IN BRIEF

- Linked training of dental undergraduates and dental technicians offers benefits in terms of communication and understanding each others' roles.
- This leads to: more thoughtful and clearer laboratory prescriptions and a better understanding of the patients' requirements.
- The use of such linked training should be considered when introducing PCD training programmes.

'Bridging the gap.' Should the training of dental technicians be linked with that of the dental undergraduate?

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Objectives: Improving communication and collaboration between members of the dental team is important to the long term aim of improving the quality of dental care for patients. For example, closer integration between trainee dental technicians and undergraduate dental students during their courses of training should both help to develop their own skills and foster an improved level of communication and understanding between these members of the dental team. The purpose of this study was to ascertain the number of dental teaching hospitals in Great Britain and Ireland currently involved with the training of dental technicians, and to find out how many of these bring trainee technician and undergraduate dental students together at some time during training as a matter of policy.

Methods: Action research was carried out in the form of a linking exercise in the Newcastle upon Tyne Dental Hospital. This involved second year trainee dental technicians and third year undergraduate dental students working together to provide complete dentures for a patient within the formal undergraduate course in complete denture construction. The trainee technicians also attended a series of lectures relevant to this course alongside undergraduate dental students.

Results: The main findings revealed that although a number of dental teaching hospitals were involved with the training of dental technicians and had encouraged links between undergraduate dental students and trainee technicians, few had formalised these links in any way.

Conclusion: The outcomes of the linking exercise were evaluated by means of focus groups, observations and semi-structured interviews. Results indicated that both the trainee dental technician and the undergraduate dental student benefited to some extent from closer collaboration during training.

INTRODUCTION

Traditionally, the working relationship between dentist and dental technician has depended on communication by written prescription with little face to face dialogue. Both make assumptions based on their own experience about the other's approach to the needs of the patient. Unsurprisingly, this sometimes unreliable means of communication has resulted in a variable quality of service[1] and a body of literature exists describing the unsatisfactory interface between clinician and laboratory.[2–4] Some of this highlights the poor nature of prescription patterns which contravenes the European Union Directives for the fabrication of oral prostheses.[5-6]

One of the problems described to the Nuffield Committee (1993), was about poor communication between dentist and technician. The report pointed out that '*Only rarely, outside hospitals, do technicians have the opportunity to see the patient for whom they are working during the making or fitting of an appliance*'.[7] This segregation can lead to difficulties when dentist and technician meet in daily practice.

The training of dental technicians in the United Kingdom has normally been structured in such a way that the trainee dental technician has only minimal contact, if any at all, with clinical dental undergraduates during training. For effective team work to take place, the team members should have a clearer understanding of one another's role than has previously been the case. In other words, if each can acquire a better understanding of the work of the other, a higher standard of oral health care should result. Indeed, many would regard dental technician training as

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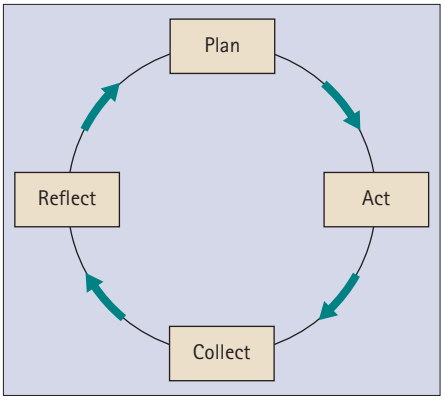

Fig. 1 Action research cycle.

incomplete without exposure to clinical dentistry.[8] Today, closer co-operation and team work seem to be the way forward not only in the world of commerce and industry but also in healthcare. The concept of the dental team is here to stay,[9,10] and the GDC have recognised this by structuring training frameworks for PCDs[11] so that they are very similar to the *First Five Years* document.[12] However, the progress made by many dental schools in the UK in providing such training for PCDs and in particular dental technicians, is questionable.

The purpose of this study was firstly: to undertake a survey to investigate the present availability of concomitant training opportunities for dental technicians and undergraduate dental students in UK dental schools. Secondly, within Newcastle Dental Hospital, to investigate whether there are any benefits from shared learning opportunities by evaluating a learning exercise that involved both trainee dental technician and undergraduate dental student in the provision of complete dentures for a patient.

MATERIALS AND METHODS

A postal questionnaire was designed[13] to identify both the number of dental teaching hospitals in Great Britain and Ireland currently involved with the training of dental technicians, and those that had established any form of link between the training of dental technicians and dental undergraduates.

The survey was limited to dental teaching hospitals: establishments suitable to link trainee technician and undergraduate dental student in the exercise. Further questions explored these links and, where established, the respondents were asked to rate the degree of importance of this linking on an ascending scale of 1 (low) to 5 (high). An accompanying letter advised all recipients about the purpose of the questionnaire and how to complete and return it. Provision was also made on the form for those willing to discuss matters further to leave a contact address. Questionnaires were sent to all the laboratory managers of the Association of Dental Hospitals. For the purposes of validity and reliability[14] the questionnaire was piloted with colleagues in the Newcastle Dental Hospital before being sent to all dental teaching hospitals in Great Britain and Ireland. The time-frame for return of the questionnaires was one calendar month.

The learning exercise was undertaken in the Newcastle Dental Hospital, and involved second year trainee dental technicians and third year undergraduate dental students working together to provide complete dentures for a patient as part of the formal undergraduate course in complete denture construction. The trainee technicians also attended the series of lectures relevant to this course alongside dental students. Ethical approval for the study was not required.

As the undergraduates normally worked in pairs, it was decided that one trainee dental technician would link up with two undergraduate dental students. A total of eight trainee technicians and 16 undergraduate dental students took part in the exercise.

The trainee technicians observed prosthodontic procedures in the clinic and carried out all laboratory procedures for the patient. The dental undergraduates were actively encouraged to involve themselves in the laboratory work for their own patients. Both groups worked together with one patient for a period of 12 to 14 weeks.

Triangulation was the methodology used in the collection of data.[15,16] Focus groups, a semi-structured interview and observation techniques were used.

Two focus groups[17,18] each consisting of four trainee technicians and eight undergraduate dental students were arranged within one week of the study finishing. Fewer than six participants was thought an insufficient number for a stimulating dialogue, and more than 12 too many for all the participants to express their points of view.[19] An observer was also present to record verbatim the participants' responses. A semi-structured interview[20] was also held with the clinical course organiser. Observation[21] was the third component in the triangular method of data collection. This was carried out by the instructor responsible for the trainee dental technicians. Observations were made on a number of occasions both in clinical and laboratory areas and recorded on paper. Both sets of students were unaware that this was taking place.

The methodology used in the implementation of the learning exercise was one of action research.[22] Action research is *learning by doing*, whereby a problem is identified (plan); something is done to resolve it (act); an assessment of success is made (collect); and further action is taken (reflect) (Fig. 1). The essentials of this cyclical process are considered by Elliott[23] as cited by Hopkins.[22] Initially an exploratory stance is adopted, where an understanding of a problem is developed and an intervention is carried out.

During the intervention, observations are made. Finally new interventional strategies are carried out, and the cyclic process repeats, continuing until a sufficient understanding of the problem is reached. Action research is now a well established research methodology. Bell suggests the nature of action research makes the approach attractive to practitioner-researchers who have identified a problem during the course of their work and see the merit of investigating it in order to improve practice.[24] Cohen and Manion advocate that it is appropriate when a new approach is to be grafted onto an existing system.[25]

RESULTS

From a total of 17 questionnaires sent, 15 hospitals responded, and of these 11 were involved in the training of dental technicians: five as course providers; four as placement providers (institutions normally providing only practical experience); two as both course and placement provider.

Table 1 shows the type of course and the number of hospitals involved. Table 2 shows the length of time a course had been in operation. The responses of the 11 hospitals currently involved with the training of dental technicians to questions about the linking of dental technician and dental undergraduate training are given in Table 3. The degree of importance attached to this linking exercise by those hospitals responding 'Yes' or 'Sometimes' to these questions is given in Table 4.

Table 1 Type of course and the number of hospitals involved

Types of course	BTEC/ND	HNC/HND	BSc(Hons)	Dip D/Tech	No response
Number of hospitals	5	2	2	1	3

Table 2 Length of time a course had been in operation

Length of time	Under 5 Yrs	6–10 Yrs	11–15 Yrs	16–20 Yrs	20 + Yrs	No response
Number of hospitals	1	4	1	1	2	2

Table 3 Responses to questions about the linking of dental technicians and dental undergraduate training

Questions	Yes	Sometimes	Never	No Response
1. Do trainee technicians attend lectures/seminars alongside dental undergraduates?	1	3	6	1
2. Do trainee technicians link up with dental undergraduates in a clinical situation?	4	3	3	1
3. Do trainee technicians link up with dental undergraduates in a laboratory situation?	4	3	3	1

Table 4 Responses to questions on the degree of importance attached to this linkage by those hospitals responding Yes or Sometimes

Degree of importance	1 (Low)	2	3	4	5 (High)
1. Trainee technicians attending lectures/seminars alongside dental undergraduates.			1	1	2
2. Trainee technicians linking with dental undergraduates in a clinical situation.				2	5
3. Trainee technicians linking with dental undergraduates in a laboratory situation.		1		1	5

Four respondents who agreed to take part in follow-up telephone interviews were asked specifically about the linking of trainee dental technicians with dental undergraduates during lectures or seminars and in either a clinical or laboratory situation.

The main points to emerge from these interviews were:

- There was no formal arrangement for trainee technicians to attend lectures or seminars alongside dental undergraduates although such trainee technicians would attend lectures alongside dental undergraduates if invited to do so.
- Trainee technicians did occasionally link up with undergraduates in a clinical situation though all respondents said they encouraged their trainee technicians to attend the clinic informally to see the results of their work in the patient's mouth.
- Dental undergraduates did link up with trainee technicians occasionally in the laboratory, but only in order to solve a specific problem.

The first question asked in the focus groups was whether any benefit had been gained from the linking exercise. All those present at both focus groups intimated that the exercise had been beneficial as indicated by the following abridged responses:

From trainee dental technicians:
'...first hand experience of clinical procedures and contact with the patient.'
'...seeing the patient at different stages made my work much more worthwhile.'
'...before the exercise I didn't know what happened in the clinic. Now I have a better understanding of how the dentist works with the patient.'
'...I didn't understand some of the dental terms, but after visiting the clinic I now have a better understanding.'

From undergraduate dental students:
'...learnt more about the technical stages in complete denture making.'
'...able to tell the technician directly what the patient wanted who was then able to get to know the patient's needs first hand.'
'...the technician could more fully understand the adjustments needed to be made in the lab, having witnessed the problems in the clinic.'

Both focus groups felt that in terms of the 'finished product', the patient did benefit from the exercise. Examples of individual responses from both trainee dental technicians and undergraduate follow:

From trainee dental technicians:
'...patient able to tell technician directly what they wanted.'
'...patient able to have immediate alterations made at the chairside by the technician.'

From undergraduate dental students:
'...patient reassured when witnessing dialogue between 'dentist' and 'technician'.'
'...the technician knew exactly what was required and therefore no communication problems between lab and clinic.'

When asked if the exercise was to be repeated or how it could be improved, both focus groups agreed that it would be a good idea to repeat the exercise at a later date with another group of students to undertake a different procedure such as partial or copy dentures.

The main points to emerge from a semi-structured interview with the clinical course organiser as to the benefits of the exercise were:

- The undergraduates had been made more aware of the problems facing the technician trying his or her best to carry out sometimes imprecise and unrealistic instructions.
- Hopefully this awareness should lead eventually to more thoughtful prescribing and ultimately to a better service of care for the patient.
- Being able to discuss technical and clinical problems face to face with the technician was a more effective and reliable means of communicating requirements.

Observation in the clinic and the laboratory showed that those involved worked well together. Both undergraduate dental students and trainee dental technicians became involved in what they were doing; constructive dialogue took place and was reinforced by non-verbal communication such as facial expression, gesturing and body posture.[26] The undergraduates who visited the laboratory were able to see at first hand how their written prescriptions were being interpreted by the trainee technician, and they were also able to clarify whether the information provided was clear and precise.

DISCUSSION

This study set out to examine whether any benefit could be gained by the establishment of closer links between trainee dental technicians and undergraduate dental students during their otherwise separate courses of training.

The main findings from the survey revealed that although a number of dental teaching hospitals were involved with the training of dental technicians and had encouraged links between undergraduate dental students and trainee technicians, few had formalised these links in any way. The exposure of trainee technicians to clinical dentistry through placements in various clinical settings has been previously reported by a number of training institutions.[8] However, the exact nature of these placements was unclear and could not be assumed to involve the examples of direct linkage described in this study. Enhancing communication and collaboration between dentist and technician could also be undertaken in other ways such as trainee dental technicians working with qualified clinicians and dental undergraduates working alongside trained techni-

cians, and indeed evaluation of these methods is clearly desirable.

Analysis of the data from the linking exercise indicated that the trainee dental technicians and undergraduate dental students had benefited to some extent. For example, the trainee dental technicians had the opportunity to observe the different stages of treatment in the clinic. This allowed them to gain a better understanding of the significance of their own work, and, at the same time, it gave them the opportunity to improve their communication skills with the patient and other members of the dental team. Of equal importance, however, was the opportunity it gave to the dental undergraduates to discuss requirements face-to-face with the technician.

At the same time, however, lessons have also been learnt. During the collection of data a number of issues came to light: a number of undergraduates failed to attend the laboratory to see work for their own patients being carried out and a number of trainee technicians missed lectures.

In addition patients were not asked whether they felt they had gained benefit from the exercise. Consequently, a second action step has been planned to address those issues raised by this study. It is also hoped the linking exercise can be extended to the crown and bridge and orthodontic curriculum.

In the implementation of the linking exercise described here, there are historical and social-status tensions between dentist and dental technician which – unlikely as they are to be resolved without radical change – must also be taken into consideration. Relatively low pay and low status are problems shared by many dental technicians, who are aware that dentists are *'reluctant to accept technicians as equal partners'*.[7]

It is also important to the good understanding of this study to know that there used to be a strong emphasis on dental laboratory techniques in the training of dentists. Today, however, there is no expectation that dentists will ever have to carry out their own laboratory work. In fact, laboratory instruction for dental undergraduates has fallen in the last 25 years by some 75%.[7]

There are a number of possible reasons why trainee dental technicians and undergraduate dental students might resist change.[27] For example, they both might regard change as a threat to their sense of competence.[28] Being comfortable with the status quo, they might fear that they will fail at new tasks. Bringing about change can be difficult; Scott and Jaffe[29] inform us that *'people do not normally change their behaviour simply by being given information'*. Others are not always willing to take on board our own good ideas.

If we are to bring about change, others must be encouraged to take ownership of the change itself. It is far more common for people to change because of the support and encouragement given to them. Change, in any organisation, can be difficult to bring about. Prejudice and entrenched working practices do not always welcome change. Thus the agent of change runs the risk of 'upsetting the boat', and in an organisation such as the dental profession, barriers to change can be difficult to overcome. However, the present study shows that when approached with care, the organisational hurdles that once seemed insurmountable are after all tractable to change.

The relevance of this study is set against changes which are imminent within the training of Professions Complementary to Dentistry (PCD) much of which will be centred in the teaching hospital environment. With the educational frameworks for PCDs now complete, this may be the opportunity to examine the undergraduate curriculum and look at areas where there may be overlap within the PCD curricula. This then may give the opportunity for closer links to be developed and direct the training towards the dental team as a whole.

CONCLUSION

The study has indicated that there are benefits to be gained from bringing together trainee dental technicians and undergraduate dental students during training when appropriate. Whether this training needs to be hospital based, in general practice or a combination of both is open to further debate.

It is likely that the implementation of such integration would be easier within a hospital based programme as the environment lends itself to the training of the dental team as a whole, with all members being able to work alongside each other. However, regardless of this setting, such training would require a significant investment in time and financial resources. It is hoped that this study will serve to usefully inform the future development of both dental undergraduate and dental technician training programmes.

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