

1 **Coherence between text comments and the**
2 **quantitative ratings in the UK's National**
3 **Student Survey.**

4

5 A. Mark Langan¹, Nick Scott², Shobana Partington³ and Agnieszka Oczujda².

6 ¹Faculty of Science and Engineering, Chester Street, Manchester Metropolitan
7 University, M1 5GD, UK;

8 ²Manchester Metropolitan University Business School, Manchester Metropolitan
9 University

10 ³Hollings Faculty, Righton Building, Cavendish Street, Manchester Metropolitan
11 University

12

13 ¹Author to whom correspondence should be addressed; m.langan@mmu.ac.uk, tel.:
14 +44 (0)161 247583; fax: +44 (0)161 2476318.

15

16

17 **Abstract**

18 Institutions are understandably interested in the profile of their own reputations based
19 upon publicly available data about student experiences. The UK's National Student
20 Survey (NSS) metrics are integrated into several 'Good University' calculations,
21 whereas teaching teams most often use the survey's text comments to change
22 practices, rather than the metrics directly. There is little information about how
23 messages from the national survey's text comments relate to the accompanying
24 numerical ratings, partly because text comments are confidential to the institution
25 and unavailable for wide-scale research. We categorised institutional NSS text
26 comments into themes that mirrored those of the original questionnaire. Comparisons
27 were made between frequencies of thematic comments and the national ratings of
28 satisfaction for several subject areas. For the first time we demonstrate broad
29 agreement between comments about measures of teaching staff and course
30 organisation with the performance of the subject areas (compared to metrics of their
31 national counterparts). These findings are consistent with previous quantitative
32 models predicting the most important factors that most influence overall satisfaction
33 ratings. We intend this study to be a catalyst for other institutions to explore their
34 non-publicly available, textual returns in a similar way. The outcomes of this type of
35 work are pertinent to all countries that use large-scale surveys. However, institutions
36 will need to release findings to a public audience if we are to gain a
37 national/international perspective on this key linkage between publicly available
38 metrics and the associated text comments.

39

40

41 Keywords: Student surveys, satisfaction, educational ratings

42 Introduction

43 For the past two decades, there has been considerable interest worldwide from Higher
44 Education Institutions (HEIs) in the development and use of mass student surveys
45 (Gibbs 2010; Buckley 2012). The UK's National Student Survey (NSS) was designed to
46 inform university applicants about their study choices and to provide a measure of
47 institutional accountability at a national scale (SurrIDGE 2009). However, it is clearly of
48 benefit to institutions to perform well in the well-publicised survey, as HEIs compete
49 for student applications and institutional prestige (Gibbs 2012). It is arguable that the
50 impact of the national survey has increased beyond its intention and capabilities (see
51 Langan et al. 2013) as its outcomes are being acted upon directly by HEIs in an
52 attempt to improve their metrics as the priority, rather than a primary focus on the
53 educational gains of its learners (Gibbs 2010; 2012). Apart from improvement of the
54 learning experience quality itself, it is in the interest of institutions to enhance
55 (directly) the survey metrics *per se* due to their public usage (Gibbs 2010). However,
56 there are significant difficulties with the processes of contextualising the information
57 generated by these large-scale survey instruments, from both local and national
58 perspectives (Fielding et al. 2010, Langan et al. 2013).

59 The NSS (www.thestudentsurvey.com/content/nss2012_questionnaire_english.pdf) is
60 carried out principally in the final year of undergraduate study and comprises 21
61 standard items (Q1-Q21; but note that an additional question about Students' Unions
62 is now included). These are designed to rate student perceptions of their experiences
63 of the whole course. The survey targets several thematic areas; Teaching, Assessment
64 & Feedback (often considered separately; e.g. Marsh & Cheng 2008), Academic
65 Support, Organisation & Management, Learning Resources and Personal Development.
66 There is also a global measure of satisfaction with the course (Q22) and opportunity
67 to add in other institution-specific questions. These are followed by the request for
68 free text comments to capture the respondent's views of best practices and areas for
69 improvement.

70 The questionnaire requires respondents to express strengths of agreement with the
71 positive statements on a scale of 1 (strongly disagree) to 5 (strongly agree) with the
72 central value of 3 indicating neutrality. Such an approach can be ambiguous and even
73 misleading in terms of insights into the student experience (Blair et al. 2012). The NSS
74 outcomes can highlight areas for targeted actions, but the metrics alone do not
75 provide clarity around the nature of dissatisfaction (or non-satisfaction), which makes
76 decision-making around learning design difficult (see Kovacs et al. 2010). Often, local
77 decision-making is informed by the rich text comments provided by the survey, in
78 conjunction with other quality enhancement procedures, to ultimately drive
79 educational quality enhancement (Buckley 2012).

80 Despite its huge impact, there is little information about the congruence between the
81 national survey's quantitative metrics and the associated qualitative comments. Staff
82 at a local level have raised concerns that there is a push to 'enhance metrics' by
83 responding to the textual comments. However, as far as the authors' are aware, there
84 is currently no evidence base in the literature that the comments and metrics in the
85 UK's survey are substantially related. The lack of evidence of this important link is
86 partly because text comments are confidential to the institution and are not publicly

87 available for wider comparisons. With availability of both types of information at an
88 institutional level, there is good reason to explore any associations (or
89 disassociations) between the qualitative and quantitative survey outputs and to share
90 the findings with the wider academic community. The current study is proposed as a
91 useful, exploratory study highlighting broad patterns only, and is not intended to
92 contribute to the debate about concepts such as triangulation, abductive logic or the
93 epistemologies that are debated in detail elsewhere (e.g. Kelle 2001). The central
94 purpose is to identify links between the survey's text comments and the associated
95 quantitative ratings, whilst retaining sufficient anonymity at an institutional level of
96 the subject areas under scrutiny. We intend for this study to prompt discussion about
97 the value of the survey which reveals its metrics publicly, but retains as confidential
98 (at an institutional level) the valuable comments from respondents.

99

100 **Methods**

101 *Premise and approach*

102 Each year in the UK, NSS metrics are made available publicly via the Unistats website
103 (<http://unistats.direct.gov.uk/>) but these are aggregated into broader subject areas
104 (JACS3 level). Institutions participating in the NSS are provided with the anonymised
105 text comments that are at a course level. This study used text comments from the
106 2011/12 National Student Survey returned to the home HEI. A thematic analysis was
107 completed on the institutional NSS returns that assigned each student's text comment
108 to the thematic categories that are used to group the quantitative survey themes
109 (such as 'Teaching' and 'Learning Resources'; see SurrIDGE 2009). Comments that
110 related to other areas (such as university buildings or personal lives of respondents)
111 were categorised as 'Other'. The analysis generated frequencies of comments
112 assigned to the categories.

113 The overwhelming majority of comments (>95%) were very straightforward to classify
114 both in terms of the coding systems and whether they were positive or negative. A
115 few comments were more ambiguous. We adopted a policy of reflecting the student's
116 emphasis on the comment. As an example, if a student wrote "some lecturers are
117 good" in the positive comment area then we would classify this as a positive
118 comment. Arguably, this could also be interpreted as some were not but since the
119 student emphasis in this case was positive so it was classified as such. Likewise, if a
120 student commented "some lecturers are poor" in the negative comment box then we
121 would classify that as a negative as the emphasis is on the poor aspects of some staff.
122 When comments mixed positive and negative "the course resources were insufficient,
123 but the lecturers were very good" both elements were recorded in the spirit of the
124 emphasis. In this case negative for resources, but positive for teaching staff. The
125 thematic analysis was carried out by two researchers and at the start of this process,
126 these 'raters' were in contact regularly to standardise any areas of uncertainty.

127 Two themes of the NSS ('Teaching' and 'Organisation and Management') are known to
128 be of particular importance in predicting (quantitative) overall satisfaction ratings at a
129 national level (e.g. Fielding et al. 2010; Langan et al. 2013). The 'Teaching' dimension
130 was split for the purposes of the study as a means to isolate comments about

131 members of staff from comments about the design of the curriculum. The dominance
132 of comments about individual staff in the survey returns and the large body of
133 research indicating how teachers are crucial in ratings of the teaching experience
134 (e.g. Marsh 2007) led to the focus being placed on comments about teaching staff.
135 Here we explore how well frequencies of positive and negative comments related to
136 the quantitative ratings of overall satisfaction (Q22) for courses (or groupings of
137 courses) compared to their national counterparts. For example, NSS metrics of
138 satisfaction for a degree in Law (note that this is not a subject included in the current
139 study) would be compared to national levels of satisfaction for Law courses.

140 Survey responses to three general subject areas were explored, but to retain
141 anonymity for institutional purposes, these are referred to as 'Areas' A, B and C. In
142 Areas A (with four networks of courses) and B (with three networks of courses), the
143 local organisation meant that data were aggregated in a way that did not allow
144 individual courses to be isolated and directly related to national Overall Satisfaction
145 (Q22) means. These two Areas are used in this study to show general patterns, i.e. the
146 subject groupings in networks that perform well, or not, compared to national
147 counterparts when the subject mix is considered together. It is noteworthy that there
148 were generally consistent performances within networks to allow this generalisation
149 to be made. For Area C, the specific courses were identifiable and thus had an exact
150 national mean to be compared against. This Area was used to explore the reliability of
151 indicator ratios (i.e. by multiplying the ratios of good/bad comments in 'Teaching' and
152 'Organisation and Management' themes) as correlates of national performance using
153 national averages of the metrics for the subjects.

154

155 *Calculation of the ratios and correlations*

156 The general premise is that the ratio of 'positive versus negative' comments about
157 staff would be higher in areas that perform well when compared to national
158 counterparts. It was always the case that more negative comments were provided for
159 the theme of Organisation & Management (O&M). The final ratio simply multiplied the
160 ratios of the two themes, giving them equal weighting. This meant higher ratios
161 express more positive comments about staff and less negative comments about
162 course organisation. There was also an issue with no comments being made about
163 some thematic areas in some cases. To account for zeros in the dataset, all
164 frequencies of comments had one added (+1 in all cases) to ensure a ratio could be
165 calculated. This allowed the calculation of ratios to be completed for all areas
166 surveyed (since some had zero comments), but please note that the modification did
167 not influence the ratings in the Likert scale (1-5) that the respondents completed in
168 the original survey. Thus, the final calculation of the final ratio was:

169
$$\frac{\text{Frequency of positive comments}+1 \text{ (Teaching)}}{\text{Frequency of negative comments}+1 \text{ (Teaching)}} \times \frac{\text{Frequency of positive comments}+1 \text{ (Organisation \& Management)}}{\text{Frequency of negative comments}+1 \text{ (Organisation \& Management)}}$$

172 Mean ratings of courses were compared to national means using publicly available
173 national data (provided on <http://unistats.direct.gov.uk/>) for the subject areas in the
174 institutional return of NSS data (which is not publicly available). Spearman's rank

175 correlation coefficients were calculated to explore relationships between the
176 calculated ratios and the deviation of the course from the national mean level of
177 satisfaction. All analyses were carried out using SPSS v19.0 (IBM Inc, Chicago, Illinois,
178 USA).

179

180 **Results**

181 Areas A and B were used in the first exploration in a general sense as the subjects
182 were embedded into 'networks' of courses. For the purposes of this study (and to
183 retain course anonymity), the term network is used to indicate a set of related courses
184 within each Area. This was achieved by considering together all the subjects taught in
185 the networks, and providing an indication (only) of their collective performance at a
186 national level. In all cases, there was a general consistency in performance of the
187 subjects in their groupings, making this collective approximation straightforward. For
188 example, there were no cases of one particular subject performing well in a grouping
189 where others in the same grouping performed poorly (data not shown). It was clear in
190 Area A (Figure 1) that the numbers of positive comments about the teaching staff
191 were much higher in subject areas that performed well and, conversely, there were
192 fewer negative comments about course organisation.

193 <insert Figure 1>

194 These patterns were present in the other subject areas, reflecting their relative
195 performances, but were not as pronounced in Area B (Figure 2).

196 <insert Figure 2>

197 These results are summarised in Table 1, which shows the absolute values of the
198 ratios of the thematic comments and the broad indicators of the performance of these
199 subjects groups against national indicators. <insert Table 1>

200 For Area C, the absolute values of national performance in the 2011/12 NSS for each
201 of the JACS3 level subjects were available and these correlated positively with the
202 calculated ratios ($r_s = 0.786$, $n = 7$, $p = 0.036$). Thus ratios of comments increased
203 (reflecting generally more positive views of the respondents) in accordance with the
204 subject performance nationally, reflecting higher frequencies of positive comments
205 about teaching staff and fewer negative comments about course organisation for
206 courses that were 'performing well' (see Figure 3). When carrying out correlations for
207 the ratio of comments for each of the two items in the final ratio separately, both
208 were positive but were not significant (for comments about staff; $r_s = 0.464$, $n = 7$, p
209 $= 0.294$: and comments about course organisation; $r_s = 0.500$, $n = 7$, $p = 0.253$).

210

211 <insert Figure 3>

212

213 **Discussion**

214 Capturing the student voice and then responding effectively, has obvious value in the
215 evaluation and development of the success of courses. In a broad sense, this study
216 has shown coherence between the metrics and text comments for this independently
217 administered, national student survey. The patterns appear consistent across three
218 disparate subject areas. There is a difficulty with reporting findings like this due to
219 sensitivity of institutions about NSS data, primarily resulting from reporting of the
220 data in public and local domains. Different subject areas need to be considered
221 separately (Fielding et al. 2010) as they consistently receive different ratings of
222 positive to negative comments and this may reflect many things, such as their
223 cultural differences (see Gibbs 2012). We believe that 'what is written in the survey
224 responses' and 'what scores are provided' do broadly relate. This is based on
225 evidence from the combination of: (i) the broad patterns of higher ratios in subject
226 areas that 'performed well' (i.e. above the national average) within the two Areas of
227 networks of courses; and, (ii) the final curvilinear relationship when the ratios were
228 explored at course level. The use of the two themes (i.e. ratings of 'Teaching' and
229 'Organisation and Management' only) was triggered by their dominance in the text
230 comments, particularly in terms of comments about teaching, and their prevalence in
231 previous quantitative models (e.g. Langan et al. 2013). We anticipated that courses
232 that receive many positive comments about staff, and few comments about poor
233 course organisation would score better in their metrics (for exploration of teacher
234 effects on learner ratings of teaching see Marsh 2007). Primarily this was due to these
235 particular themes of the survey being important in the quantitative models that
236 predicted Overall Satisfaction (Q22; Langan et al. 2013). It is important to note that
237 these are comparisons with national counterparts in general subject areas, rather
238 than comparison against individual subjects. This was mostly due to the problems
239 with comparing metrics from different subject areas (for detail about subject
240 differences in metrics see Fielding et al. 2010; and Marsh & Cheng 2008; for an
241 exploration of interpretations of the survey items see Blair et al. 2012). It is not
242 straightforward to elucidate how the survey dimensions inter-relate. The 'teachers'
243 could potentially have a strong influence on the respondents' views of other aspects
244 of the survey (such as learning resources or assessment) and there is little
245 understanding of how the national survey's responses (metrics and comments) reveal
246 true educational gains (rather than what learners like; see Gibbs 2010). The need for
247 in-depth explorations of these areas is apparent if decision-makers are to maximise
248 the usefulness of the survey.

249 The lack of significance detected for correlations that explored separately the ratios of
250 comments about staff and course organisation reinforces the need for multiple factors
251 to be considered simultaneously in the consideration of the complex area of ratings of
252 student satisfaction. It is notable that these analyses were limited in sample sizes due
253 to the numbers of areas that can be reported on in the survey ($n = 7$ in this case).
254 Also, the addition of 1 to all frequencies to allow ratios to be calculated introduces
255 some bias to the correlations since it influences low sample sizes more greatly than
256 higher those with higher frequencies (although the use of ranked correlations limits
257 this bias and generally the patterns are clearly visible in all Areas). It also underlines
258 the value of the initial observations of the data (i.e. that both 'Teaching' and
259 'Organisation and Management' are important as indicators when scrutinising the
260 frequencies of text comments returned shown in Figures 1 and 2) which is how they

261 were interpreted in a broad sense locally and prompted this study in the first instance.
262 There is potential to develop this work to the other themes of the questionnaire, but
263 this would need greater numbers of comments about other themes of the survey
264 (since comments about teaching, staff etc. dominated the return). It would also
265 require sensitive data (i.e. the text comments) to be released from institutions to
266 evaluate how consistent these patterns are for other institutions and courses at a
267 national level.

268 The potential to internally survey students in earlier years (and in the term before the
269 NSS is released to final year students) provides a significant opportunity to identify
270 'early warning indicators' using the ratios described in the current study. Many
271 institutions have their own surveys in place and many include statements derived
272 from the NSS. Subject areas that suddenly change in terms of comments about staff
273 or course organisation would be useful to identify and be used to generate dialogue
274 between staff and students to resolve issues earlier in the student lifecycle, and to
275 enhance student perceptions of their experiences in tertiary education.

276 We acknowledge that this study provides a basic interpretation of the survey returns,
277 designed only to highlight broad patterns in the text responses and the performance
278 of subjects. Although often used, counts of the number of times that text comments
279 relate to qualitative codes provide only a simple approach to gauge major patterns in
280 questionnaire returns (Driscoll et al. 2007). Despite this 'data-reduction synthesis'
281 losing information about the subtle differences between the respondents' comments,
282 such analyses can detect general themes in responses and their popularity/value
283 have led to qualitative data analysis software programs to carry out the thematic
284 analysis. Such automation is prone to bias due to respondents who re-emphasise
285 particular concepts (see Onwuegbuzie & Teddlie 2003). With sufficient research, such
286 systems could be used for a rapid evaluation of areas that may be at risk of low levels
287 of student satisfaction.

288 There is a need to build on the current findings to provide greater context to these
289 conclusions. This should include debate about why certain aspects of the student
290 experience have more influence on the ratings provided and which critical factors
291 prompt certain ratings or comments to be recorded on the survey. This could be
292 achieved by in-depth discussions with students surrounding the drivers of their
293 responses, both in terms of text comments and metrics. This would require careful
294 experimental design to protect students through anonymisation procedures, for
295 example with researchers unconnected to their institution. In addition, further
296 evaluations could be made about how students interpret the wording of questions in
297 this survey (Blair et al. 2012) and how these interpretations differ from those of the
298 academic staff who use the survey outcomes to enhance the quality of courses. A
299 disadvantage commonly voiced by qualitative researchers is a loss of depth (and
300 flexibility) that occurs when qualitative data are quantified (Driscoll 2007). Whereas
301 the qualitative codes can provide insights into many interrelated conceptual themes
302 (Bazeley 2004), the responses were reduced into a more 'one-dimensional'
303 quantitative derivation by categorising them as simply positive or negative. Further
304 work is required to clarify the underlying complexity behind apparently
305 straightforward responses from simple numerical ratings (of 1-5) and the
306 accompanying written comments that provide a much more detailed overview of the

307 experiences of the students. However, the findings are a first step to highlight areas
308 to target surrounding the student voice and this supports the quantitative metrics that
309 the respondents provided (Langan et al. 2013).

310 There is a large body of evidence that the NSS does not provide direct measures of
311 educational gains (Gibbs 2010) and also it is noted that the survey is not intended to
312 do this (Surridge 2009). In a slightly different area of study, Coates (2009) highlighted
313 the difficulty of directly measuring the outcomes of training courses at a national level
314 given the scale and diversity of training operations and contexts. This mirrors the
315 difficulty with using national level surveys such as the NSS to capture student
316 satisfaction at large scale, as this leads to output metrics being accepted without
317 sufficient context (see Langan et al. 2013). The free comments provide greater depth
318 and can inform those involved with the design of learning systems of areas to
319 improve, but should be seen as the start of this process rather than the only evidence
320 base (Buckley 2012).

321 The current study suggests that the 'student voice' captured in a national survey, in
322 the form of text comments about the staff teaching on the courses and the
323 organisation, relate in at least a broad sense to the questionnaire scores of overall
324 satisfaction. There is potential for the use of these ratios as early warning systems if
325 internal surveys are used to capture text comments during the full student lifecycle.
326 The techniques described in the current study could be applied to earlier surveys to
327 indicate areas that receive 'poorer' ratios of comments about teaching staff or course
328 organisation. The ratios from the national survey described here could also be used to
329 stimulate dialogue between students and staff about their learning experiences. This
330 is not to preclude discussion about other elements of the learning experience, but the
331 ratios could be used to reassure staff that links exist between these two forms of
332 survey data. The wording of survey items may also influence the nature of comments
333 that are volunteered by respondents, and it seems timely for other measures, such as
334 engagement (Trowler & Trowler 2010) and belonging (Blair et al. 2012) to be used
335 together with ratings of the experience to gain a better understanding of the complex
336 nature of learners' experiences of tertiary education.

337 Decades of empirical research (Pascarella and Terenzini 2005; Kuh et al. 2008) have
338 affirmed that the active engagement of learners in effective training practices plays a
339 critical role in developing high-quality outcomes. Lessons from the current study could
340 be applied to qualitative comments from these alternative questionnaire designs such
341 that, in addition to new metrics, the respondents should have reflected upon their
342 senses of 'belonging' and/or 'engagement' before writing text comments. Future work
343 could then begin to link ratings of the student experience with (self-assigned)
344 measures of active involvement and feelings of belonging, using the current study as
345 one method for such an exploration. Provision of such information in surveys would
346 allow analysis of the associated comments after respondents have been asked to
347 consider wider aspects of their experiences and could be followed by in-depth
348 interviews with students to gain greater context as to why they responded as they did
349 and what can be changed to enhance their satisfaction and learning gains. This wider
350 view of the experience of university life, and the subsequent ways to process the
351 outcomes, provide the next challenge to researchers of the student experience.

352

353 **Notes on contributors**

354 Mark Langan is a Senior Fellow (Learning and Teaching) and a Principal Lecturer in the
355 Faculty of Science and Engineering. He has interests in student assessment and the
356 use of measures of the student experience and educational engagement. He has
357 spoken and published widely about maximising the use of student surveys to enhance
358 quality in higher education.

359 Nick Scott is a Senior Fellow (Learning and Teaching) and a Principal Lecturer in the
360 Manchester Metropolitan University Business School. He manages and explores the
361 student experience.

362 Shobana Partington is a Principal Lecturer in the Hollings Faculty who manages and
363 explores student satisfaction.

364 Agnieszka Oczujda is a Research Assistant in the Manchester Metropolitan University
365 Business School exploring student satisfaction with interests in quality enhancement
366 and assurance in Higher Education.

367

368 **References**

369 Bazeley, P. 2004. Issues in mixing qualitative and quantitative approaches to research.
370 In: *Applying Qualitative Methods to Marketing Management Research*, eds. R. Buber, J.
371 Gadner. 141–156. Hampshire, UK: Palgrave Macmillan.

372 Blair, B., S. Orr, and M. Yorke. 2012. 'Erm, that question... I think I probably would've
373 just put something in the middle and sort of moved on to the next one, because I
374 think it's really unclear': How art and design students understand and interpret the
375 National Student Survey. Higher Education Academy, York, UK.
376 http://www.heacademy.ac.uk/assets/documents/resources/publications/GLAD_FINALns.doc
377 s.doc

378 Buckley, A. 2012. *Making It Count: Reflecting on the National Student Survey in the*
379 *process of enhancement*. York, UK: Higher Education Academy.

380 Coates, H. 2009. Building Quality Foundations: Indicators and instruments to measure
381 the quality of vocational education and training. *Journal of Vocational Education and*
382 *Training* 61: 517-34.

383 Driscoll, D. L., A. Appiah-Yeboah, P. Salib and D.J. Rupert. 2007. Merging qualitative
384 and quantitative data in mixed methods research: How to and why not. *Ecological and*
385 *Environmental Anthropology* (University of Georgia), 18.
386 <http://digitalcommons.unl.edu/icwdmeea/18/>

387 Fielding, A.F., P.J. Dunleavy and A.M. Langan. 2010. Effective use of the UK's National
388 Student (Satisfaction) Survey (NSS) data in science and engineering subjects. *Journal*
389 *of Further and Higher Education* 34: 347-368

390 Gibbs, G. 2010. *Themes of Quality*. York, UK: Higher Education Academy.

- 391 Gibbs, G. 2012. *Implications of 'Themes of Quality' in a market environment*. York, UK:
392 Higher Education Academy.
- 393 Kelle, U. 2001. Sociological explanations between micro and macro and the
394 integration of qualitative and quantitative methods. *Qualitative Social Research*, 2(1).
395 <http://www.qualitative-research.net/index.php/fqs/article/view/966>
- 396 Kovacs, S., L. Grant, and F. Hyland. 2010. *Research papers in Education*. A study of the
397 use of the National Student Survey to enhance the student experience in Education
398 Departments. ESCcalate- Subject Centre for Education. Higher Education Academy,
399 York, UK.
- 400 Kuh, G.D., T.M. Cruce, R. Shoup, J. Kinzie and R.M. Gonyea. 2008. Unmasking the
401 effects of student engagement on first-year college grades and persistence. *Journal of*
402 *Higher Education* 79: 540–563.
- 403 Langan, A.M., P.J. Dunleavy and A.F. Fielding. 2013. Applying models to national
404 surveys of undergraduate science students: What affects ratings of satisfaction?
405 *Education Sciences* 3: 193-207.
- 406 Marsh, H.W. 2007. *Students' evaluations of university teaching: A multidimensional*
407 *perspective*. In R. P. Perry and J C. Smart (Eds.), *The Scholarship of Teaching and*
408 *Learning in Higher Education: An Evidence-Based Perspective* (pp.319-384). New
409 York: Springer.
- 410 Marsh, H.W., and J.H.S. Cheng. 2008. *Dimensionality, multilevel structure, and*
411 *differentiation at the level of university and discipline*. York, UK: Higher Education
412 Academy.
- 413 Onwuegbuzie, A. J. and C. Teddlie. 2003. *A framework for analyzing data in mixed*
414 *methods research*. In: *Handbook of Mixed Methods in Social and Behavioral Research*.
415 Eds. A. Tashakkori and C. Teddlie, 351-383. California, USA: Sage.
- 416 Pascarella, E.T. and P.T. Terenzini. 2005. *How college affects students: A third decade*
417 *of research* (Vol. 2). San Francisco, USA: Jossey-Bass.
- 418 Surridge, P. 2009. *The National Student Survey three years on: What have we*
419 *learned?* York, UK: Higher Education Academy.
- 420 Trowler, V. and Trowler, P. 2010. *Student engagement evidence summary*. Higher
421 Education Academy, York, UK.