Teaching and learning in dental student clinical practice

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Abstract Clinical learning in restorative dentistry is principally centred around the provision of patient care, yet we know very little about the learning processes occurring within the clinical environment. A study of undergraduate dental student clinical practice used a combination of group interview and questionnaire techniques to explore some of the characteristics of student/teacher interaction that students finds significant, and which they consider to affect their learning of clinical skills. Study data, when analysed, revealed three major categories of teacher or student behaviour which appear to be of importance to students. This paper focuses on one of these, describing a number of behaviours, grouped together under the category of ‘teaching/learning behaviours’. The aim of the paper is to report these results and to discuss their application to clinical teaching of restorative dentistry.

Key words: education; dental clinical skills.

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A significant part of dental student training consists of clinical practice on patients, under the supervision of qualified dentists. Although many health care professions use a clinical environment in the teaching of students, the teaching of dentistry has a number of unique aspects.

There is a good deal written in the literature on the assessment of dental student clinical practice. But, whilst medicine and nursing have a literature rich in discussion of student learning in clinical practice, in dentistry that literature is almost non-existent. Studies that do exist focus principally on appropriate teacher behaviours in the clinical setting (1, 2).

Dental students may be expected to learn from a number of sources during their clinical practice; for example from the clinical procedures themselves, from interactions with patients, dental nurses, dental technicians and student colleagues. The way in which the student learns from each of these sources appears to be largely unexplored.

Clinical learning in restorative dentistry is principally centred around the provision of patient care. In providing patient care clinical teacher and dental student interact on a one-to-one basis, a relationship which has been traditionally perceived as one of the key elements in student learning. Yet this process may not be particularly conducive to student learning, principally because the clinical learning environment also includes the patient, who adds extra complexity to the learning process. For the student, clinical practice involves irreversible operative procedures, which must be executed without harm to the patient (3).

In order to prevent harm to the patient, the clinical teacher must also be a clinical supervisor, and a tension exists between the learning needs of the student, and a duty to prevent harm to the patient.

This paper is based on a study carried out as part of a further degree (4). The study examined aspects of the clinical teaching carried out on a mixed restorative clinic in Cardiff Dental School, University of Wales College of Medicine. The study used a combination of group interview and questionnaire techniques to explore some of the characteristics of student–teacher interaction that students find significant, and which they consider to affect their learning of clinical skills.

The aim of this paper is to report some of the results of that study and to discuss their application to the clinical teaching of dentistry.

Study methodology

Qualitative research methods
There are a number of research methods for collecting and analysing qualitative data. In general they rely on verbal, non-verbal or written communication between
researcher and sample, rather than on physical measurement. Examples of such research methods include group interviews and questionnaires.

Interviews have the advantages of being able to collect a depth of data often inaccessible using questionnaire techniques. They are considered useful for exploratory research. This is especially true if the interview is unstructured, and the extra dimension of a group interview style increases the potential for understanding the issues affecting a group as a whole (5).

Questionnaire surveys are well-recognised tools in both qualitative and quantitative research. It is common in qualitative research to collect data in more than one way, because such triangulation is thought to increase the validity of the information being collected. It is also common to use group interviews for preliminary investigation in order to inform the development of an appropriate questionnaire.

Content analysis is a research method frequently used to understand and to make valid inferences from textual data (6). Central to content analysis is the breaking down of the material into individual items – sometimes phrases and sometimes individual words. Once identified, such items can then be allocated into a finite number of categories for analysis. Such categories are derived by the researcher, either from the data itself, and/or from an external source if available. Derivation of categories, whilst ensuring that the interpretation of the data remains reliable and valid, is the most challenging aspect of textual analysis. Because categorisation is dependent on meaning as understood by the analyst, he or she becomes an integral part of the research process (7, 8). In the present study it was the derivation of the categories themselves which provided important insights.

The study
The study cohort consisted of all the students from the third and fourth years of the Bachelor of Dental Surgery programme (4th BDS and 5th BDS) at the Dental School, University of Wales College of Medicine. All students in the cohort were involved in clinical practice on the same mixed restorative dentistry clinic.

Collection of data took place in two distinct stages. The first of these involved a number of group interviews with a self-selected subset of the study cohort. Subsequently data from these interviews informed the development of a questionnaire which was then administered to all students in the cohort.

Group interviews
The first data collection took the form of two group interviews; one with a self-selected group of 4th BDS students, the second with a self-selected group of 5th BDS students. Both groups were taught by a similar mixture of dental clinical staff on the same clinic. Because students interviewed were volunteers, the composition of the interview groups was not random. The interviewer played no part in the make-up of the interview groups. The interview process was unstructured in each case, on the basis that this might allow the most significant elements to enter into discussion. The interviews were recorded on audio tape (with group permission) and later transcribed for analysis. From this content analysis three major themes of student concern were derived as depicted in Fig. 1.

Questionnaire-based survey
Questionnaire development was informed by the issues raised during the interviews. The questionnaire was piloted with both staff and a selection of students from the cohort. It contained principally closed questions to be answered using binary and Likert-type response scale, though there were also three open-response questions.

After piloting and adjustment the questionnaire was administered to all students in the cohort. Over a 1-week period 98 questionnaires were issued to students at the beginning of an appropriate clinical session. It was intended that students complete the questionnaire directly following the clinical session, providing a cross section of comment on the session. All returns were anonymous. Eighty-five questionnaires were completed and returned, though in 15 cases return was delayed until the following day. The return rate was 83%, giving a representative sample. Distribution of returns by year of the course and by gender is described in Table 1.

The collected data were analysed for frequency, mode and median and, where appropriate, mean and standard deviation. Many of the open responses contained reflection on teacher comments. All such reported comments were interpreted with caution, being based on recollection which may be incomplete or misunderstood.

Comparison between group interview and questionnaire results showed a high degree of agreement. Using group interview data to inform the development of the questionnaire will have played a part in this. Nevertheless it is assumed that the level of agreement between the two data collections increases confidence in the data.
Discussion of results

During the content analysis process it became apparent that there were three broad categories of elements within the student–teacher relationship. These were student behaviour, teacher characteristics and teaching/learning behaviours, though it is true that these areas overlap in a number of ways. The focus of this discussion is on some of the teaching/learning behaviours that appeared to be of importance to students.

Students made a number of significant comments concerning teaching/learning interactions, both at interview and as responses to open questions in the questionnaire. Such comments should be understood in context, that context being clinical teaching in dental student clinical practice, and that the comments come exclusively from dental students. Nevertheless many reflected themes common to other teaching environments, such as feedback, demonstration, integration of theory with practice, and student autonomy.

Feedback

The importance of the quality and especially of the emotional tone of feedback to the students in the study was made very clear by comments at interview, such as:

One clinician said to me the other day, ‘Look, if I was doing that, I don’t know if I’d be able to do it anyway, so don’t worry, you are here to be taught’. So he said a positive thing, but then he said ‘You’ve got to improve on this’. You felt like going back to your patient and doing [the task] really well, and instead of [saying to yourself] ‘he’s really put me down, I just want [the patient] to go now’. You really want to strive to do better.

The study also underlined the power that feedback puts into the hands of the clinical teacher. As one student commented, ‘even the smallest word or the shortest sentence can make a difference’.

Because interview data indicated the importance of feedback to students, the questionnaire included three closed and one open question on feedback. The open question asking for a description of feedback received, to which there were 69 (out of a possible 85) responses.

### TABLE 1. Distribution of returns by gender and year of course

<table>
<thead>
<tr>
<th>Year of course</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4th BDS</td>
<td>22</td>
<td>22</td>
<td>44</td>
</tr>
<tr>
<td>5th BDS</td>
<td>21</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>42</td>
<td>85</td>
</tr>
</tbody>
</table>
The first point to mention is that (Table 2) very few students thought they had received enough feedback. The data indicate that most feedback consisted only of staff reassuring students that their work was ‘fine’, though a few more detailed staff comments were reported. Most such comments were reported as being positive in nature, though there were criticisms of the feedback in some open responses, suggesting that teachers focus on negatives.

Feedback is generally recognised as important to student learning, as it provides the student with understanding on which to base future learning (9). Feedback perceived to be incorrect by the student, or negative feedback which is personality or ability related, may affect self-efficacy and motivation (10, 11). Moreover, the emotional tone of feedback is thought to be closely interlinked with student motivation and self-efficacy, and important to the student’s ability to learn effectively (12). Mager (13) provides a useful way of understanding feedback in clinical teaching by classifying it as adequacy, diagnostic or corrective: adequacy feedback providing information on the adequacy of the clinical outcome, diagnostic feedback providing detail on the shortcomings in the clinical outcome, and corrective feedback suggesting action to be taken to ameliorate those shortcomings.

It does appear that students appreciate feedback which is accurate, comprehensive and systematic, and provided in a positive emotional environment. Given the importance of feedback to student learning, perhaps dental clinical teachers should be encouraged to offer feedback in a more comprehensive, structured and positive way; more comprehensive in that feedback should contain diagnostic and corrective information; more positive and encouraging in tone. Structure, perhaps using a standardised form, would give dental teachers a focus for the feedback process.

**Demonstration**

Students in the study commented on how useful they found demonstration of procedures by staff. Of course this happens regularly in pre-clinical restorative dentistry, but it does appear that students find demonstration on patients to be useful:

Some will actually do part of the prep for you. That’s when you actually gain, when you see what a 1.5 mm shoulder looks like.

In practice the study showed that, although new procedures did generate more ($P = 0.006$) demonstration than did familiar ones, demonstration actually appeared as a feature in relatively few student procedures (Table 3).

Demonstration is thought to be a significant factor in learning psychomotor skills (14, 15), and ought to be a common feature of dental student clinical practice. Clinical teachers should be encouraged to make demonstration a regular practice where students are learning new procedures, even though it does take significant time.

Although essential to student learning, demonstration needs careful managing. Knowledge underlying demonstration is often tacit and not visible to the student (16), and needs to be clearly communicated as part of the demonstration. It should also be borne in mind that demonstration has the potential to undermine the student–patient relationship.

**Integration of knowledge and skill**

In the group interview data a number of students complained that the theoretical teaching they receive was non-contextual, and that they were offered no help in the integrative process. As one student commented, “people tell us ‘get on with it, you studied it two years ago, you should know this’. As a result two questions relating to student preparation for clinical activity were inserted into the questionnaire. Responses to these indicated that most students, when faced with new procedures, did prepare themselves, and found personal preparation to be useful.

Nevertheless, because the student does not yet have the experience to categorise and link information to experience, and because not all students have had the same clinical experience, contextual teaching should be part of clinical practice. It appears from the student perspective that there is a reluctance to engage in this.
It has become usual to divide, and think of, professional activity as consisting of separate domains of knowledge, attitudes and skills. It may be more accurate to envisage student learning as taking place in a number of different domains simultaneously during clinical practice, or perhaps in the interaction between them (17). It is the responsibility of the clinical teacher to facilitate learning within clinical activity, which might be structured (18) to promote learning by interaction between knowledge, attitudes and skills, so that both cognitively and also physically, the clinical practice environment becomes a ‘convergence’ of academic and practical understanding.

**Student autonomy and student self-assessment**

Because the clinical teacher is legally responsible (in the UK at any rate) for the patient’s well-being, there is a tendency inherent in dental student clinical practice towards teacher-led clinical decision making. All clinical teachers have had occasion to take over the student’s work occasionally to protect the patient. Many students in this study had experienced this infringement of their autonomy, and it appeared to cause some resentment for a variety of reasons. For example:

- We’re supposed to be diagnosticians as well, not just technicians. If they say ‘do this, do that’ then we get into the habit of going ‘OK’ rather than thinking carefully and thinking ‘why, specifically am I using this material?’
- If it’s going wrong, the best person to sort it out is the clinician. Sometimes you don’t want them to pick up the handpiece; it’s just knowing when you need the help and when you don’t.

Dentists, as professionals are expected to take responsibility both for their clinical decision-making and in their own professional development. In this context it seems reasonable to suggest that student clinical activity needs to be directed towards increasing autonomy to prepare the student for practice.

It also appears important, for a number of reasons, to familiarise students with assessing their own clinical work. First, it is recognised that self-assessment is an important promoter of learning (19) ‘at the heart of the educational process itself and one of the aims of professional education’ (20). Second, the ability to self-assess is thought to be important in the development of the motor skills which are important to clinical activity (21). Third, the ability to self-assess is thought to be important to the professional’s ability to monitor personal standards of care (22, 23).

**Conclusion**

For most of its life, research in dentistry has been dominated by quantitative research methodologies. Yet qualitative methods of information collection and analysis are on the whole more suitable to understanding a complex physical, social and psychological environment in which the isolation of any particular variable for study is impossible (24). It can be suggested that the emphasis on quantitative methodology has resulted over time in a relative neglect of the social and interactive aspects of dentistry (25), and may go some way to explain the lack of discussion in the dental literature of clinical teaching.

It is also true that qualitative methodologies have their limits. The research process is primarily descriptive, and the understanding gained may not be generalisable nor predictive. It means that the conclusions noted in this paper must be specific to the clinic and the study cohort. Adequacy, or otherwise, of the clinical teaching provided cannot be taken as indicative of other clinical teaching environments without much broader examination, though many of the concepts noted do also appear in discussions of clinical teaching in other health care professions (26–30).

This paper focuses on some of the significant teaching/learning behaviours revealed by the study. These behaviours are examined uniquely from the student perspective, providing a necessarily incomplete understanding. Even so, some tentative conclusions can be drawn, and will need to be tested in other contexts. An obvious complement to this study would be to examine dental student clinical practice from the clinical teacher’s perspective.

Many of the ideas discussed above, such as demonstration, motivation and positive affirmation, also occur in the concept of role modelling. The idea of the dental clinical teacher as a role model was discussed by Chapnick and Chapnick (2). Mentoring and role modelling are an accepted part of medical educational literature, but the idea seems also to be relatively neglected in dental educational literature. Perhaps appropriate role modelling has a useful part to play in the process of helping dental students to learn the knowledge, skills and attitudes appropriate to independent clinical practice.

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References


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