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1 **How preferred learning approaches change with time: a survey of GPs**
2 **and GP Specialist Trainees**

3

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16 **How preferred learning approaches change with time: a survey of GPs**
17 **and GP Specialist Trainees**

18 **Abstract**

19 ***Background***

20 The Approaches and Study Skills Inventory for Students (ASSIST) questionnaire assesses
21 whether learners prefer a deep, strategic or surface approach to learning. This study aimed to
22 establish the effect of time since qualification, gender and work role on ASSIST scores of
23 General Practitioners (GPs) and GP Specialist Trainees (GPSTs).

24 ***Methods***

25 An anonymous online questionnaire with demographic questions and the ASSIST survey was
26 completed by 1,005 GPs and GPSTs from across the United Kingdom.

27 ***Results***

28 Of the 544 GPs and 461 GPSTs completing the survey, 96.5% preferred a deep and/or
29 strategic approach to learning. There was a significant increase in the preference for a deep
30 approach with time from graduation and significantly less preference for a surface approach.
31 There was no significant change in any of the scores over the GPST years. Men had
32 significantly higher scores for a deep approach than women.

33 ***Conclusions***

34 GPs and GPSTs prefer deep and strategic approaches to a surface approach. While higher
35 levels of GP experience are associated with a higher deep approach score and a lower surface
36 approach score, this change is not seen during progression through GP training. Men have
37 higher scores for a deep approach than women.

38 ***Keywords***

39 Graduate medical education, continuing medical education, learning styles, general practice

40 **Background**

41 An awareness of learning styles is often taught early in General Practitioner training [1, 2, 3]
42 and is regarded as an important learning objective [4]. The development of metacognitive
43 skills in relation to individual approaches to learning has the potential to help each individual
44 to become a more effective independent learner [5]. The logic behind this is that, through
45 knowledge of their own strengths and weaknesses as learners, individuals can become more
46 motivated to learn and therefore become lifelong learners [6], which is recognised as being
47 necessary for a career in medicine [7]. However, there is a multitude of learning style models
48 [8], making this a complex research field: in a systematic review, Coffield et al identified
49 seventy-one models of learning [6]. In the United Kingdom (UK), Kolb's Learning style
50 inventory (LSI) and Honey and Mumford's Learning Styles Questionnaire (LSQ) are well
51 known and widely used [6], though questions have been voiced over their validity [9]. When
52 examined for evidence in the Coffield review, while these two models demonstrated test-
53 retest reliability, neither showed internal consistency, construct validity or predictive validity.
54 Entwistle's Approaches and Study Skills Inventory for Students (ASSIST) originated from
55 the Approaches to Studying Inventory (ASI) [10]. It examines three dimensions – deep,
56 surface and strategic – independently of each other, with the aim of indicating a student's
57 preferences for each of these dimensions. The surface approach arises from an intention to
58 get tasks finished with minimum trouble while appearing to meet course requirements,
59 whereas the deep approach is due to a felt need to engage the task appropriately and
60 meaningfully, so that the learner tries to use the most appropriate cognitive activities for
61 handling it [11]. The strategic approach results from an intention to achieve the highest
62 possible grades by using organised study methods and good time-management [10]. The
63 ASSIST tool has been shown to have internal and construct validity [6], with predictive
64 validity for surface and strategic approaches [12, 13]. There is no evidence on test-retest

65 reliability. The ASSIST tool helps raise students' awareness of their learning styles and
66 provides them with a framework within which they can consider these variations, reflect on
67 them and discuss the differences with their colleagues [14]. Some students found that
68 ASSIST gave them useful information that could help them develop their own learning
69 environment. Others found the information more useful in helping them to think about how
70 they approached learning and, if necessary, to improve those approaches.

71 The usual pattern of responses found among successful students is a deep, strategic approach
72 [15]. While there have been contradictory results on the relationship between various learning
73 approaches and outcomes [16], construct validity of the ASSIST tool has been supported by
74 studies that have linked academic performance to preferred learning approach: deep and
75 strategic approaches are related to greater success [17, 18], and a surface approach preference
76 may be linked with poor academic performance [19]. Students preferring a deep approach
77 tend to show active engagement and interest in their studies [20].

78 In a study of nursing and medical students the highest mean score was for a deep approach in
79 both cohorts, though the trend was for a slight decline in deep and strategic approach scores
80 during their programmes [21]. This was supported by a study showing that second year
81 medical students had a less deep approach than first year students [22]. Another study
82 reported that there was no change in the deep approach to learning after three years at
83 medical school, even though the case-based learning approach used had been assumed to
84 foster deeper learning [23]. The amount of knowledge gained by medical students from
85 clinical experience was found to be related to strategic and deep learning styles: not only their
86 styles in their final student year, but also their styles at the time they had started their courses
87 five or six years previously [24]. There has, however, been no published research on the use
88 of the ASSIST questionnaire with General Practitioners (GPs) or GP Specialist Trainees
89 (post-graduate doctors preparing for GP examinations, GPSTs).

90 The study was designed to establish the effect of time since graduation, gender and work role
91 on ASSIST scores of GPs and GPSTs.

92 **Methods**

93 An anonymous online questionnaire was used, allowing access to a large number of GPs and
94 GPSTs across the UK. The ASSIST questionnaire [25] was used with kind permission of its
95 author, and some of the questions were modified to make them easier to understand and more
96 relevant to GPs and GPSTs (Appendix 1). Ten GPs and GPSTs piloted the study to check for
97 feasibility and acceptability regarding survey length and content, this resulted in minor
98 changes to the questionnaire. The online survey included demographic questions followed by
99 the modified version of the ASSIST survey shown in Appendix 1. Participants were GPs and
100 GPSTs in the UK. No financial or other incentives were offered for participation. The survey
101 took place over three months, closing in June 2015. To ensure wide representation of
102 responses across the UK, survey invitations were forwarded by Local Medical Committees
103 and Postgraduate Deaneries. The survey was also publicised through the British Medical
104 Association, newsletters, word of mouth and social media.

105 The response to each ASSIST statement was measured using a five-point Likert scale: the
106 response options varied from 'Strongly agree' to 'Strongly disagree'. Scoring was carried out
107 as described in the documentation for the short version of ASSIST [25]: the scores for deep
108 approach were the sums of the responses to Qs 2, 6, 10, 12, 15 and 17; the scores for strategic
109 approach were the sums of the responses to Qs 3, 5, 7, 9, 11 and 13; the scores for the surface
110 approach were the sums of the responses to Qs 1, 4, 8, 14, 16 and 18. For each respondent
111 where there was a difference of less than 10% (3 units) on the ASSIST scores for two or more
112 learning approaches, that individual was classified as having more than one preferred approach.
113 Data were analysed using descriptive statistics and comparisons were made by analysis of

114 variance. Where necessary, adjustments were made for multiple comparisons using the
115 Bonferroni correction.

116 **Results**

117 In total 1005 doctors completed the survey, 544 (54.1%) GPs and 461 (45.9%) GPSTs. Their
118 characteristics are given in Table 1. The age/gender mix of respondents was broadly similar
119 to that of the English national profile where data are available (Table 2).

120 Of established GPs: 116 (21.3%) had a higher score for a deep approach, 81 (14.9%) had a
121 higher score for a strategic approach and for 19 (3.5%) their highest score was for a surface
122 approach. However, 60.3% of GPs had similarly high scores for two or more of the
123 approaches, with 236 (43.4 %) having similar scores for both deep and strategic, 29 (5.3%)
124 for both surface and deep, 18 (3.3%) for both strategic and surface and 45 (8.3%) having
125 similar scores on all three approaches. Combining the results of all established GPs, the mean
126 deep and strategic scores were similar (20.9 and 20.2 out of a possible 30 respectively),
127 substantially higher than the mean score for surface approach (13.9 out of a possible 30).

128 The mean (SD) GPST score for a deep approach was slightly lower than that for established
129 GPs: 20.2 (3.7) for GPSTs vs. 20.9 (3.8) for GPs, $P=0.008$. The score for a strategic approach
130 was similar for both groups, 20.0 (4.4) for GPSTs vs. 20.2 (4.3) for GPs, $P=0.46$, but GPSTs
131 had significantly higher scores for a surface approach: 15.2 (3.8) for GPSTs vs. 13.9 (3.6) for
132 GPs, $P<0.001$.

133 The ASSIST scores for established GPs and GPSTs combined are shown diagrammatically in
134 Figure 1.

135 *[Figure 1 near here]*

136 *Figure 1. GP and GPST approaches to learning: area-proportional Venn diagram of ASSIST*
137 *results*

138

139 There was a trend for increasing deep approach scores with increasing time since graduation,
140 with mean (SD) scores of 20.2 (3.8) for 0-10 years since graduation, 20.5 (3.7) for 11-20
141 years, 21.0 (3.9) for 21-30 years, and 21.2 (3.4) for 31-40 years, $P=0.007$. There was little
142 change in the strategic approach scores: 19.8 (4.5) for 0-10 years, 20.1 (4.4) for 11-20 years,
143 20.5 (4.3) for 21-30 years, 20.2 (4.0) for 31-40 years, $P=0.36$; and a reduction in surface
144 approach scores over time: 15.1 (3.8) for 0-10 years, 14.3 (3.6) for 11-20 years, 13.9 (3.4) for
145 21-30 years, 13.8 (4.0) for 31-40 years, $P<0.001$. This was paralleled by similar trends with
146 increasing participant age. There were no statistically significant differences between the
147 first, second and third GPST years for any of the preferred approaches (Table 1).

148 Strategic and surface approach scores were similar for both genders. The mean (SD) scores
149 were 20.2 (4.3) for women vs. 19.9 (4.5) for men for strategic scores, $P=0.21$, and 14.7 (3.6)
150 vs. 14.3 (3.9) for surface scores, $P=0.08$. However, while the difference was small, women
151 had a significantly lower mean score for a deep approach than men: 20.0 (3.7) vs. 21.3 (3.7),
152 $P<0.001$. This gender difference in deep approach scores persisted after using analysis of
153 variance to adjust for the effect of age ($P<0.01$), suggesting the effect of gender on mean
154 deep scores is independent of the age of the respondents. The gender difference also
155 persisted when deep approach scores were analysed for GPSTs alone: 19.8 (3.7) for women
156 vs. 20.8 (3.7) for men, $P=0.005$.

157 There were no statistically significant differences between the scores for approach to studying
158 between established GPs that had locum, salaried or partnership roles (Table 1).

159 **Discussion**

160 Both established GPs and GPSTs had high mean scores for deep and strategic approaches,
161 with much lower scores for a surface approach. However, the majority had an overlap of two
162 or more approaches. Men tended to have a higher score for a deep approach than women.
163 While there was no significant change in any of the scores over the GP training years, there
164 was a modest increase in the preference for a deep approach, and less preference for a surface
165 approach, with time from graduation. Established GPs were more likely than GPSTs to prefer
166 a deep approach and dislike a surface approach.

167 Two phases of piloting were undertaken to ensure face validity. The study approaches of a
168 large number of both GPSTs and GPs were elicited. Responses were sought from across the
169 UK, however we are unable to determine a response rate due to the multiple recruitment
170 methods used. Because of this we are unable to be sure whether the views of respondents
171 reflected that of the GP and GPST populations, and it may be that those who were most
172 interested in thinking about learning were those that were most motivated to complete the
173 survey. With the exception of Northern Ireland, regions of the UK were well represented
174 (Table 3) [26]. The ASSIST questionnaire was designed to assess the preferred learning
175 styles of individuals who were on courses. However, the established GPs who were surveyed
176 in our study were likely to have answered the questions in relation to their continuing medical
177 education, rather than a specific course.

178 By virtue of having achieved a medical school place and then qualified as doctors, our
179 respondents had already demonstrated their ability to succeed academically. Our finding of
180 high scores for deep and strategic approaches in this group is consistent with evidence that
181 successful academic performance is generally associated with such an approach [15]. Also in
182 keeping with our findings, a study of medical and law students found that both groups
183 preferred the deep and strategic approaches to a surface approach [27]. While our study

184 showed no significant difference in approach on progression through GP training, third year
185 medical students have been found to have more of a surface approach than those in their first
186 and second years [27]. Our study showed a trend for increasing mean deep approach scores
187 with increasing time since graduation, similar to another study that found that postgraduate
188 trainees had higher mean scores for deep and strategic approaches than first and final year
189 medical students [28].

190 Our finding of a small but statistically significant gender difference for deep approach scores
191 contrasts with a study of medical and law students' learning approaches, which found no
192 gender difference [27], so it may be that this difference appears after graduation. However, a
193 review and meta-analysis of gender differences in learning styles [29] found a small but
194 consistent gender difference: men showed a greater preference for the abstract
195 conceptualisation mode of learning, which may be in keeping with a deep approach being a
196 learner's intention to seek meaning for oneself [25, 30], while women were more often
197 interested in learning for learning's sake. While the female GPSTs in our survey had lower
198 scores for a deep approach, there is no evidence that this is linked with poorer performance:
199 female GPST candidates for the Membership of the Royal College of General Practitioners
200 (MRCGP) examination have higher pass rates for both the multi-choice Applied Knowledge
201 Test (83.8% pass rate for women vs. 77.5% for men) and the Objective Structured Clinical
202 Examination (OSCE) style clinical skills assessment (87.0% vs. 73.9%) [31].

203 Research is needed to assess which approaches are most associated with success in the GP
204 career. Work is also needed to assess whether doctors in other medical specialities have a
205 similar spectrum of preferred learning approaches, or whether our findings are specific to
206 those working in general practice.

207 **Conclusions**

208 GPs and GPSTs tend to have much higher scores for deep and strategic approaches than for a
209 surface approach. However, a majority have similarly high scores for two or more of these
210 approaches. It may be that selection for medical school, graduation and then selection for GP
211 training has a bias towards individuals who prefer these approaches.

212 In the UK, progression through GP training has no observable impact on the approach
213 preferred by GPSTs. This suggests that, in a group that has a preference for deep and strategic
214 learning from the outset, attempts by tutors to further deepen GPSTs' learning preferences
215 may be ineffective and indeed unnecessary. For established GPs there is an association
216 between increasing time since graduation and an increase in deep approach scores. This could
217 be due to a gradually increasing experience of the issues that arise in day-to-day practice,
218 which require an in-depth understanding. While the men in our study have a higher score for
219 a deep approach to learning than women, for GPSTs this is not linked with an improvement
220 in men's MRCGP examination performance scores.

221 **List of abbreviations**

222 ASI: Approaches to Studying Inventory

223 ASSIST: Approaches and Study Skills Inventory for Students

224 GP: General Practitioner

225 GPST: General Practitioner Specialist Trainee

226 LSI: Learning style inventory

227 LSQ: Learning Styles Questionnaire

228 MRCGP: Membership of the Royal College of General Practitioners

229 OSCE: Objective Structured Clinical Examination

230 UK: United Kingdom

231 **Declarations**

232 *Ethics approval and consent to participate*

233 The study design was reviewed for ethical integrity by the Research Ethics Advisory
234 Approval Committee for Health at the University of Bath. REACH reference number: EP
235 14/15 13.

236 Consent was implicit by agreeing to take the survey.

237 *Consent for publication*

238 Not applicable

239 *Availability of data and material*

240 The datasets generated and analysed during this study are not publicly available because of
241 the need to ensure participant confidentiality, but an anonymised dataset is available from the
242 corresponding author on reasonable request.

243 *Competing interests*

244 The authors report no conflicts of interest.

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246 This work was supported by Health Education South West, UK.

247 *Authors' contributions*

248 PC administered the survey and collected the data. All authors were involved in designing the
249 study, analysing and interpreting the data. All authors read and approved the final manuscript.

250 *Acknowledgements*

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252 The authors are also grateful to Professor Entwistle for his advice and for his permission to
253 use and adapt the ASSIST survey for this study.

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331

332 Table 1. GP and GPST approaches to learning

	Number of respondents	Mean score for deep approach (SD)	Mean score for strategic approach (SD)	Mean score for surface approach (SD)
Gender				
Female	554	20.0 (3.7)	20.2 (4.3)	14.7 (3.6)
Male	451	21.3 (3.7)	19.9 (4.5)	14.3 (3.9)
Difference between mean scores		1.3 ($P<0.001$)*	-0.3 ($P=0.21$)	-0.4 ($P=0.08$)
Years since graduation				
0-10	450	20.2 (3.8)	19.8 (4.5)	15.1 (3.8)
11-20	188	20.5 (3.7)	20.1 (4.4)	14.3 (3.6)
21-30	209	21.0 (3.9)	20.5 (4.3)	13.9 (3.4)
31-40	158	21.2 (3.4)	20.2 (4.0)	13.8 (4.0)
Difference between mean scores for least and most years since graduation*		1.0 ($P=0.007$)**	0.4 ($P=0.36$)	-1.3 ($P<0.001$)**
Age				
25-39	515	20.2 (3.8)	19.9 (4.5)	15.0 (3.8)
40-54	346	20.8 (3.9)	20.1 (4.4)	14.0 (3.5)
55-65	144	21.5 (3.4)	20.5 (4.0)	13.8 (4.1)
Difference between mean scores for youngest and oldest respondents		1.3 ($P=<0.001$)**	0.6 ($P=0.36$)	-1.2 ($P<0.001$)**
GP Specialist Trainee or established GP				
GPST	461	20.2 (3.7)	20 (4.4)	15.2 (3.8)
GP	544	20.9 (3.8)	20.2 (4.3)	13.9 (3.6)

Difference between mean scores		0.7 (<i>P</i> =0.008)**	0.2 (<i>P</i> =0.46)	-1.3 (<i>P</i> <0.001)**
Year of GPST training				
Year 1	139	20.1 (3.8)	19.3 (4.6)	15.4 (3.6)
Year 2	169	20.0 (3.7)	20.1 (4.0)	15.2 (3.9)
Year 3 or 4	148	20.4 (3.7)	20.4 (4.7)	14.9 (3.9)
Difference between mean scores for first and final GPST training years		0.3 (<i>P</i> =0.70)	1.1 (<i>P</i> =0.11)	-0.5 (<i>P</i> =0.45)
GP role (for established GPs)				
Locum	46	20.2 (3.8)	20.9 (4.4)	14.2 (3.6)
Salaried	93	20.9 (3.8)	19.9 (4.4)	14.3 (3.8)
Partner	386	20.9 (3.8)	20.2 (4.3)	13.8 (3.6)
Other	19	22.2 (3.7)	18.4 (3.8)	14.5 (3.5)
Maximum difference between mean scores for locum, salaried and partner roles		0.7 (<i>P</i> =0.30)	1.0 (<i>P</i> =0.19)	0.6 (<i>P</i> =0.51)

333

334 * Tests for normality of distribution of years since graduation: skewedness -0.458, kurtosis -
335 1.224.

336 ** Significant at *P*<0.05

337

338 Table 2. Gender and age of GPs and GPSTs and comparison with data for England [32]

	Number of established GP respondents (%)	<i>Number of established GPs in England (%)</i>	Number of GPST respondents (%)	<i>Number of GPSTs in England (%)</i>
Gender				
Female	281 (51.6)	<i>16,723 (47.1)</i>	273 (59.2)	<i>2,832 (64.0)</i>
Male	263 (48.4)	<i>18,804 (52.9)</i>	188 (40.8)	<i>1,594 (36.0)</i>
Age (years)				
≤34	36 (6.6)	<i>4,389 (12.4)</i>	353 (76.6)	Data not available
35–44	142 (26.1)	<i>10,920 (30.7)</i>	94 (20.4)	
45–54	223 (41.0)	<i>12,205 (34.4)</i>	13 (2.8)	
55–64	134 (24.6)	<i>6,534 (18.4)</i>	0	
≥65	9 (1.7)	<i>1,453 (4.1)</i>	1 (0.2)	

339

340 Table 3. Comparison of proportions of participants from different nations of the UK,
341 excluding Armed Forces participants, with national GP workforces

	Number of respondents (%)	GPs practising in each nation (%)
England	862 (88.4)	35,561 (82.7)
Scotland	70 (7.2)	4,251 (9.9)
Wales	39 (4.0)	2,026 (4.7)
Northern Ireland	4 (0.4)	1,171 (2.7)

342

Appendix. Amended ASSIST (short version) questionnaire

Each statement has a five-point Likert scale, with response options varied from ‘Strongly agree’ to ‘Strongly disagree’. Where changes were made, the original text is shown in square brackets.

The original ASSIST (short version) questionnaire is available at: https://www.researchgate.net/profile/Noel_Entwistle/publications.

- 1 I often have trouble in making sense of the things I have to remember.
- 2 When I’m reading an article or book, I try to find out for myself exactly what the author means.
- 3 I organise my study time carefully to make the best use of it.
- 4 There’s not much of my ongoing learning [original: ‘my work’] that I find interesting or relevant.
- 5 I work steadily through the year [original: ‘term or semester’], rather than leave it all until the last minute.
- 6 Before tackling a study [original: did not contain ‘study’] problem or assignment, I first try to work out what lies behind it.
- 7 I’m pretty good at getting down to studying [original: ‘work’] whenever I need to.
- 8 Much of what I’m studying makes little sense: it's like unrelated bits and pieces.
- 9 I put a lot of effort into studying because I'm determined to do well.
- 10 When I’m working on a new topic, I try to see in my own mind how all the ideas fit together.
- 11 I don't find it at all difficult to motivate myself to study [original: did not contain ‘to study’].
- 12 Often I find myself questioning things I hear in lectures or read in books.
- 13 I think I’m quite systematic and organised when it comes to revising for exams or assessments [original: did not contain ‘or assessments’].

- 14 Often I feel I'm drowning in the sheer amount of material we're having to cope with studying [original: did not contain 'studying']
- 15 Ideas in course material [original: 'books'] or articles often set me off on long chains of thought of my own.
- 16 I'm not really sure what's important in lectures, so I try to get down all I can.

17 When I read study material [original: did not contain 'study material'], I examine the details carefully to see how they fit in with what's being said.

- 18 I often worry about whether I'll ever be able to cope with my ongoing learning [original: 'the work'] properly.