Quantitative methods intervention: What do the students want?

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The shortage of social science graduates with competent quantitative skills jeopardises the competitive UK economy, public policy making effectiveness and the status the UK has as a world leader in higher education and research (British Academy for Humanities and Social Sciences, 2012). There is a growing demand for quantitative skills across all sectors, including business, public sector and charities (Nuffield Foundation, 2013). This preliminary report explores the usefulness of the one minute paper (OMP) classroom assessment tool (Wilson, 1986), firstly as a useful pedagogical tool and secondly its effect on undergraduate students' attitudes and anxiety while participating in a research methods course. Whilst results showed that there was no statistically significant difference in student anxiety or student attitude levels pre module and post module, qualitative analysis of the students' written feedback identified that students were engaged with the topic and that they sought active learning techniques. Implications and further research are considered.

T HE MACINNES REPORT (2009) high-lighted a serious deficiency in the teaching of quantitative methods (QM) in non-science subjects. This problem is exacerbated by the many barriers that students encounter when undertaking a quantitative methods course. These include non-cognitive issues such as negative attitudes to the subject (Mills, 2004) and high statistics anxiety (Onwuegbuzie & Wilson, 2003).

Specific factors have been identified as the foundation of statistics anxiety. These include the student's prior engagement with and pre-conceptions of statistics, their self-esteem, and maths self-concept (Onwuegbuzie & Wilson 2003). Predictably, research suggests a positive relationship between students' attitudes to and their achievement in QM (Slootmaeckers, Kerremans & Adriaensen, 2014). Therefore, the development and implementation of pedagogies and interventions designed to engender positive attitudes is crucial to producing social scientists with the quantitative skills needed to analyse and evaluate data.

Traditionally, classes at university encourage a one-way transfer of information from the lecturer to the students (Fry et al.,

2006), with feedback from students being solicited at the end of the course. To enable deliverers to implement changes during the course, one-minute papers (OMPs) were introduced (Wilson, 1986). This classroom assessment technique has been demonstrated as a useful pedagogical tool and provides a simple and effective way for students to give feedback on their learning within a lesson (Angelo & Cross, 1993). It can also provide students with an element of control and a level of input on their education which motivates and engages students within the classroom setting (Chizmar & Ostrosky, 1998). Taking into consideration the benefits that have been described in previous research of the one minute paper, students' anxiety towards QM and student attitudes to QM was explored.

The participants were recruited from the Psychology with Foundation course (n=32) at the University of Bolton. There were 26 females (81.3 per cent) and 6 males (18.8 per cent). Their age ranged between 18 and 47 with a mean age of 26.5 (Std deviation 9.811).

Statistical anxiety was assessed using the STARS questionnaire (Cruise, Cash & Bolton, 1985). For the purpose of the current study only three of the anxiety subscales were

included: interpretation anxiety, which measures anxiety when interpreting data; test and class anxiety, which measures the anxiety experienced when attending a statistics class and taking a statistics test; fear of asking for help, which measures the anxiety a person experiences when asking for help on a statistics problem.

Attitudes towards statistics (ATS; Wise, 1985) was used to assess students' attitudes.

Qualitative data was collected using weekly (first 4 weeks) and end of module feedback forms. The questions based on the one minute paper (Wilson, 1986) included asking students how they felt about certain aspects of the module, any suggestions to enhance their learning experience through delivery and whether they were left with any unanswered questions from the topic taught. The comments made by the students on the weekly feedback were subject to thematic analysis (Braun & Clarke, 2006).

Results

A paired samples t-test was conducted to compare students' attitudes and anxiety towards QM on commencement (pre) and completion (post) of the research method module in Psychology with Foundation (n=18).

There was no significant difference in student anxiety or student attitude levels pre module and post module. Qualitative analysis of the students' written feedback identified two themes:

Active learning
Students' comments suggested they liked to be involved in their own learning:

'I like it but there needs to be more discussions among students really, because it's a workshop whereby students can learn from each other as well'; (Week 1)

'I really like the practical as I felt more involved' (Week 4)

Engagement
Students used words such as, 'interesting', 'thought provoking', 'enjoyable' and 'infor-

mative' throughout the first three questions, suggesting that the content and how it was presented was keeping them engaged throughout. The students also expressed what they liked about the delivery, suggesting that students like to be able to understand how the topic they are learning will be applied in the 'real world', which in turn helps to keep the student engaged:

'Enjoyable lecture, easily understood content due to the use of real life examples, allowing for better applied understanding' (Week 2)

'I have enjoyed this module and I have learnt a lot. I now view statistics and graphs in a new light. They are not scary!' (Week 4)

Discussion
The aim of this preliminary study was to identify how receiving feedback in situ from students and implementing the changes they want can affect firstly attitudes to QM and secondly anxiety to QM. The results showed that whilst there were no significant differences in students' anxiety levels and attitude towards QM pre- and post- completion of the research methods module, there did appear to be a slight decrease in anxiety and a slight increase in positive attitudes. This was to some extent supported by the qualitative data in the study as students' comments were more positive at the end of the module than they were at the beginning. The active learning theme emerged quite early in the module and demonstrated that when students' requests were implemented, their general attitude and level of engagement improved.

Information provided in the current study may have value for statistics tutors, as using the one minute feedback to gain an understanding of what students want from the course may help to ease the barriers that statistics tutors face. This in turn will assist with engaging the students in their statistics class and making the experience more pleasurable.

To extend this research, further investigation should include exploring other factors including individual differences. There is research to suggest that many variables can

affect statistics anxiety, including gender, age and previous maths experience (e.g. Onwuegbuzie, 1995; Royse & Rompf, 1992; Baloğlu, 2001). Students exhibit different attitudes towards learning and how they are taught (Felder & Brent, 2005) and have preferences for different learning styles (Barry, 2012). The idea is that the more that statistics tutors understand what students want from their studies, the more effective the tutor can be in assisting them with the barriers they face in learning QM.

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