SYSTEM IN TEACHING PROSTHETIC DENTISTRY.

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THE title of this paper may suggest to some the attempt to apply to this highly technical branch of our art, the methods of the efficiency expert, or it may seem to smack of the widely advertised correspondence course of the common or magazine variety.

Neither of these, extremely useful as they are in their fields, have been the incentive to the writer hereof to unburden himself of the observations following.

However, both may have had their part in his subconscious mind in stimulating an effort toward an orderly arrangement and application of the diversified fragments of knowledge gradually acquired by accident or intention, thru years of association with the subject while endeavoring to impart some of its principles to others. Indeed, one cannot fail to be impressed by the lack of efficiency of the average student, and his fearful waste of the time at his disposal in purposeless and ineffectual movements, even tho he feels he is putting his best into his work. Seeing this waste of time, and with it energy, it may well be that in the near future we shall find it advisable to include somewhere in our curriculum a study of co-ordinated motions correlated with brain reflexes. This might appropriately come in our new course, Applied Physics.

Already we see an application of these principles in the work of the Gilbreths, and others, in the teaching of partly dis-

abled soldiers to take up new and wholly unfamiliar vocations, oral hygiene among them. In many instances entirely new series of brain reflexes are established as well as the physical motions necessary in the performance of the work.

But before we apply any system to teaching, we must know exactly what we want to teach, and settle definitely whether the thing we are going to teach is useful knowledge. It may prove to be merely so much mental junk, which, unlike that which accumulates in the garrets and basements of our homes, unfortunately is not so conveniently dragged out and disposed of, but remains to clutter the mind, perhaps to impart its own mildew to new accumulations of really useful facts. Right here is need for fine discrimination, lest in our ardor for the immediate practical application of all our teaching material, we may omit that which has its correlative value in giving more than one aspect of a problem.

For instance, a student may be so trained technically as to be able to execute a beautiful bridge, without any conception of the pathology of degenerate apical areas and traumatized gingivae, or the significance of faulty articulation. He might be termed a dental jeweler, but not a prosthesis.

On the other hand it is obvious that to produce a technically skillful prosthesis, it is neither necessary nor desirable to require the student to make technic specimens of obsolete replacements, nor

to use processes that were abandoned for something better about the time he was going from knickers into trousers. One of our instructors at one time insisted that the students learn to do all of their soldering with a mouth blowpipe. He was a jeweler, by the way, before he took up dentistry.

How then shall we define the boundaries of our teaching subjects?

First:—By careful selection of the subject matter for its practical value in present day dentistry:

Second:—By elimination of obsolete ideas and superfluous details, also duplicate methods in laboratory procedure. On what remains, the teaching effort should be concentrated.

To offset the possible narrowing effect of this vigorous pruning, reference may be made in didactic teaching to dental history sufficient to furnish a background to the student, against which will stand out in his mind a concept of that which is Dental Prosthesis today compared to that which was "Mechanical Work" yesterday. In addition, comparisons should be made of other methods and processes in vogue, with reference to their merits and demerits, to enable the student to judge of the soundness of the teaching he is receiving, and allow him to feel that his horizon is not fixed by the traditions of his school, nor the personal prejudices of his teachers.

Third:—Evolution of new methods. In this as in other lines of human endeavor, the aid of research must be invoked, in order to place dental prosthesis on a foundation of scientific facts.

Research is synonymous of experiment, thru it empiricism becomes science.

The dentist must cease guessing, for instance, that four teeth will do their own work and that of ten other teeth besides in a bridge from molar to molar. He must *know* that those teeth will prove unequal to the task just as he will himself fail if he tries to do three men's work every day. He must

cease hoping that by some miracle or special dispensation in his favor, such a formula as: "A bowlful of plaster, a dozen or so of porcelain teeth, two sheets of rubber, a cup of water, mix, add salt to taste, and cook in a moderately hot vulcanizer" will produce an efficient masticating apparatus, one that will "bite corn off the cob" or "take a chaw off a plug o' terbacker."

He must *know* the limitations within which he can obtain beneficial results, and *know* how to take advantage of every favorable condition both in the field of his operations and also in the materials and appliances with which he must work.

We must recognize the fact, that in a broad sense, all of dentistry, except such subjects as dental pathology and therapeutics, prophylaxis, and oral surgery, is prosthesis, inasmuch as it restores a lost part.

If we consider a single tooth a "part" in the sense that it is a human organ, then, of course, the restoration of even a portion of such an organ lost by disease (caries in this instance) is replacement; i. e., prosthesis. That branch of dentistry, however, which is concerned with tooth cavities has been arbitrarily termed operative dentistry, in distinction to prosthetic dentistry, the art of restoring the lost tooth or teeth as entire units.

In Dr. G. V. Black's writing, grouped under the heading Operative Dentistry, we have a complete system which the dentist may follow with the assurance that it will meet his every need along this line:—that its methods are proven, and scientifically sound, and that there are no gaps in the detail of the physical actions and movements necessary to accomplish the desired end, i. e., successful filling operations.

When we turn, however, to so-called prosthetic dentistry, what do we find?

"Systems," for this, that or the other, impression, or plate, or crown, or bridge we have a plenty, named

after their originators, plagiarists or most vociferous itinerant teachers, but no complete, detailed summing up of scientific facts. No system exists which within itself suffices to accomplish the replacement of one tooth or all the teeth, as the case demands, with due regard to the prevention of further loss, utilization of favorable anatomical and physical conditions present, and the correlation of small partial restorations with complete restorations of the entire denture.

Such a system there must ultimately be, if dental prosthesis is to be conducted with the same orderly sequence of details as Black's work has made it possible to apply to filling operations. It must be said that recent text books present evidence of a long step in this direction, and in this thought of an ultimate system we must of course, recognize that every man who has worked out a so-called "Technic" of any phase of prosthesis, has contributed a part toward such a system. Any "Technic" is the expression of an effort toward system, and may be complete in itself, without bearing any relation to the next problem encountered in the restoration of the same denture.

Dr. Black, no doubt found such conditions; indeed we are led to think that it was largely this very diversity of methods which prompted him to test conflicting ideas, reject the impractical, utilize the logical and sound things, and even to develop new methods in the instances where those already in use did not measure up to his standards.

Probably the chief obstacle in the development and establishment of such a system is the great variety of technical and artistic processes embraced in its field. Dental prosthesis draws so largely from the arts and crafts that he who would weld all its diversified elements into one universal text must be versatile indeed, scientifically trained, and yet endowed with an intensely practical mind. All these qualifications he must possess

if he is to produce such a text as dentists and dental teachers can and will accept in the course of time as authoritative and sufficient, just as they are accepting Black's work because of its unassailable truth, and well tested processes, once they have comprehended it and mastered its principles.

While awaiting the advent in prosthesis of a Black to do for it what he has done for operative dentistry, we can at least by concerted effort contribute largely to that desirable final object. Thru classifying and segregating the knowledge already extant, eliminating, improving where necessary, evolving new processes where nothing seems to quite fit the needs, we who have to do with teaching can make this knowledge more available, more widely diffused.

What constitutes prosthetic dentistry in Illinois? In Massachusetts? In New York? In California? In Texas? In Ontario? What relation exists in the teaching of the Art in these various sections? How can a student be assured in one place of getting an approximate total of what is taught in the others?

It would seem that only by closer coordination of curricula can any such right be assured to the student even in a moderate degree. While this paper was being written, no less than five different candidates, for our State Board of Examinations, graduates from as many different schools, came to the writer for information on the technic of making a "Standard" crown. This may be more widely known as a "Plate and Post" crown and the name Standard may indicate the insularity of our schools and our State Board. The point is that the graduate from the school which has the best reputation of the lot (no better school exists, in my estimation,) said that he had never made such a crown and had never heard of it, but that he had specialized

on the making of dowel crowns with a band. (The Richmond type.)

In dealing with this situation a real live commission composed of representative teachers from various sections of the country could accomplish great headway, provided each of its members would do his share, instead of letting the other members do it, and providing his school were not so hampered by personal prejudices or by its economic conditions that it could or would not accept the findings of the commission.

This may be "old stuff," but if it is, what are you going to do about it? Simply because it has been tried and has brought no results, are you going to sit still and let well enough alone, or do you refuse to admit that what is good teaching in the East and West ought to be good teaching in the North and South also?

An eminent economist recently observed that the great problem of this age is distribution. Distribution of natural resources, agricultural products, of manufactured articles and of knowledge. Distribution of knowledge assuredly involves didactic teaching, tho such teaching is by no means the only or best channel for diffusion of knowledge. Visual instruction, manual training, and the plentiful use of teaching models, must all play their parts in teaching our highly specialized subdivision of human knowledge.

A system which will stand the acid test of teaching dental students will in most details stand the test of use by practitioners, unless the teacher be too much of a pedagogue and too little of a dentist. As a modest contribution to such a system, may the writer be permitted to present somewhat in detail a description of some of the concrete results of his work along this line.

My conception of the teaching plan of some of the early English Universities is that the students were left to their own responsibilities to a great extent, asso-

ciated with their tutors rather intimately in dormitories and outdoor life, and held to certain requirements in recitations and essays, being expected to gain the necessary knowledge from their books or tutors in their own way. This was the condition existing to a great extent in many of our dental schools up to the last decade or so, the student being required to do certain prescribed things and allowed to get this work done as best he might. In the meantime he was referred to certain text books and listened to lectures of various kinds presumed to aid him on his struggling way.

The largest net result of this system being that he often got more from advanced students and outside dentists than from his school, the school's chief function thereby became one of supplying the environment for study of a kind, and furnishing the final authority for him to pass from a condition of paying for the opportunity to practice on patients to one under which they began to pay him for practicing upon them. Hence the term "Dental Practice."

Several years ago the writer arrived at the conclusion, quite advanced it seemed to him at the time, that we ought to have rigid requirements for the student and then assist him by every legitimate means to meet those requirements, so that the teaching might come from the top instead of from the bottom.

On this assumption we began to build. It was felt that to assure technical skill, laboratory technic, popularly despised under the term "Dummy Work" was needed in large doses. But we determined that we should concentrate on one good method of doing each thing, not make the victims do a piece of work by a perfectly good procedure, and then do it over again, merely for the sake of the training involved, by means of another procedure which might be bristling with difficulties no sane dentist would undertake to overcome.

The selection of technic work was

likewise made under the primary consideration of its relation to practical work upon patients, to be taken up later in the course, and also to be administered in large doses.

Didactic work consisting of lectures, recitations on prescribed portions of texts, and quizzes of general character was also arranged so that the lectures would either slightly precede the work in hand or proceed with it, not taking up crowns for instance while students were making casts and vulcanite work or vice versa.

Another pressing need had to be met: Students find it difficult to form a conception of prosthetic structures without tangible example of the things they have to make. So the production was begun of a series of teaching specimens or models showing progressive steps in construction, actual size.

Nowadays in our school, when a student is required to make a piece of technic work, the corresponding teaching model is displayed in the laboratory during the time allowed for the piece, usually one month. At the time assigned for beginning the work, the class is assembled in a room which we call the Prosthetic Clinic laboratory, which is fitted with a dental chair, engine, laboratory bench, polishing lathe, draw press and rolls, casting appliances, vulcanizer, in fact practically everything pertaining to prosthetic work as it would be carried on in a regular office. Portable seats, circus style, arranged in tiers, in the shape of a V are provided for the students, with the demonstrator between the extremities of the V.

At this time each member of the class received a mimeographed sheet of instructions covering the technic and the Instructor or Professor devotes the hour to explaining this, in detail, together with clinics interspersed with "Chalk Talk." Next, each student receives a laboratory technic card, indicating definite steps in the technic in their proper order, each of which he is required to

have checked by the instructor before proceeding to the next. This prevents mistakes to a great extent, and when mistakes are made permits them to be corrected without reconstructing the entire piece.

During this period, the lectures and quizzes proceed. Co-ordinated as nearly as possible with the nature of the technic pieces under construction, they are also arranged to comprise the general subject of which the technic piece is an example. For instance, while a partial vulcanite plate and repair is being made, the lecturer takes up rubber, vulcanite, vulcanizing, vulcanizer, presses, flasks, packing and finishing, etc.

These technic procedures are designed with the thought of eliminating all superfluous details which do not have a direct relationship to the making of an identical piece for a practical case. Alloys, karats and gauges of materials, styles of teeth and facings required are all indicated, for both technic and practical cases, in either the legend of the teaching model, the laboratory card, the instruction sheet, or all three. For construction of practical cases in the infirmary which are assigned as nearly as possible in progression with the technic work, the student is referred again to his technic sheets and cards, besides the instruction received at the chair by the demonstrator. The variations and additions involved in practical work, as distinguished from technic, are specifically covered in the lectures, during which appropriate portions of the text are assigned for study also. For instance, during the making of dowel and shell crowns, the infirmary procedure of root and stump preparation is given.

In addition to the above details, we are also considering the inclusion with the technic instruction sheet of a list of instruments needed in the procedure and the sequence of their use. It is also intended to apply the laboratory card, with the checking of successive steps, to the practical cases as soon as the details

can be worked out, and for each fixed or removable bridge or partial plate to require a study model of the case as well as the working model and another showing the conditions when completed. Not only will this have its value as a record of the student's work, but what is far more important, will furnish a large variety of examples of different design for similar conditions.

Having such a plan as here outlined and adhering to it strictly carries a big advantage to the teaching staff by eliminating conflicting ideas. Any member of the staff who is concerned with teaching prosthetic dentistry can give the student instruction at any stage of the work. He need not fear that the next instructor who comes in contact with the student will reverse his directions. Any differences of opinion are thrashed out with the Head of the Department, who welcomes suggestions for betterment.

The student also profits by this arrangement—he may go on with his work knowing that if one step is approved by an instructor he will not have to tear it all to pieces and begin over again the next day to please another instructor.

The teaching models are the standard for comparison, and of course, changes will have to be made in them from time to time as new methods develop.

One required piece, specified in each session, is made by the student on his own judgment. No instruction sheet nor laboratory card is issued for this, but we encourage the student to consult with us and his fellows as to details. We call this a museum specimen, meaning that it may get into the museum—perhaps—if it is extremely good.

For the freshmen and juniors this consists of the same thing for the entire class.

In the senior class we specify several pieces, so that groups of four or five only will be working on the one thing.

The Seniors draw lots for these, relieving us of any charge of favoritism in

placing the best selections, and making quite an occasion of gayety.

All technic work is displayed in a large case in a room open to the students at all times. This spurs them to produce work of which they will not be ashamed, knowing that it cannot escape criticism. All technic work is returned to the students at graduation, or upon leaving the school for any cause with the exception of a few museum specimens selected from year to year for their excellence, this of course being an honor much sought.

The graduates find these specimens of much assistance to them in their offices in explaining the nature of various kinds of prosthetic work to patients. The expense of making technic work is more cheerfully borne when the student knows the specimens are to be returned.

In order to make sure that the student at the end of his college course, picks up the loose ends of instruction and acquires a comprehensive grasp of the subject of dental prosthesis, we have instituted the following plan: In the second semester of the Senior year, a number of subjects are assigned for a thesis in lieu of a final examination. This year we have ten topics which pretty thoroughly cover the subject. About ten weeks are allowed for preparation, including the Christmas vacation of three weeks. The theses are all presented on the same day. The best one of each group is selected, the writer is required to read it in class, and several other members of the class appointed to discuss it. Thus every student has to write a thesis, discuss another thesis and listen to the reading and discussion of all the others and his final credit is based on his discussion as well as on his own thesis. Two theses are usually presented at one session of the class, the reading and discussion of these taking from two to four hours. Much interest is aroused, the discussions are highly entertaining and instructive and sometimes amusing and it would be a dull student indeed who

did not derive more permanent and lasting benefit from this plan than he possibly could from a written examination. (I will not inject further details here, but will furnish them to any one interested).

SUMMARY.

System is needed in teaching prosthetic dentistry.

The system must be carefully thought out. Superfluous details and obsolete methods must be eliminated.

Select teaching material for its practical value.

Condense it but include enough history and comparison of existing methods to avoid making the student narrow.

Concentrate on teaching one good method for each phase of prosthesis. Duplicates waste time and scatter energy.

Don't ask the student to do something you can't do.

Stop guessing—be sure your technic will produce the result you claim for it.

Co-operation between various schools is lacking.

Co-ordination of curricula is needed to assure the student he is getting good teaching, no matter in what section of the country.

Invoke the aid of research. Make empiricism science.

Utilize didactic teaching, visual instruction, manual training, teaching model, all leading to practical cases.

More knowledge wanted and better distribution of what we have.

THE AUGMENTATION OF THE TWO FUNDS OF THE NATIONAL DENTAL ASSOCIATION.

By **Otto E. Inglis, D.D.S., Philadelphia, Pa.**

A THOUGHT applicable to my theme was expressed many years ago by Mr. Barney Barnats, of England and South Africa.

Owing to the passage of time, I can only give the quotation from long distance memory: "There are men who think in thousands and only the ten cent pieces come their way, while those who think in millions get millions."

With this preamble, let me state that the object of this paper is to offer a suggestion as to ways and means of raising a large sum for the use of the Relief Committee of the National Dental Association. The latter committee reports \$28,312.69 in bank after six years addition to a nucleus, given by California members presumably collected to relieve those suffering from the San Francisco earthquake and fire. (\$50,000 is aimed at.)

The Research Commission in The

Journal of the National Dental Association for January, 1917, page 103, reports a present ambition of an endowment of one million dollars with \$380,000 in sight.

Thus approximately is Mr. Barnat's aphorism vindicated by the face of these showings.

The Research Fund seems in a fair way to be realized yet it would do no harm if it were largely and immediately increased.

That the Relief Fund, as it at present exists, is far below requirements, an actual example will show.

Before me is "The Weekly Roster" official bulletin of the Medical Organization of Philadelphia and vicinity.

The Committee on Benevolence of the Philadelphia County Medical Society prints a report that shows nine persons receiving annuities (not exceeding \$200.00 to each) and three persons