite basic and you don't need to know much detail about the principles. But if you understand what they are for and could practise applying them, then I think you can gear yourself towards the thinking in the right frame of mind.  
(stuD)
- S: I just think this module's just meant to be a broad base for next year, I don't think it's trying to teach you anything particularly profound, to be quite honest.
- S: Yeah.
- S: I think what they want to ensure that, they want to force you to learn everything reasonably, as opposed to guessing three topics.
- S: Otherwise why would it be compulsory?  
(...)
- S: That's what they want, they just want a broad base for everyone, for everyone to start off in the same place next year.  
(stuB)

When asked about their views on the appropriateness of (longer) essay questions as an assessment tool for this module, some students expressed the view that essays required more depth than this module was asking them to achieve.

- S: I don't think we know enough in-depth knowledge to answer knowledge essay questions. Because there's such a breadth of knowledge, there's no way you can get that done. Personally I don't think.  
(...)
- S: (...) You either go to some topics in depth, like you do in Politics for example, or you cover the whole range of concepts at a basic level. I much prefer our way of doing it.  
(stuI)

Although the students generally recognised that SAQ assessed a higher level of understanding than MCQ, there were some interviewees who thought that hardly any depth at all was required to answer SAQ. This view is expressed in the following interview excerpts:

- S: Presume I did absolutely no revision whatsoever. I think I realise I have to do some, but not very much, because they are short answer questions, you just do one diagram, two paragraphs, and that's it.  
(stuB)
- S: Just like for History, as I say, you can always learn a little bit more, a little bit more in depth. But there's nothing really in depth in Economics, it's just the graph. [Tittering] Learn a few lines on it. That sounds really bad.  
(stuE)

Overall, the examination can be described as assessing a moderate depth of understanding. Considering in particular the emphasis on application via SAQ, the highest level required could perhaps be equated to the *relational level* of the SOLO taxonomy (Biggs and Collis 1982). The top level of the taxonomy, extended abstract, however, does not appear to feature in the examination, as perceived by the students and as described by the lecturers. The absence of the highest level of complexity may well be what students refer to when they talk about the module not requiring that much in-depth knowledge, as for instance, would be necessary for constructing good answers to essay questions.



## Making the teaching-learning environment more congruent

### *Rethinking the examination*

When it was first decided during a departmental annual review meeting to introduce more MCQ into examinations, the module leader was relatively sceptical and aware of the possible negative implications for student learning.

- L: The original reason I was pushed to do it is because it saves on staff time –  
(...)  
L: - and makes it more objective –  
(...).  
L: - and I was very reluctant to do it.  
(staB)

In the meetings between the ETL researchers and the module staff team, the second lecturer expressed a much keener interest in MCQ than the module leader. The module leader's reluctance, however, changed during the process of redesigning the examination. The focus gradually shifted from using MCQ in order to make marking quicker and easier to *rethinking the entire nature and purpose of the examination*. Within this, MCQ only had a limited role to play, namely to ensure syllabus coverage. When staff were interviewed about the changes that had been made, much more time was devoted to talking about SAQ. It seemed that it was SAQ in particular which genuinely reflected the intentions of the module team as well as accounting for over two thirds of the overall grade. Since SAQ required students to link theories to real-world cases, the development of the SAQ element of the examination allowed staff to focus on a core aspect of WTP in Economics. In the staff interviews the inclusion and design of SAQ was therefore portrayed as their main achievement.

- L: I'm quite proud of the fact that it really is asking students to do some thinking that they haven't done before, that is to say apply well-known areas of Economics, which they can memorise, to specific problems, which in some cases they face themselves. That's the one big, I think, the thing we can be quite proud of, that we do far more of that now than we've ever done in the past.  
(staB)

It was the module leader and the second lecturer who were mainly responsible for and active in redesigning the examination. When talking to them about the redesign, the rationale given for making the changes, both informally and as part of formal interviews, varied and seemed to reflect different stages of the thinking process which they went through in the course of the redesign. From a research perspective, it was difficult to distinguish between the original aims for the changes and the actual advantages discovered during and after their implementation. The following reasons featured in the staff interviews:

- coping with an increase in student numbers
  - speeding up the marking process
  - making marking more objective
  - preventing inequities between students as a result of essay questions being marked by markers of differing experience and quality
  - preventing memorisation of essay answers
  - ensuring coverage of syllabus
  - focus on application, problem-solving and analysis
  - discriminating better between good and bad students
- L: There's a number of different markers and the essay-based nature of the exam is more subjective so we did change it. A: because the department wanted us to introduce more objective tests and B: it did need looking at anyway.  
(staA)

### *Making the teaching-learning environment more congruent*

Not only had the enforced introduction of MCQ led to a complete redesign of the examination, the changes to the examination also resulted in staff *rethinking other components of the teaching-learning environment* of the module and in a strong focus on the key learning outcomes, as conceptualised by the two lecturers.

- L: Because we decided to change the assessment system, we had to discuss what it is that we want to assess. And it was a rather old fashioned exam. Now (...) we were focused on problem solving, and could they use the information that they've got.  
(staA)

In an interview conducted during the first year of the collaboration, the module leader described what he wanted students to achieve on the module as acquiring the foundations for further study. This included an understanding of certain key concepts and being able to apply them, using Economics to make sense of the real world, technical skills in handling graphs and simple mathematics as well as understanding the way in which economic knowledge has evolved and the relevance of schools of thought.

- L: What do they need to survive in 2<sup>nd</sup> year? They've got to get a handle on certain key concepts (...) Demand and supply are basic. (...) Indifference curve and isoquant analysis are key. Maximising the constraint, that's a key idea. In macro, well, I'd say IS and LM analyses. (...) Growth theory.  
(sta1)
- L: If they can't understand the theory, that's the first problem you've got to overcome. It's a lot of teaching. But when they've A: understood it and B: they can apply it, then that really is a success.  
(sta1)
- L: You've got to equip them with basic skills to go into second year. And my own personal idea is to give them an understanding that we're trying to understand a real world as there is no one bible that will help you do that. Technical skills are important, an attitude to what is knowledge.  
(sta1)
- L: I keep hammering home (...) that knowledge is the outcome of dispute, of academic debate, so it isn't gospel. Look at the way the theory has evolved.  
(sta1)

Redesigning the examination thus seemed to have provided an opportunity to focus the assessment more specifically on some of these intended learning outcomes, in particular on understanding and applying key concepts to real world cases and on using of diagrams. These outcomes were foregrounded, not only in the examination, but also through other components of the teaching-learning environment. The module team put several measures in place which provided students with additional guidance and experiences preparing them for the examination and helping them to achieve the learning outcomes which the examination was going to test. It can be argued that this ultimately led to a *more congruent* teaching-learning environment. The individual stages of the redesign and alignment process are listed in the table below:

Table 6  
*Measures taken to prepare students for examination*

1.	Self-marked MCQ tests are made available to all students via VLE	During academic year 2002/3
2.	Department recommends to introduce MCQ into examinations as part of Annual Review	End of academic year 2002/3
3.	Module team decides to introduce MCQ into final examination	End of academic year 2002/3
4.	Students take formative test on microeconomics, which include MCQ and SAQ	Beginning of term 2 2003/4
5.	SAQ modelled on exam questions are used in some tutorials	During term 2 2003/4
6.	Sample examination paper is made available to all students and used in some tutorials	During term 2 2003/4
7.	Two revision lectures take place in the last two teaching weeks before the examination (as in previous year)	Beginning of term 3 2003/4
8.	Staff send out e-mail containing guidance and tips for revision	During term 3 2003/4
9.	Students take the redesigned end-of-module examination, which include MCQ and SAQ	End of term 3 2003/4

While redesigning the examination was the main driver of the change process, this also led to focusing the attention of the staff team on the way in which the different components of the teaching-learning environment contributed to the learning outcomes of the module. The student interviews during the second year of the collaboration conveyed a relatively strong sense of congruence and of students knowing what was necessary to do well on the module.

- I: Did the exam test what you were taught on the module (...)? Was it a good reflection on what you had been taught during the year?  
S: Yes, I thought so.  
S: Yeah, for the most part I think it was.  
I: So there is quite a good alignment, shall we say?  
S: Yeah, you could see which part of the course it was testing, in most cases so.  
(stuF)

We would tentatively suggest that this sense of alignment or congruence may be a product of introducing a new examination format and of the process which led to its implementation.

### *Components of the teaching-learning environment contributing to congruence*

From the interviews it became obvious that some components of the teaching-learning environment had made particularly significant contributions to this sense of congruence which was felt by the students. The tutorial questions, which were modelled after the SAQ used in the formative test and the examination, repeatedly came up in the interviews<sup>1</sup>. They provided the students with a very clear idea of what to expect and made them feel well prepared.

- S: I think the tutorials better prepared us for the test, particularly in our tutorials where we always had every week a set of short answer questions to do, and so I think that was good preparation.  
(stuC)
- S: I thought it was kind of, the layout and stuff was how I expected and the type of questions, and I thought it was good that we went through the same type of ones in the tutorial that we got in the test, so you kind of knew what kind of questions you can get.  
(stuD)
- S: In my tutorials (...) we had several questions to answer, which we'd go through, which were on the topic that we'd been covering in the past two weeks. (...) If there were any questions about anything that we'd done, we could bring them up. (...) I think I did learn most of the, the sorts of questions that would come up in the exam, the style of answers. In the lectures you'd learn the theory, but in the tutorials you are just going to apply that to the problems that we'd have in the exam or just generally.  
(stuH)

The practice MCQ made available in the VLE were another component of the teaching-learning environment contributing to congruence. They provided an opportunity for students to make themselves familiar with the format and possible content of the MCQ.

- S: For that test (...) you can sort of train yourself, and we were trained last term because we did four sets of multiple choice questions for each lot of topics and so we were in the right frame of mind for that kind of questioning.  
(stuD)

There were also some instances in the interviews which suggested that complete congruence had not been achieved. Some of the interviewees commented, for instance, on discrepancies between the formative test, the sample paper and the final examination.

- S: It [the sample paper]'s much harder than the one that we did.  
I: Than in the test, yeah. In what way harder?  
S: (...) The short answer questions, (...) it's much harder to find the economic content within it, whereas before it

---

<sup>1</sup> It must be borne in mind that the interviewees had not been recruited equally across tutor groups, so that it cannot be guaranteed that the same kind of questions were used in all tutorial groups without any exceptions.

was slightly easier I think.

S: Yeah, I think it's hard as well, for the same reasons.

I: What do you mean by economic content?

S: The economic theory that it's trying to get you to analyse isn't as explicit in the question – (...)

S: - you've got to interpret certain parts of the question and see what the theory is behind, the theory that they're trying to demonstrate.

(stuC)

It is likely that these discrepancies were due to the fact that some of the measures listed in table 6 above were implemented before the new examination had been written.

Both the positive and negative examples illustrate that going through this process of change and fine-tuning of the environment contributed to staff gradually sharpening up their sense of what it was they were trying to achieve and how it could be achieved. There is evidence in the interviews of a *gradual process of change* which evolved over time. Going through the process of making small changes and implementing them bit by bit, writing questions for the VLE, the formative test, the tutorials, the sample paper and the actual examination seemed to have shaped the module team's thinking about the teaching-learning environment. It allowed them to experiment with different ways of testing and to move closer to the kind of examination which actually assessed the learning outcomes they were hoping to assess.

## Conclusion

The discussion has highlighted that the introduction of MCQ into the examination of a first year introductory Economics module did not quite have the exclusively negative effect which had been anticipated. In the module under investigation MCQ and SAQ were used *in parallel*, and we assume that the fact that both question types complemented each other was responsible for the specific impact they had on student learning. Both the quantitative and the qualitative data used for this study seemed to suggest that the new examination format produced a combination of surface and deep approaches to studying. These were linked to student perceptions of the examination as testing both breadth and some depth of understanding, and student perceptions mapped very clearly onto staff intentions. The literature led us to assume that the combination of breadth and depth, of lower as well as higher level understanding may well reflect the purposes of introductory Economics, which seemed to focus on laying the foundation for future, more in-depth study.

The analysis of the interviews highlighted the crucial role of diagrams for students' developing sense of WTP in Economics. The examination and SAQ in particular required a thorough knowledge of some key diagrams, thus engaging the students with a core aspect of WTP in Economics. The way in which the interviewees referred to diagrams led us to conclude that knowing diagrams comprised both elements of understanding as well as memorisation, perhaps reminiscent of what Tang (1994) called 'deep memorisation'. Other authors have drawn attention to the fact that memorisation and understanding may be more closely related than initially assumed (e.g. Entwistle and Entwistle 2003), and this study provides additional support for that claim. In addition, we wonder whether the deep memorisation found in the data may point to a discipline-specific facet of approaches to learning and studying, arising in particular from the role of diagrams as core representations in Economics.

One interesting, yet tentative finding has been the positive effect of the changes to the examination format on the attempts made by staff to achieve a high level of congruence within the teaching-learning environment. We would argue that a change which leads staff to rethink the assessment and the way in which it is constructively aligned with the other components of the teaching-learning environment, must be regarded, at least to a certain extent, as positive. This finding draws attention to the actual *process* of making, or trying to make, a teaching-learning environment congruent. McCune and Hounsell have already alerted us to the fact that alignment is "an ideal that is well worth striving for but one that is seldom likely to be attained in any full or complete sense" (McCune and Hounsell 2005: 259). This case study has shown that it may be worthwhile to pay more attention to the process of making a teaching-learning environment more congruent rather than conceptualising congruence (or constructive alignment) exclusively as an end product.



There is a need for research which looks more closely at 'real-world' assessment and the processes involved in designing it, as well as taking account of the context in which such assessment is situated, including the disciplinary one. Only if educational research engages with the contextual and disciplinary purposes which influence the design of teaching-learning environments will practitioners take notice of the findings it generates and consider its implications for their practice. The present study has shown that such research would also need to consider the system of assessment (Tang 1994) and the interaction between different tasks and question types rather than investigating them as separate phenomena.

## References

- Becker, W. E., Johnston, C. 1999 'The Relationship between Multiple Choice and Essay Response Questions in Assessing Economics Understanding' *Economic Record* 75(231): 348-57.
- Biggs, J. 2003 *Teaching for Quality Learning at University. What the student does*. Second Edition. Maidenhead: Society for Research into Higher Education & Open University Press.
- Biggs, J. 1996 'Enhancing teaching through constructive alignment'. *Higher Education* 32: 347-364.
- Biggs, J., and Collis, K.F. 1982 *Evaluating the Quality of Learning. The SOLO Taxonomy (Structure of the Observed Learning Outcome)*. New York and London: Academic Press.
- Carlson, J. L., Ostrosky, A. L. 1992 'Item Sequence and Student Performance on Multiple-Choice Exams: Further Evidence' *Journal of Economic Education* 23(3): 232-35
- Chan, N., Kennedy, P. E. 2002 'Are Multiple-Choice Exams Easier for Economics Students? A Comparison of Multiple-Choice and "Equivalent" Constructed-Response Exam Questions' *Southern Economic Journal* 68(4): 957-71.
- Entwistle, N., and Entwistle, D. 2003 'Preparing for Examinations: The interplay of memorising and understanding, and the development of knowledge objects'. *Higher Education Research & Development* 22(1): 19-41.
- Hounsell, D., and McCune, V. 2002 *Teaching-learning environments in undergraduate biology: initial perspectives and findings*. Universities of Edinburgh, Coventry and Durham: Enhancing Teaching-Learning Environments in Undergraduate Courses (ETL) Project, Occasional Report No. 2, <http://www.ed.ac.uk/etl/publications.html> [Last accessed 21 May 2004].
- Heck, J. L. ; Stout, D. E. 1998 'Multiple-Choice vs. Open-Ended Exam Problems: Evidence of Their Impact on Student Performance in Introductory Finance' *Financial Practice and Education* 8(1): 83-93.
- Krieg, R. G., Uyar, B. 2001 'Student Performance in Business and Economics Statistics: Does Exam Structure Matter?' *Journal of Economics and Finance* 25(2): 229-41.
- Maunder, P. 2002 'In support of multiple choice questions: some evidence from Curriculum 2000'. Paper presented at the Annual Conference of the British Educational Research Association, Exeter, 12-14 September 2002. [s.ac.uk/educol/documents/00002575.htm](http://www.lleds.ac.uk/educol/documents/00002575.htm) <http://www.lleds.ac.uk/educol/documents/00002575.htm> [last accessed on 4 November, 2004]
- McCune, V., and Hounsell, D. 2005 'The development of students' ways of thinking and practising in three final-year biology courses'. *Higher Education* 49: 255-289.
- O'Neill, P. B. 2001 'Essay versus Multiple Choice Exams: An Experiment in the Principles of Macroeconomics Course' *American Economist* 45(1): 62-70.
- Paxton, M. 2000 'A Linguistic Perspective on Multiple Choice Questioning'. *Assessment & Evaluation in Higher Education* 25(2): 109-119.
- Ramsden, P. 2003 *Learning to Teach in Higher Education*. Second Edition. London, New York: RoutledgeFalmer.
- Reid, F. J. 1976 'Scoring Multiple-Choice Exams' *Journal of Economic Education* 8(4): 55-59.

- Reimann, N. (in press) 'Aligning teaching-learning environments with students – a new perspective on constructive alignment in the light of student diversity' *Proceedings of Improving Student Learning Symposium* September 2004.
- Scouller, K 1998 'The influence of assessment method of students' learning approaches: Multiple choice question examination versus assignment essay'. *Higher Education* 35: 453-472.
- Scouller, K & Prosser, M. 1994 'Students' experiences in studying for multiple choice question examinations'. *Studies in Higher Education*, 19(3): 267-279.
- Tang, C. (1994). Assessment and student learning. In Gibbs, G. (ed) *Improving Student Learning: Theory and Practice*. Oxford: Oxford Brookes University: pp.151-170.
- Thomas, P.R., Bain, J.D. 1984 'Contextual dependence of learning approaches: the effects of assessments'. *Human Learning* 3: 227-240.
- Walstad, W. B., Becker, W. E. 1994 'Achievement Differences on Multiple-Choice and Essay Tests in Economics' *American Economic Review* 84(2): 193-96.
- Walstad, W. B., Robson, D. 1997 'Differential Item Functioning and Male-Female Differences on Multiple-Choice Tests in Economics' *Journal of Economic Education* 28(2): 155-171
- Walstad, W. B. 1998 Multiple choice tests for the economics course. In Walstad, W. B., and Saunders, P. (eds.) *Teaching undergraduate economics. A handbook for instructors*. Boston et al: McGraw-Hill: 287-304.
- Walstad, W. 2001 'Improving Assessment in University Economics'. *Journal of Economic Education* 32(3): 281-294.
- Welsh, Arthur L., and Saunders, P. 1998 Essay questions and tests. In Walstad, W. B., and Saunders, P. (eds.) *Teaching undergraduate economics. A handbook for instructors*. Boston et al: McGraw-Hill: 305-318.

## Contact details

Dr. Nicola Reimann  
 Centre for Learning, Teaching and Research in Higher Education  
 School of Education  
 University of Durham  
 Leazes Road  
 Durham DH1 1 TA  
 UK  
[Nicola.Reimann@durham.ac.uk](mailto:Nicola.Reimann@durham.ac.uk)

Rui Xu  
 Higher and Community Education  
 School of Education  
 University of Edinburgh  
 Paterson's Land  
 Holyrood Road  
 Edinburgh EH8 8AQ  
 UK  
[Xu.rui@education.ed.ac.uk](mailto:Xu.rui@education.ed.ac.uk)