What makes a good dentist and do recent trainees make the grade? The views of vocational trainers.

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Objective The aim of this paper is to examine the factors that vocational trainers regard as important in a 'good' dentist and to assess whether they think recent graduates were achieving these factors.
Design The study was based on a statistical analysis of returns from a postal questionnaire.
Setting Postal questionnaires were sent to all vocational advisors in England who then sent them on to a number of their vocational trainers.
Materials and methods The questionnaire was analysed using various statistical techniques including factor analysis. Analysis was undertaken to determine whether student or trainer characteristics influenced the trainer's responses.
Results The vocational trainers judged that the group of skills that contribute to technical ability are the most important component in making a 'good' dentist. However, the most important single skill is communication with patients, closely followed by diagnostic skills and communication with the dental team. The areas where trainees are most likely to fall short in terms of actual as compared to desired performance are in areas of technical ability.
Conclusion Overall, recent trainees scored rather well when compared with an idealised good dentist. However, it is clear that more evaluation of vocational training is needed. Recent studies, including this one have looked at several different aspects of vocational training. However, the time seems ripe for a full-scale prospective evaluation.

A recurring theme in recent times has been the debate about the standards of graduates leaving UK dental schools. Concern has been aired in certain quarters that 'dental students ain't what they used to be,' as Grace[1] succinctly puts it.

This belief stems mostly from anecdotal comments that dental graduates are not as competent as they were a few years ago.[2] If true, it is ironic that the problems could be due to improvements in dental health since decline in dental decay and edentulousness amongst patients may have reduced graduates' practical clinical experience.

Cabot and Radford[3], however, are not convinced of the fundamental premise and have leapt to the defence of today's graduates by questioning whether selective recall is at work and argue that although today's students are very different to those of the past they are not worse.

In particular, they are expected to be both scientist and dentist and have to contend with many more materials and methods than graduates of the past. They go on to argue that, '. . .it would seem sensible to find out exactly what vocational trainers and experienced practitioners think about the modern graduate'.[3]

This paper takes up that challenge. It presents the results from a random survey of English vocational trainers (VGDPs). VGDPs identified what factors contributed to making a 'good' dentist and how recent trainees measured up to those criteria. Although this cannot settle any disputes about whether today's dental graduates are better or worse than those of the past it does add to the debate about whether today's graduates make the grade. The next section outlines the methods used and is followed by results and a discussion.

Methods

The main themes in the questionnaire were initially developed in an open-ended manner with a small group of VGDPs. The questionnaire was then constructed and piloted with different VGDPs and was finalised after minor amendments. The chairman of the Committee on Vocational Training for England And Wales (CVT) provided the names and addresses of all 48 vocational training advisers in England. Following the chairman's advice, each adviser was contacted and sent sealed letters containing questionnaires and freepost envelopes to distribute to any three of their VGDPs. In total, 144 questionnaires were distributed, of which 96 were returned, a response rate of 67 per cent.

The questionnaire was restricted to three sides of A4-size paper in order to reduce the burden on respondents. The first side contained 25 questions on a Likert scale of 1 to 5 where the lower point was marked 'less important' and the upper 'more important.' The respondents were asked, 'On a scale of 1-5 how important do you think the following qualities are in contributing to making a good dentist?'

The second side contained question pairs where respondents were asked, 'On a scale of 1-5 how did your previous vocational trainee perform on the following criteria?' The lower point was marked 'poor' and the upper 'excellent' due to the change in objective. Finally, the last side of the questionnaire asked for background information on them and their previous trainee.

Results

Because of the large number of related questions on the questionnaire factor analyses were first carried out to uncover the key constructs underlying VGDPs' responses. The analyses reported here are based on principal components with varimax rotation. Oblique rotations were also undertaken but resulted in similar results so they are not reported here. Principal components analysis is a method of analysis of interdependence of variables. Our questionnaire contained many closely related questions. Principal components analysis transforms the variation in these many questions into variation in new uncorrelated variables which reflect the key con-

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Table 1 Main factors contributing to a good dentist

Percentage of common variance explained	Loading	Factors and their description
21.38		FACTOR 1: TECHNICAL ABILITY IN DENTISTRY
	0.934	Technical ability in periodontics
	0.913	Technical ability in prosthetics
	0.885	Technical ability in conservative dentistry
	0.831	Technical ability in paedodontics
	0.689	Good diagnostic skills (e.g. treatment planning)
	0.665	Technical ability in orthodontics
13.90		FACTOR 2: PATIENT ORIENTATED PERSONAL BEHAVIOUR
	0.766	Sympathy
	0.707	Friendliness
	0.698	Not intimidating
	0.622	Talkative
	0.589	Confidence
8.58		FACTOR 3: PROFESSIONALLY ORIENTATED BEHAVIOUR
	0.650	Good interaction with the DSA (e.g. 4 handed dentistry)
	0.637	Punctuality
	0.631	Professional appearance
	0.604	Commitment to the practice
	0.559	Communication with the dental team
6.58		FACTOR 4: PERSONAL ATTRIBUTES
	0.700	Multilingual skills
	0.677	Ability to carry out mundane tasks
	0.545	Gender
	0.511	Non-dental experiences
50.44%		

structs underlying the responses to the many original questions.

The final factors were selected by analysing screeplots. These plot eigenvalues — the variances of the components — in descending order against the number of possible factors. Step-change points (where eigenvalues fall precipitously between one factor and the next) were used to discern the number of factors to extract. Deciding on the number of components to select is therefore subjective to some extent, as is their labeling, which depends on the interpretation of the cluster of questions which comprise them.

The questions that contributed to each factor were selected on the basis of their factor loading being greater than 0.5. The higher the factor loading the more a particular question contributes to the factor under consideration. 0.5 is a more stringent cut-off than used by Slade (1997)[11] in his work reducing the number of questions on his oral health impact scale. Only those questions which were highly related to the underlying factor were included.

The first analysis undertaken was of the 'good' dentist. Four factors were extracted and these are set out in Table 1. The selection and labelling of these factors is subjective to some extent (depending on interpretation of the screeplots) The prime factor was 'technical ability in dentistry' which explained almost 25 per cent of the common variance across the whole questionnaire. The common variance is a similar concept to that of R^2 in multiple regression analysis. The second factor was 'patient orientated personal behaviour.' The final two factors were distinct but weaker: 'professionally orientated personal behaviour' and a collection of quite diverse characteristics labeled 'personal attributes.' Overall these four factors accounted for just over half of the total variance of the questionnaire.

The second analysis looked at the factors underlying the actual as opposed to desired performance of previous trainees. Only three major factors emerged as Table 2 shows. The first of these, somewhat clumsily labeled, 'professional and patient orientated personal communication and behaviour' reflects the fact that scores for patient and professional interaction, for want of a better term, tended to correlate.

This factor explained almost 40 per cent of the common variance on its own. The factor 'technical and general ability in dentistry' was somewhat wider than its equivalent in the first analysis. This and the final factor, 'practice behaviour and attitudes' accounted for a further 18 per cent of the variance.

The questionnaire also asked for background information on the trainer and trainee including gender, ethnic origin and dental school attended and the age of the trainer. Two sets of regressions were undertaken on the factor scores to test whether there were any differences in score by these VGDP and trainee characteristics. The first set sought to explain the factor scores for the 'good' dentist in terms of trainer characteristics (age, gender and dental school).

The second set sought to explain factor scores for previous trainees in terms of trainer and trainee characteristics (age of trainer and gender and dental school of trainee). The high number of dental schools relative to sample size left only enough degrees of freedom to sensibly test membership of three of the largest schools (GKT, Birmingham and Leeds) relative to all others. Ethnicity was excluded as a trainee and trainer characteristic due to problems with the coding of responses caused by an open-ended question design.

Table 3 reports the results. It is clear that all regressions performed very poorly — the factor scores are not closely related to the background variables collected.

Individual question scores were compared in more detail using the paired samples t-test. Theoretically data for the t-test should follow a normal distribution and be continuous. Signs tests were also undertaken for which the data should also be continuous (not reported). Our data does not conform precisely to these requirements but many statisticians feel that these are too strict and the t-test is generally robust to departures from normality and continuity.[4] The t-tests and signs test generally correlate as to which characteristics were significantly different. Table 4 reports the results. In the table paired questions are ranked in descending 'good' dentist score order. Communication — with the patient and the dental team — and diagnostic skills were believed to be the most important single attributes of a 'good dentist.' At the other end of the scale, gender and multilingual skills were seen as being of little or no importance.

The table also shows the mean differences between scores for the good dentist and the previous trainee. Of the 22 pairs where meaningful comparisons can be made, previous trainees scored significantly lower than a good dentist on 13 (59 per cent), significantly higher on 4 (18 per cent) and similarly on 5 (23 per cent) pairs.

The largest discrepancies were for diagnostic skills, communication with patients and ability in prosthetics. There were no significant differences in terms of friendliness, sympathy, commitment to career advancement or professional appearance.

Table 2 Main performance factors of previous trainees

Percentage of common variance explained	Loading	Factors and their description
38.65		FACTOR 1: PROFESSIONAL & PATIENT ORIENTATED PERSONAL COMMUNICATION AND BEHAVIOUR
	0.837	Friendliness
	0.815	Talkativeness
	0.782	Sympathy
	0.743	Communication with patients
	0.669	Communication with dental team
	0.645	Interaction with DSA (e.g. 4-handed dentistry)
10.85		FACTOR 2: TECHNICAL & GENERAL ABILITY IN DENTISTRY
	0.811	Technical ability in prosthetics
	0.804	Technical ability in periodontics
	0.730	Technical ability in conservative dentistry
	0.711	Technical ability in orthodontics
	0.652	Diagnostic skills (e.g. treatment planning)
	0.566	Previous dental work experience
7.15		FACTOR 3: PRACTICE BEHAVIOUR & ATTITUDES
	0.669	Timekeeping
	0.668	Ability to carry out mundane tasks
	0.652	Professional appearance
	0.565	Commitment to the practice
56.65%		

Discussion

The finding that technical ability is the main factor behind what makes a 'good' dentist mirrors the findings of Gerbert et al.[5] However, most studies have tended to find general communication issues are of more importance than technical ones.[6,7] The majority of these studies however have been undertaken from the patient's perspective, most of whom who will not have the knowledge or ability to judge technical issues.[8] From a trainer's perspective it is crucial that the trainee is competent. The other factors need little further discussion except to say that trainers clearly split the dentist's behaviour into two distinct categories: behaviour with the patient and behaviour with the rest of the dental team. Characteristics of the trainer did not predict the emphasis they placed on the different factors — the only significant finding being that older trainers were more likely to rate professionally orientated behaviour more highly (Table 3).

Table 2 is more interesting. It shows that scores for actual trainees tend to cluster into three groups. First, trainees who (do not) offer sympathy and friendliness to their patients tend to be good (poor) communicators with patients and the rest of the dental team and interact well with assistants during treatments. Second, technical ability (or lack of it) in one specialism tends to go hand in hand with technical ability in others (or lack of it) and this correlates with diagnostic skills and previous dental work experience. Thus trainees, when they are good, appear to have very rounded skills. Although trainee characteristics were once again in the main very poor predictors of trainee performance there are a few interesting results (Table 3). Birmingham trainees scored significantly lower than average for factor 2 and Leeds trainees significantly higher on factor 3. Finally, it appears that the changing gender mix of dental undergraduates has not led to any significant differences in terms of performance as trainee dentists.

The most interesting table of all is Table 4 which breaks down the scores for all question pairs. It shows that VGDPs judge that communication with patients is the most important single element in what makes a 'good' dentist — although as reported above the extracted factor 'technical ability' is the most important underlying core concern of trainers. Patient communication is closely followed by diagnostic skills and communication with the dental team. It also shows that these are the areas where trainees are most likely to fall short in terms of actual as compared to desired performance. In areas of technical ability trainees' absolute scores are also amongst the lowest. In contrast, the areas where trainees outperform what is expected in a 'good dentist are of lower importance, to trainers at least.

What does this mean? At first sight it seems to imply that Cabot and Radford's[3] claim that, '. . . with well-developed communication skills, from day one, the new graduate should be able to inform and converse with patients in a competent manner,' is overly-optimistic. Despite more emphasis on communication skills in under-graduate dental courses, trainees leave their vocational year lacking the ability to communicate with patients. Yet, is this their fault? After all, as Cabot and Radford[3] point out it is the role of vocational trainers to turn dental graduates into successful dental practitioners. Where else are trainees going to hone communication skills but under the watchful gaze of trainers? If there is a communication problem perhaps trainers should shoulder part of the blame.

Perhaps the problem has been overemphasised however. Although the gap between ideal and desired performance is one of the largest, trainees still scored a creditable 3.78 and 3.72 out of five on average for communication with patients and the dental team respectively. There may be deeper cause for concern about the more technical aspects of dentistry. The score for diagnostic skills was closer to three (3.15 out of 5 on average) as were all scores for technical ability, indeed ability in orthodontics received the lowest overall score (2.33 out of 5 on average).

This taken in conjunction with the high average score for academic knowledge may add some grist to the mill for those who

Table 3 Regression of main factor scores for 'good dentist', 'previous trainee' and their determinants

	Sig. variables	$\bar{R}^2$	F-statistic
a) A good dentist-			
Factor 1) Technical ability in dentistry	-	0.007	0.353
Factor 2) Patient orientated personal behaviour	-	0.000	0.938
Factor 3) Professionally orientated behaviour	Constant Age (+ve)	0.079	0.037
Factor 4) Personal attributes	-	0.000	0.487
b) Evaluation of previous trainee-			
Factor 1) Professional & patient orientated communication & behaviour	Constant Birmingham (-ve)	0.080	0.036
Factor 2) Technical & general ability in dentistry	Constant Age (-ve) Leeds (+ve)	0.088	0.026
Factor 3) Practice behaviour & attitudes		0.766	0.000

Table 4 Mean scores for good dentist and previous trainee and significant differences (*)

Paired attributes	Mean score		Difference	t-test	Direction
	Good dentist	Previous trainee			
Communication with patients	4.8	3.78	1.02	0.000*	Good dentist higher
Diagnostic skills	4.62	3.15	1.47	0.000*	Good dentist higher
Communication with the dental team	4.55	3.72	0.83	0.000*	Good dentist higher
Technical ability in conservative dentistry	4.23	3.43	0.8	0.000*	Good dentist higher
Friendliness	4.23	4.21	0.02	0.84	None
Confidence	4.17	3.72	0.45	0.001*	Good dentist higher
Punctuality	4.14	3.44	0.7	0.000*	Good dentist higher
Commitment to the practice	4.1	3.27	0.83	0.000*	Good dentist higher
Interaction with the DSA (e.g. 4-handed dentistry)	4.1	3.65	0.45	0.000*	Good dentist higher
Technical ability in prosthetics	4.06	3	1.06	0.000*	Good dentist higher
Technical ability in periodontics	4.06	3.31	0.75	0.000*	Good dentist higher
Not intimidating	3.99	n.a.	n.a.	n.a.	n.a.
Technical ability in paedodontics	3.98	3.2	0.78	0.000*	Good dentist higher
Sympathy	3.98	3.85	0.13	0.25	None
Professional appearance	3.89	3.68	0.21	0.139	None
Commitment to career advancement	3.6	3.61	0.01	0.942	None
Academic knowledge	3.5	3.97	0.47	0.000*	Trainee higher
Talkativeness	3.25	3.74	0.49	0.000*	Trainee higher
Technical ability in orthodontics	3.14	2.33	0.81	0.000*	Good dentist higher
Previous dental work experience	2.85	2.71	0.14	0.276	None
Non-dental experiences (e.g. work experience)	2.78	3.16	0.38	0.008*	Trainee higher
Ability to carry out mundane tasks	2.71	2.42	0.29	0.033*	Good dentist higher
Patient turnover	2.53	2.98	0.45	0.000*	Trainee higher
Multilingual skills	1.89	n.a.	n.a.	n.a.	n.a.
Gender	1.27	n.a.	n.a.	n.a.	n.a.

argue that graduates are being pumped full of academic knowledge at the expense of practical technical expertise.

Conclusion

This study is the first — to the author's knowledge — that has canvassed the views of vocational trainers about the factors that make a 'good' dentist and rated their previous graduate trainee according to these factors. It makes mixed reading. Overall, trainees scored rather well with average scores on almost half of the questions over 3.5.

However, making the grade in the more technical areas seems problematic. It is not clear whether this is due to inadequacies on the part of the new graduate or unrealistic expectations on the part of VGDPs. It is also unclear whether this will be a problem for future dentists. If, as Hobson[2] argues, the dentists' role is changing from that of a 'highly skilled technical professional to the oral health physician of the future' the dental schools may be ahead of the game in equipping their graduates with the academic skills they need. The cost of this is lower technical ability in the short-term.

What is clear is that more evaluation of vocational training is needed to answer some of these questions. Recent studies, including this one, have looked at several different aspects of vocational training.[9,10] However, the time seems ripe for a full-scale prospective evaluation. This should involve both trainee and trainer assessment to agreed criteria, be longitudinal if possible, and importantly be undertaken by independent assessors. Perhaps then we will be more confident about whether current trainees make the grade.

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