Medical Education

Insights into some aspects of clinical education - II A theory for clinical education

John I. Balla

Postgraduate Medical Education Unit, Faculty of Medicine, University of Hong Kong, 7 Sassoon Road, Hong Kong.

We assume that for professional practice we should aim to teach for understanding. The focus of discussion to this stage has been on the acquisition of theoretical concepts judged necessary for understanding the basis of clinical practice. We looked at *why* this theory should be taught and *what* it should encompass. Specifically, we did not deal with the array of psychomotor skills required for the pursuit of the profession. Amongst these skills is the ability to communicate, which we have argued is essential for good practice. How to teach these skills has recently received a great deal of attention¹ and will not be pursued further.

We shall now turn our attention to the development of a framework suitable for examining *how* the theoretical foundations of clinical medicine should be introduced into the medical curriculum so that the outcome is the acquisition of increasingly complex concepts. To gain insights into this paradigm, we need to consider the relevant characteristics and interactions of the participants in the process.

Institutions—in this case universities and teaching hospitals—provide the setting where the students come with individual characteristics that interact with the curriculum which provides the context for learning. This is mediated through the teachers and the assessment procedures which measure outcomes and influence how learners perceive the task. We shall take a brief look at each of these constituents.

The learner

Students bring an *approach to learning* that may alter through their career and may vary from subject to subject. This approach is affected by their

motivation, and is associated with the development of well defined but diverse *strategies* to learning, that will in turn affect the *outcome* of learning. The same student may develop different strategies for different subjects so that outcomes are likely to vary, depending on the interplay between subject matter and approach.²

Students come to each learning task with *concepts* that are developed to different degrees. They also bring *misconceptions* about understanding each topic.³ These will affect the way they *understand* subject matter and will need to be identified by teacher and student at the outset when they are learning individual topics. The same student will have differing degrees of conceptual development about different topics, so that it cannot be assumed that there will be an all-round development which will be comparable between subjects.

Implications: Educational theory must provide a basis for rational developments that can take into account how the relations between individual learner's approaches to learning, conceptual growth and existing misconceptions will affect the outcome of learning.

In view of the accumulated evidence about the relationships of context with approach and approach with outcome,⁴ the learning environment can be manipulated through appropriate teaching and curricular adjustments to lead to desired outcomes.

It is often forgotten that even novice students have preconceptions about subject matter. Despite variations between students' conceptual development and misconceptions, these generally run to a pattern, with predictable categories within a limited range for each topic. After the collection of data bases for individual subjects, direct identification of likely misconceptions can be introduced into the teaching at an early stage. This reduces the perpetuation of building new knowledge on shaky foundations.

In the postgraduate years, when trainees may re-learn preclinical subjects and when there is

Correspondence: Professor John I. Balla, M.B., B.S. (Melb.), F.R.A.C.P., F.R.C.P.E., M.A.

Part I of this paper appeared in the March 1990 issue of the *Postgraduate Medical Journal*.

Received: 12 October 1989

plenty—and at times too much—of unsupervised decision making, basic theory can begin to make more sense. Arranging suitable programmes will meet with different problems, particularly related to the balance between in-service education and work commitments.⁵ Supervisors who recognize that it is not enough for the pupil to watch the master for optimal learning, will give explicit reasons for actions and explore the student's pre-existing assumptions before introducing new concepts.⁸

The institution

Educational institutions are governed by a dominant set of values which affect the content as well as the process of assimilation of knowledge. The ensuing dilemma is how to impart the academic knowledge espoused by the institution and yet prepare students for practise in a different milieu.⁵

A major problem of learning in an institutional context is how to integrate abstract knowledge as taught in institutions, into practical problem-solving in the professional context.⁶ The student's approach to learning is largely dependent on motivation to understand and the perceived relevance of the subject matter in its application. The removal of theory from its practical context also distances the relevance of the subject from its intended purpose.

In traditional medical schools the student is taught preclinical and clinical content, mostly in well-defined departmental structures. The curriculum which is determined by the institution, by its very nature will concentrate on theoretical concepts, in the belief that students will be able to refer to these in practice.

Implications The transfer of theoretical knowledge from institutional learning to practice is one of the major considerations when developing the curriculum. Successful innovation requires a change in the values of the institution that will allow the necessary curricular modifications.

The most significant difficulties occur in the undergraduate years, where students are unlikely to be allowed to participate in decision making about patients and where due to lack of knowledge, they cannot perceive the whole whilst they are overwhelmed by the necessary factual information about detail. Change can only succeed if members of the faculty are willing to allow change of the context and go beyond individual departmental interests and arguments about the number of teaching hours allocated to each.

People who work and teach within the confines of a university or teaching hospital on the one hand and those who limit their activities to clinical work outside these institutions on the other, may find it difficult to communicate. This can be one of the causes of lack of integration of course material and of teacher perspectives. To overcome this, cross pollination between teacher activities is necessary. Combined teaching between basic scientists and clinicians—provided that this is done to understand each other's perspective—may help each see where the other comes from and permit desired curricular developments to occur.

The curriculum

The curriculum is an expression of the philosophy and the objectives of the institution and refers to the content and its arrangement in presenting the material that students are expected to learn. There are a number of issues to be considered here, some of which are peculiar to the education of clinicians:

1. The *difference in practice patterns* of teaching hospitals, where most teaching takes place, and the new environment after graduation means that students are exposed to content and principles of practice which are not a direct representation of the issues they will encounter as graduates. These differences include prevalence of disease, the more undifferentiated nature of the symptomatology and the expectations of patients presenting outside hospital.

2. Subject matter is taught in a *compartmentalised* fashion, so that students will be expected to make the connections to other subjects without necessarily understanding the relevant links.

3. The curriculum will be grossly *overloaded* due to the demands of the very extensive knowledge stores that graduates are expected to possess. This will mean that students will come to ration their time carefully in such a way that it will affect their approaches to learning with a resultant effect on outcomes.

4. Due to the nature of the profession, the practitioner will need to be *ready to make independent decisions*. It will, therefore, be necessary to devise learning situations to prepare students for this task. This may be particularly difficult due to the institutional constraints offered by teaching hospitals.

Implications: The curriculum should be seen as a set of opportunities for appropriate learning structured in such a way as to make clear the connections between the various parts to form an integrated whole.⁷ To attain this, concrete experiences are required to link appropriate

theory to be learnt in context, making the task meaningful for the student. Curricular change, if appropriately structured, should alter the context of learning sufficiently to change outcomes of learning.

Changing some of the context and order of the undergraduate curriculum, such as the early introduction of clinical problems, or sub-internship experiences where there is scope for supervised decision making, may help to make the necessary links. Well-supervised attachments to primary care groups assist students to see the spectrum of disease in the community.

The teacher

Between institution, curriculum and students are the teachers who are the intermediaries guiding students towards curricular objectives.

1. In most medical schools teaching is but one of many duties which generally rates *priority and reward* low compared to clinical work and research achievements.

2. Many teachers will have little or no *understanding of educational theory* which, we have argued, is an important prerequisite—although not sufficient by itself—if we are to assure uniformly good teaching. Even the best teachers may have difficulty in making their method of reasoning explicit, so that students are then left to follow the teacher without understanding. This method of teaching endorses a superficial approach to learning with the student lacking an understanding of how the solution to problems was achieved.

3. Few would have the knowledge to *diagnose where their students stand* in relation to the subject matter they are teaching. Ideally, they should be in a position to know what conceptual development and misconceptions their students bring with them to the classroom, so that they can devise learning situations to develop concepts and confront misconceptions.

4. Even if they have the best intentions to teach for understanding, they recognize that they have to *prepare students for assessment* procedures which may be diametrically opposed to the avowed objectives of the curriculum.

5. Although they may teach in a compartmentalised curriculum, they will have to try and devise learning situations which will *help students integrate* and relate one area of learning to another.

6. If they are to *change their own conceptions of teaching*, then there will be a need to change the institutional reward system for teaching that gives opportunities for development.

Implications: If we expect students to learn for understanding, then there is a concomitant need

for teacher change. Teachers will need to know how to diagnose where the students start, have clear objectives about where they want them to go, understand and confront their difficulties and focus on meaning rather than on the transmission of factual information.⁸ To be able to do this, there is a need for change in conception of what teaching is about, an ability to arrange situations which allow students to change their model of subject and also to be sufficiently expert in the subject matter to focus on critical issues.

A great deal is expected of teachers, from pre-clinical to postgraduate supervisors. They will need to find out about how students learn through active teacher participation in development programmes. In view of the nature of student learning and what we know about conceptual development in individual subjects, staff development programmes have to be tailored to the peculiar needs of specialties.

Assessment procedures

The context where the practitioners will practise is different from the one where students learn subject matter. To gain entrance to this new environment some sort of assessment procedures are necessary.

These will have two, at times incompatible functions. First, making sure that students achieve the objectives set by the academic curriculum and second, that they satisfy the criteria of the accreditation procedures that enable them to practise their profession.

The assessment process should be congruent with the objectives of the curriculum. To achieve this, it is necessary to bring the theories of learning and assessment together.⁹ We expect students to develop: (1) a higher level of conceptualization at the end of the learning process than at the entry level, (2) an ability to relate one part of what they had learnt to another, and (3) an ability to retrieve knowledge in appropriate situations.

Implications: With the focus shifted to what students understand about what they do, the task of assessment is: (a) to identify key areas of understanding of subject matter, (b) to construct ordered categories of conceptualization and discern varying degrees of understanding that lie behind their answers; to be followed by (c) the construction of assessment tasks based on these insights and (d) the development of measures analogous to conventional tests.⁹ Any assessment task must also take into account the imperative for competent practitioners, so that students are expected to pass certification procedures to practise as safe professionals.

Presently used assessment procedures need

review. The available evidence indicates that many do not measure the sort of outcomes that we are looking for and that there is a need for experimentation with new assessment techniques based on theoretical insights.

Overview of the theoretical base for clinical education

After this review on the components of the educational process, we are in a position to take a wider view. Central to the theory of what learning in medical school should be about, is the belief that we want students to make conceptual shifts to an increasingly complex understanding of subject matter. How to facilitate this, how to deal with institutional problems which may hinder appropriate learning, how this is affected by teachers and the student's personal needs and how to arrange assessment procedures which will provide the most relevant outcome measures, form part of this theory.

A value stance has been adopted. This concerns the belief that for professional practice it is necessary to have a relevant theory upon which practice is based. It was suggested that for the practice of clinical medicine two complementary theories are required. One of these pertains to causal explanations about health and disease, with theories derived from the biological, social and behavioural sciences. The second group of theories bears on the critical evaluation of decisions and derives from a different background, largely covered by decision analysis but encompassing ethical considerations and explicitly involving the patient in decisions about the matters of health and illness. This theory is at present inadequately represented in the curriculum, and with modern developments in technology, the need has increased to educate clinicians in how to deal with uncertainty and how to make ethical decisions as well as understand the causation of disease.

The second theme related to how learning takes place in medical school and evidence was produced to show that under present curricular arrangements this was generally not optimal. It was proposed that successful educational change required a basis in educational theory. The central theme of this paradigm requires value judgments about educational objectives to be made explicit. The curriculum should reflect these aims and assessment procedures must be congruent with the curriculum. For successful implementation, teachers will have to diagnose the level of conceptual development students have achieved in relation to these objectives and then devise learning situations and assessment procedures in keeping with these and the student's needs. This will nearly

always involve changes in teacher's perceptions about the process of learning, and these will be contingent on teacher development. The effect of institutional context should be recognized, as successful innovation will best occur within the confines of existing institutions. This will need altered demands so that curriculum change and assessment will then be in line with institutional objectives.

An agenda for change

There are a number of logical steps, and associated corollaries that follow, if successful change is to be introduced in medical education. There is a need for strong leadership with a unified faculty theme and the presence of structures for data collection about student learning that will assist staff development to foster an altered learning environment.

1. The institution, i.e. medical faculty or specialist colleges, will have to define explicitly a unified theme about what it wants its graduates to achieve. This requires strong leadership and a spirit of partnership, since without full participation and cooperation of the teachers, who are charged with the delivery of the curriculum, innovation cannot succeed.

2. There will have to be an ongoing evaluation of the curriculum to confront teachers with its attainments and shortcomings. Structures need to be set up to assist the evaluation process. One may only expect teachers to support change if the need is made explicit.

3. Teachers will need to change their perceptions of what teaching is about and will have to want to develop themselves. This requires a strong desire to participate in change and a satisfactory reward system from the institution that values such commitment from teachers.

4. There is a need for a data base about students' conceptual developments and categories of misconceptions to assist teachers to teach in response to these. Individual data bases are required for different subjects. These can be collected by teachers who wish to cooperate in such projects. Teachers need to be informed about the findings so they can develop strategies to enhance student understanding of their subject.

5. There is a need for ongoing participatory research to determine what are significant educational events that help students achieve the conceptual shifts necessary to attain curricular objectives. Relatively little data exist on what are the most powerful educational events that help students toward the development of appropriate concepts. Therefore, ongoing research driven by educational theory is needed for rational curriculum change, such as the format of early clinical exposures or the

value of intern type experiences in the undergraduate years.

6. Assessment procedures will have to be revised to ascertain that they are congruent with objectives and reflect the student's achievements. These changes require a data base developed by subject experts, on critical issues for each topic, followed by the construction of appropriate assessment tasks.

Success depends on strong commitment from teachers, and a willingness to change and par-

ticipate in the process of education for understanding.

Acknowledgement

The ideas expressed in Parts I and II of this paper matured under the influence of a number of scholars. Wherever possible, their individual contributions are acknowledged in the bibliography. Margaret Gibson helped to develop concepts and discard misconceptions.

References

1. Irwin, W.G., McClelland, R. & Love, A.H.G. Communication skills training for medical students: an integrated approach. *Med Educ* 1989, 23: 387–394.
2. Biggs, J.B. Approaches to the enhancement of tertiary teaching. *Higher Educ Res Dev* 1989, 8: 7–25.
3. Ramsden, P. Studying learning: Improving teaching. In: Ramsden, P. (ed.) *Improving Learning: New perspectives*. Kogan Page, London, 1988, pp. 13–31.
4. Laurillard, D. Understanding medical student's problem-solving. In: Balla, J.I., Gibson, M. & Chang, A.M. (eds). *Learning in Medical School: A Model for the Clinical Professions*. Hong Kong University Press, Hong Kong 1989, pp. 119–130.
5. Balla, J.I., Gibson, M. & Biggs, J.B. Problems with curriculum implementation in in-service clinical education. *Med Educ* 1989, 23: 282–289.
6. Biggs, J.B. Institutional learning and the integration of knowledge. In: Balla, J.I., Gibson, M. & Chang, A.M. (eds) *Learning in Medical School: A Model for the Clinical Professions*. Hong Kong University Press, Hong Kong, 1989, pp. 21–39.
7. Coles, C. The role of context in elaborated learning. In: Balla, J.I., Gibson, M. & Chang, A.M. (eds) *Learning in Medical School: A Model for the Clinical Professions*. Hong Kong, 1989, pp. 41–57.
8. Ramsden, P. What does it take to improve medical students' learning. In: Balla, J.I., Gibson, M. & Chang, A.M. (eds) *Learning in Medical School: A Model for the Clinical Professions*. Hong Kong University Press, Hong Kong, 1989, pp. 133–147.
9. Masters, G. Improving the assessment of clinical reasoning. In: Balla J.I., Gibson, M. & Chang, A.M. (eds) *Learning in Medical School: A Model for the Clinical Professions*. Hong Kong University Press, Hong Kong, 1989, pp. 149–165.