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## **STUDENT AND STAFF PERCEPTIONS OF THE USE OF MULTIPLE CHOICE TESTING IN HIGHER EDUCATION ASSESSMENTS**

*Kay I. Penny, Jacqueline Brodie, Edinburgh Napier University, United Kingdom*

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### **Introduction**

During the last twenty years, participation in Higher Education has doubled and there has been more variation in student backgrounds and prior experiences (Biggs, 2003). Multiple choice questions (MCQs) are commonly used in higher education assessments, and their use has increased alongside the improved reliability and availability of information and computer technology (ICT). As an alternative to paper-based MCQs, the use of online MCQ testing is often considered as an option to help deal with increasing numbers of students on distance learning and workplace learning courses, reduced education resources, and they can also help to reduce the burden of marking that is associated with large cohorts of students (Bull & McKenna, 2004; Nicol, 2007). As well as their use in the traditional university setting, MCQs are commonly used to assess learning in workplace settings, for example, a study by Albino and colleagues (Albino et al., 2008) reported that 45% of academics surveyed used MCQs to assess learning in dental education based in the workplace.

Many studies have concluded that the use of MCQs promotes memorisation and factual recall and therefore do not encourage high-level cognitive processes (Airasian, 1994; Scouller, 1998). However, some researchers believe that they can be used to evaluate learning at higher cognitive levels if the tests are constructed to allow for this (Cox, 1976; Johnstone & Ambusaidi, 2000). By their nature, MCQs are not usually considered to encourage deep learning as the questions require the selection of a correct answer rather than the construction of a response. On the other hand, students who participate in online self-assessment have improved academic performance compared to those who have not, and even students with low motivation levels made use of an online MCQ tool (Ibabe & Jauregizar, 2010).

Seven principles of good feedback practice were identified to support the development of learner self-regulation and are listed in Figure 1 (Nicol & Macfarlane-Dick, 2006) and the ways in which MCQs can be used to support these points have been considered in detail using case studies (Nicol, 2006).

Good feedback practice:

1. Helps clarify what good performance is (goals, criteria, standards)
2. Facilitates the development of self-assessment and reflection in learning
3. Delivers high quality information to students about their learning
4. Encourages teacher and peer dialogue around learning
5. Encourages positive motivational beliefs and self-esteem
6. Provides opportunities to close the gap between current and desired performance
7. Provides information to teachers that can be used to help shape teaching

Figure 14. Seven principles of good feedback practice (Source: Nicol & McFarlane-Dick, 2006)

The aim of this paper is to present the perceptions of both lecturing staff and students on the use of MCQs in higher education and to summarise the viewpoints and opinions of their usefulness to give both formative and summative feedback. These findings will help to summarise current opinions on the use of MCQs in Higher education and will aid lecturers, programme leaders and work-based tutors to consider the appropriateness and acceptability of their implementation for distance or e-learning study.

## **Methods**

All Business School students and teaching staff members at Edinburgh Napier University Business School were invited to participate in the online survey in May 2012. An email invitation was sent to all students and to all teaching staff within the faculty inviting them to participate in the respective survey questionnaires. The email invitation contained information about the research study and it was made clear to potential respondents that participation in the survey was on a voluntary basis. Ethical approval was sought from the Faculty Research Integrity Committee before embarking on the survey research. The email invitation also contained a hyperlink to the online survey which was developed within the online survey tool, SurveyMonkey.com. In order to try and boost response rates, email reminders were sent out to the staff and student cohorts three weeks after the first invitations, asking those who had not responded to take part in the surveys, and thanking those who had already responded. The survey contained mostly closed questions relating to experience and opinions on the use of MCQs in higher education assessment, but also included a couple of open questions to gain a more in-depth understanding of views on the use of MCQs.

## **Findings**

### **Survey Findings**

A total of 334 students responded by answering questions related to their experience or their opinion on the use of multiple choice questions in their university modules. Only 28 teaching staff, approximately one quarter of the total teaching staff members in the faculty, responded to the questionnaire survey.

The majority of students who participated in the survey were female (64.4%) and 80.2% of respondents were less than 30 years of age. Students were studying a range of different degree programmes within the Business School. Of the 334 students who responded to the survey, 282 (84.4%) were undergraduate students and 52 (15.6%) were postgraduate students. Of the undergraduate students, most were in years three and four of their studies (30.5% and 31.9% respectively), and fewer students were in year one (17.0%) and year two (20.2%). One student (0.4%) selected 'other' for year of study, indicating that this student is perhaps not studying towards a full degree but rather for a stand-alone module.

Of the 52 postgraduate students in the sample, the majority of 33 students (63.5%) were studying towards a taught MSc Programme, 10 (19.2%) were MBA students and the remaining 9 students (17.3%) said they were studying for an MSc by research.

Students were asked if they had taken an MCQ test at University in their current degree programme. A total of 63.1% of undergraduates answered 'yes' they had taken an MCQ test whereas only 48.1% of postgraduates said 'yes' to this question. This difference is statistically significant ( $p = 0.045$ ) indicating that students were less likely to take an MCQ test at postgraduate level than they were at undergraduate level. Of those who had taken an MCQ test, 90.5% of postgraduates said they had taken a test as part of the formal module assessment and 9.5% of postgraduates said they had only been exposed to an MCQ test to inform them of their progress and no marks were awarded. Only 3.5% of all undergraduates who had taken an MCQ test, said the test was solely for the purpose of informing the students of their progress.

Table 1 shows the numbers and percentages of undergraduate and postgraduate students who agreed or strongly agreed with each of the statements. Chi-square tests of independence were carried out to test for associations between student degree level and agreement with each of the statements and p-values are presented in the final column of the Table 1. The findings demonstrate that neither undergraduate nor postgraduate students have a favourable attitude towards MCQ testing, and postgraduate students are more negative towards this type of test than undergraduate students. Although differences in opinions have been observed in our student sample, these differences are not statistically significant except for the statement 'Students enjoy MCQs more than other types of assessment' where 53.4% of undergraduates are in agreement with this statement compared to only 22.5% of postgraduates ( $p = 0.007$ ).

Students who had taken an MCQ test were also asked their opinions on the use of MCQ testing in their university modules. Fisher's exact tests were carried out to test for an

association between student degree level and their opinions on MCQ testing. Table 2 presents the percentages of undergraduates and postgraduates who believed that the MCQ tests were trying to assess each of the learning skills.

The majority of both undergraduates (83.1%) and postgraduates (76%) believe that MCQ tests are trying to assess knowledge; the difference in percentages between the two student groups is not statistically significant ( $p = 0.403$ ). The majority of undergraduate students (72.5%) believe that MCQ tests can assess comprehension or understanding, whereas only 32.0% of postgraduates believe MCQ tests can be used for this purpose ( $p < 0.001$ ). Fewer students, particularly postgraduates, believe that MCQ tests are useful for assessing application, and very few students in either group believe MCQ tests are useful for assessing oral skills and written skills.

Table 4: Student agreement with statements regarding attitudes towards MCQ testing

Statement	Number of students (percentage)		p-value
	UG	PG	
Adopting MCQ testing means 'dumbing down'	66 (28.1%)	15 (37.5%)	0.055
Students can guess their way to a Pass result in an MCQ test	109 (46.2%)	22 (55%)	0.762
The use of MCQ assessments encourages rote or surface learning	117 (50.0%)	21 (53.8%)	0.121
MCQs can test oral skills	33 (14.1%)	3 (7.5%)	0.212
MCQs can test written skills	47 (20.0%)	6 (15.0%)	0.323
MCQs could be used effectively to assess 50% or more of my module outcomes	86 (36.8%)	8 (20.0%)	0.124
MCQs do not allow student self-expression	148 (64.1%)	33 (82.5%)	0.089
MCQs should not be used for Masters level education	118 (50.9%)	26 (65.0%)	0.408
Students enjoy MCQs more than other types of assessment	125 (53.4%)	9 (22.5%)	<b>0.007</b>

Table 2: Percentages of students who believe MCQ tests are useful for assessing various types learning

Statement	Number of students (percentage)		p-value (Fisher's Exact tests)
	UG	PG	
Knowledge	83.1%	76%	0.403
Comprehension/ understanding	72.5%	32.0%	<b>&lt;0.001</b>
Application	25.8%	8.0%	0.075
Oral skills	1.7%	4.0%	0.411
Written skills	2.2%	0.0%	1.000

Students who had taken at least one MCQ test were asked how the tests were administrated and the findings are presented in Table 3. Most tests were administered online; 75.8% of undergraduates and 72.0% of postgraduates had taken an online MCQ test and very few students had received an MCQ test via an email attachment. Although 44.4% of undergraduates had taken a paper-based MCQ test, only 12.0% of postgraduates had done so; Fisher's exact test is highly significant ( $p = 0.002$ ) demonstrating that postgraduate students are less likely to be asked to take an MCQ test on paper.

Table 3: Method of administering MCQ test

Method of Administering Test	Number of students (percentage)		p-value (Fisher's Exact tests)
	UG	PG	
Online	75.8%	72%	0.630
On paper	44.4%	12.0%	<b>0.002</b>
Via email attachment	1.7%	4.0%	0.411

Students were asked how their MCQ tests were usually marked. The majority of all students said 'Online' (45.0%) and 36.1% said 'by staff', 3.7% said by student peers and 2.1% said they marked their own. A total of 13.1% of students who had taken an MCQ test stated that they didn't know how they were marked.

When comparing student opinions with teaching staff opinions, there were some differences in views relating to the role of MCQs as summarised in Table 4. Chi-square tests for independence were carried out to compare the levels of agreement between students and staff; significance levels are also presented in Table 4.

Table 4: Student and staff agreement with statements regarding attitudes towards MCQ testing

Statement	Numbers agreeing (percentage)		p-value
	Students	Staff	
Adopting MCQ testing means 'dumbing down'	81 (29.5%)	9 (34.6%)	0.095
Students can guess their way to a Pass result in an MCQ test	131 (47.4%)	10 (40.0%)	0.556
The use of MCQ assessments encourages rote or surface learning	138 (50.6%)	10 (40.0%)	0.465
MCQs can test oral skills	36 (13.2%)	2 (7.7%)	0.288
MCQs can test written skills	53 (19.3%)	7 (28.0%)	0.467
MCQs could be used effectively to assess 50% or more of my module outcomes	94 (34.3%)	2 (7.7%)	<b>&lt; 0.001</b>
MCQs do not allow student self-expression	181 (66.8%)	20 (76.9%)	0.797
MCQs should not be used for Masters level education	144 (52.9%)	15 (57.7%)	0.603
Students enjoy MCQs more than other types of assessment	134 (48.9%)	5 (19.2%)	<b>0.006</b>

For the majority of the comparisons presented in Table 4, there is no evidence of a difference in agreement between staff and students except that students are more likely to agree that

MCQs could effectively assess more than half of their module outcomes (34.3%) compared to only 7.7% of staff who took part in the survey ( $p < 0.001$ ). Also, 48.9% of students agreed that they enjoy MCQs more than other types of assessments whereas only 19.2% of staff thought this was true ( $p = 0.006$ ). The survey respondents were also asked if they thought that MCQs alone could be used as the only type of assessment in a university module. Only one staff member said 'yes' (3.8%) whereas 46 students said 'yes' (16.4%); this comparison was not statistically significant ( $p = 0.175$ ).

### ***Thematic Analysis***

A thematic analysis was carried out on the two open questions included in both the staff and student questionnaires which invited respondents to comment on whether they believed that MCQ testing could be used to assess a complete module/ course as well as inviting any additional comments or views on the use of MCQ tests in university education. Views are summarised into three main themes: Pedagogical tool to support student learning at HE; Questionable suitability at HE level; and Question construction.

On the whole, staff felt that MCQs were very useful in formative testing, but have limitations in testing higher level skills such as critical analysis, and are most useful in summative assessment when used alongside other more 'rigorous' assessment methods such as exams or essays. However, it was felt that the usefulness of MCQs is dependent on the quality of the question construction and that it is not good practice "to include obviously wrong answers."

While staff's views of the value of MCQs were on the whole critical, some positive factors were identified. For example, in the sub-theme 'supports formative assessment' some staff perceived it as a 'useful formative assessment tool' and it could help 'students with revision' and provide an 'opportunity for positive feedback' during the semester in 'some types of knowledge, understanding and application'. It was also highlighted under this theme that MCQs were particularly valuable when there was one definitive 'correct answer' and in two instances staff suggested it was even best suited to a 'non-scoring progress' test. Finally, it was noted that it was beneficial as part of a 'variety of assessment methods' that students could be exposed to, particularly in their early years of university study.

Despite some positive voices from staff, on the whole the feedback for the value of the use of MCQs was more negative. Several significant reservations were raised as to the value of MCQs in the classroom. The over-riding issue was MCQ's extremely limited use as a summative assessment tool. For example, several lecturers highlighted it could not assess higher order skills in their students thereby necessitating other pedagogical tools needing to be used. These higher order skills were identified as interpretation, critical evaluation, judgments, understanding of competing theories, writing skills, group working skills and reflective learning skills, alongside research and debating skills. There was also a sense that the use of MCQs could be perceived as sending the wrong message to students, particularly those engaged in postgraduate study. One staff member commented it's usage at that level 'sent a poor message about the rigour of any Masters' degree'. While another noted it became less

useful the higher the level of education. The reasons given for this were that students do not find MCQs particularly challenging or sophisticated tools to support their learning. With the opportunity to guess, distractions needed to be credible so that students needed to think about the topic presented. One particularly challenging point to the value of MCQs, from a member of staff, was that students were unable, through MCQs, to demonstrate their learning and 'to create an output'. This goes against current social constructivist approaches in the classroom and, as noted by another member of staff, means that most likely the use of MCQs will just be testing rote learning and guess work.

When looking at the student responses, the majority of students held negative views on the use of MCQ testing that reflected the staff's viewpoints. In particular, there was a perceived 'unfairness' of the scoring of MCQs and their overall effect on students' skills development. Students also highlighted MCQ's limitation in allowing them to apply and demonstrate higher cognitive skills during the assessment. In terms of unfairness, students singled out several issues, namely that grading schemes can seem random, the wording of questions can be very challenging for foreign students, and guessing can mean that results obtained are an inaccurate reflection of a student's true abilities. In terms of skills-development, an over-reliance on MCQs can mean students don't get an opportunity to explore an issue in-depth during their assessments, encouraging a lazy attitude towards learning and failing to intellectually challenge the students. In addition, the use of MCQs was identified as stopping students demonstrating an innovative approach to work and utilising their higher order skills such as writing or logical analysis.

Despite this negativity, some students did highlight a few positives around the use of MCQs in the HE classroom. Again reflecting the opinions of staff expressed above, it can be used, for example, as a suitable adjunct to other coursework, because if the MCQs are well designed they are as difficult to answer as typical essay questions. Another student identified their suitability as part of a well-rounded assessment strategy experience. Finally, their role in self-evaluation and formative testing was highlighted, as one student noted that if the feedback is properly provided and additional reading is noted, MCQs can be a useful tool.

## **Conclusions**

The statistical findings and the thematic analysis indicate that, on the whole, both academic staff and students tend to have a rather negative attitude towards the use of MCQs in higher education. The consensus was that MCQs may have a place in assessing knowledge, but are not useful in assessing higher level skills such as interpretation, critical evaluation and writing skills. However, staff felt that MCQs can be very useful as a formative assessment tool and a means of providing positive feedback to students. Students agreed that MCQs are useful for self-evaluation, and this is in line with other studies (Ibabe & Jauregizar, 2010; Desouza & Fleming, 2003) which concluded that students performed better in their final exams if they had access to online quizzes during their study, and students were also satisfied with the use of MCQs as a means of revision. However, students felt that MCQs, when used on their own, did

not provide them with the opportunity to demonstrate their higher cognitive skills in an assessment setting.

When designing higher education courses, teaching staff should consider the use of well-designed MCQs as a tool for providing formative feedback to students, and the use of ICT in distance or work-based learning provides a means of access to a wide range of learners. However, adult learners in a workplace setting are often very motivated deep learners (Tan, 2206) hence the use of MCQs has its limitation in assessing higher level skills.

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