

Lifelong Learning for Doctors

Hans E. Renschler, Bonn

Medical teachers are mostly engaged in undergraduate medical education. The objective of this presentation is to make them think about the relationship between undergraduate education and postgraduate education and the significance of both for lifelong learning. It can give only perspectives, and is not yet fully verified. It may be opposed to many present beliefs. Many ideas, facts and recommendations were already expressed, or were recently published in the proceedings of the Oslo conference on „Learning in Medicine“ (Coles C, Holm HA, eds. 1993).

Most of the patient care is generated after the conclusion of all phases of formal education. It is generally assumed that the preceding education provides the underlying basis. Some faculties still behave, *as if their graduates had to learn all they will need for their practice of medicine in medical school.*

Even before the turn of the last century it was realised, that this is no longer true, continuing education was therefore introduced by using the prevailing educational method „lecturing“. It was and is still believed by many, that lecturing is

effective for undergraduate students and for doctors. FLEXNER did not see the necessity of lifelong learning after undergraduate education (Flexner, Abraham. 1910). In 1910 he saw in postgraduate education only an „effort to mend a machine that was predestined to break down“. „Men trained in medical schools were unfit for the responsibilities of medical practice“. He characterised the „postgraduate school as a compensatory adjustment ... calculated to „teach the trick“ without systematic, thorough learning“. The „postgraduate school was thus originally an undergraduate repair shop“.

The product of a medical school is quite different from that of other productions, like car manufacturing. A car is working best when leaving the production line and gets only worse. A human being is by her or his very nature learning as long as she or he lives. Humans are improving by adjusting to the needs of the environment. It is my personal view, that in many aspects of live basic education is less significant for the performance in later life than generally assumed. Learning on the job is more important.

1. Applicability of undergraduate education to performance in practice.

Several outcomes of recent research and developments have to be considered.

1.1. Research by English, American, and Dutch scientists found, that knowledge gained in basic sciences without symptom-disease orientation is not retained in a form useful for dealing with clinical problems. Therefore, if needed for application, it must be learned later (Grant J, Marsden P. 1987; Patel VL et al. 1988).

1.2. Tolnai and Julie McGowan found, that not even the methods of learning used by students in problem-based curricula were maintained several years after medical school (McGowan JJ. 1991; Tolnay S. 1991). Medical schools and other educational institutions can influence the behaviour only as long as they can exert power over people. Later on, social pressure and the system of rewards and remuneration are of much greater influence. *„People behave the way they are rewarded for behaving“*

1.3. Another factor, which is getting more important is the speed and amount of change occurring due to technical progress and an increase in research power. It took about 30 years for the most important method of formal communication, printing, to be transferred from the Rhineland, where it was invented, to England (Hellinga L. 1982). With modern information technology new programs are transferred and included in one's own work within hours. In science and business millions communicate daily over networks. It can be predicted that information and communication technology are going to change medical practice at an unprecedented speed. Computer conferencing as mode for learning in small groups was first suggested in 1982 by AAMC and NLM (Wilson MP, Smythe CM et al. 1982). It is also called „Computer Supported Cooperative Work“, CSCW (Krüger G. 1994). It has many uses and advantages for CME. It can be used independent from place, location, progress of colleagues and even a library. Only real

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learning activities are controlled without the presence of a supervisor. Outcome of CME can be analysed, which is most difficult by

traditional methods of teaching. Only activities of personal interest are to be attended.

2. Effectiveness of CME with different methods of learning.

We know, that doctors change their practice continuously (Fox RD, Mazmanian PE et al. 1989). But how do they do it? It is now accepted, that transferring the method of teaching from the undergraduate lecture hall to continuing medical education is not effective in changing the practice of doctors.

**TEACHING does not equal learning,
LEARNING does not equal competence,
COMPETENCE does not equal patient care,
PATIENT CARE does not equal best possible OUTCOME**

which is the purpose of all learning in medicine.

Recently, Davis performed a metaanalysis of the literature to determine what teaching methods were most effective in improving patient care (Davis DA, Thomson MA et al. 1992). From a subset of 50 reports he and his co-workers at McMaster University grouped the 74 discrete interventional strategies quoted in the literature and related it to the measured outcome of CME. Most effective were combining interventions, like providing information, practice-oriented work-

shops, using computer generated practice remainders, giving feedback, activating opinion leaders etc. Providing information alone, like lecturing, handing out literature or practice guidelines or even participating in unstructured and undirected workshops produced mostly negative or inconclusive results. Self-directed learning using many modes within a social framework providing stimulus, support and feedback can now be regarded as an effective way of learning. According to this understanding all activities enhancing physicians clinical practice and learning are continuing medical education.

European organisations concerned with continuing education formulated in the 1993 "Declaration of Dublin", that "discussions among small groups of colleagues with or without invited experts together with the classical activities are the principal methods of continuing education (Comité Permanente 1993) The declaration of Cologne of the European Academy of Continuing Medical Education of March 1994 stresses linking learning to practice and activities of the learners (Europäische Akademie für Ärztliche Fortbildung 1994).

3. Survey of the Acquisition of Knowledge and Skills used in Practice

Based on these premises two problems were formulated. In spite of these insights it is still generally assumed, that undergraduate education provides the main and lifelong basis for the work of doctors. Today, this is no longer tenable. The first question for our research was to find out, when, where and how doctors had acquired the knowledge and skills they use in their daily practice. We made 2 surveys, the first of doctors participating in a traditional continuing education session (Renschler HE, Fuchs U. 1993). In April 1994 a second pilot study was carried out at a workshop for educators engaged in introducing problem-based learning in their curriculum.

3.1 Methods

We developed and revised a one page questionnaire in two versions. We asked the physicians in a conventional CME session to estimate what percentage each of the seven phases of their

education had contributed to their practice five years after the completion of their postgraduate training.

The seven phases can be seen in the first column of table 1 headed „Phase“. In addition to demographic data, participants were asked, whether they participated in study groups intended to improve patient care. In the second version of the questionnaire for the participants of a workshop for medical educators on problem-based learning 10 differentiated periods were added. They are listed in column 2 of table 1, headed „Period“.

3.2.1 Results from the CME-Group:

114 of the questionnaires returned from 330 participants in the CME sessions could be analysed. As the frequency distribution of the data is not normal, the results are better given as median as in table 2. Using the median instead of the

Phase CME Questionnaire	Period Educators Questionnaire	CME- Group	Educators Group
Speciality Training	Speciality Training	35.9	22.6
Updating	Updating	21.1	13.4
Practical Year	Practical Year	15.2	9.3
Clinical Education	Clinical Education	14.1	13.2
	Research		7.8
Preclinical Education	Preclinical Education	7.3	7.5
	Teaching		6.1
	Post-Doc		4.8
	Nursing		3.5
	Famulatur		3.2
	Courses		2.5
Formal CME	Formal CME	6.4	2.1
	Congress		1.8
	Tours		1.3
	2 Others		0.8
SUM		100.	99.9

Table 1

Median Gain from 7 Educational Phases
 as Percents of Total (N = 114)

Phase	Median	Range
Preclinical Education	5	0 - 30
Clinical Education	10	0 - 60
Practical Year	15	0 - 60
Practical Phase 2	15	0 - 71
Speciality Training	20	0 - 80
Formal CME	5	0 - 30
Independent Learning	18	0 - 90

Table 2

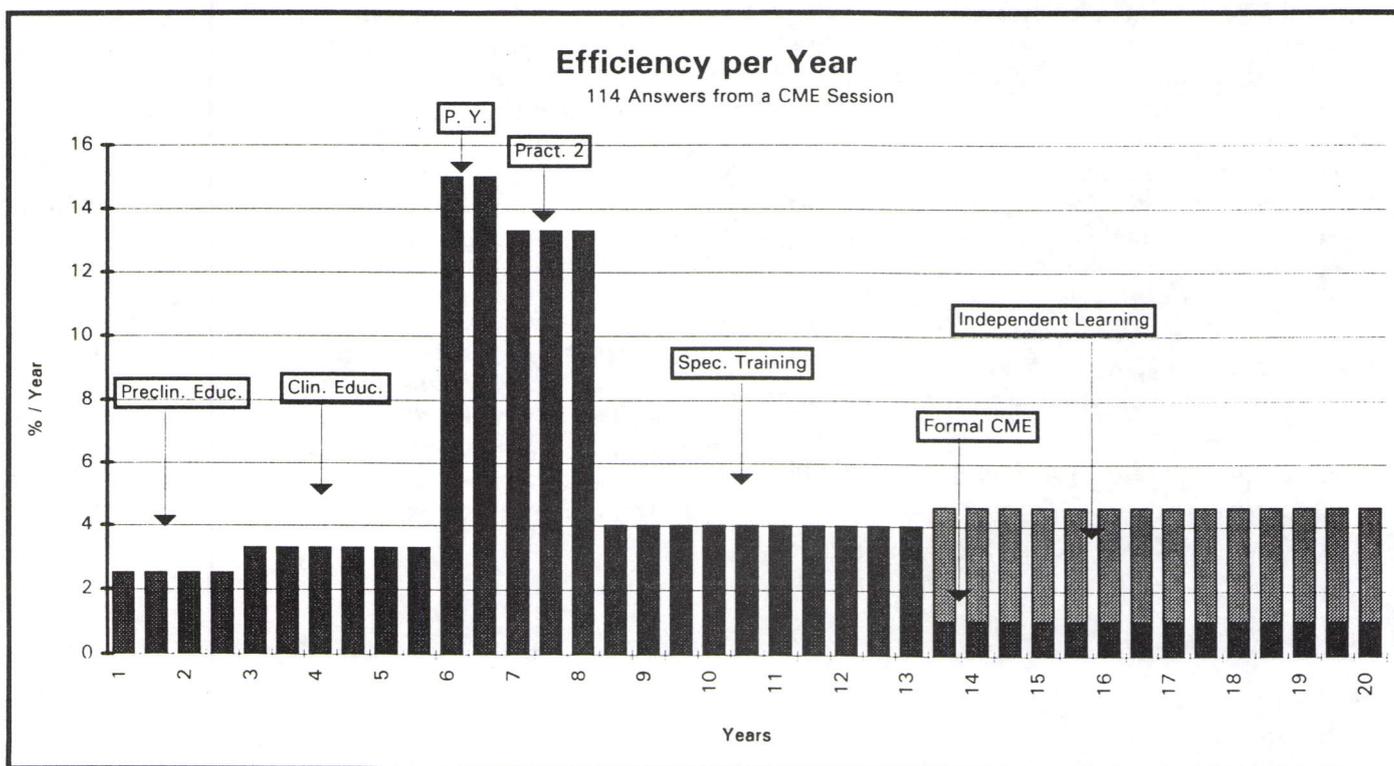


Fig. 1
 Annual gain from 7 educational phases

arithmetic mean, the ranking of the 6 or 7 phases remains the same, speciality training ranking first with a median of 20 %, followed by independent learning with a median gain of 18 percent. The 2 practical phases each, lasting 12 and 18 months, as well as the total 5 years of university education were perceived to contribute each 15 percent. Formal CME comes last with a median annual gain of 5 percent.

Another result is most interesting and confirms that learning is a highly variable process and illustrates the individuality of physicians and their learning styles. For any of the 7 phases, 61 % of the participants reported no gain as recognisable from the range given in the last column of table 2. 32 % reported no gain from 2 up to 4 phases. Preclinical studies and CME had an upper limit of 30 % each. A considerable number, 34 or 30 % stated to have gained more than 50 % from one single phase. The highest gain was 90 % from independent self-directed learning, which was given by 6 as the most effective phase with a gain of 50 % or more. This surprising result can be explained by the changes doctors make in their career. 39 percent of all 114 responders stated to participate in meetings of study groups.

The efficiency of learning

It can be evaluated for the different phases by relating the gain to the minimal duration of each phase, which is plotted in figure 1. The gain per year is lowest for the university phases, in spite of the fact, that they are devoted exclusively to learning and where teaching is done by scientifically qualified professionals appointed mainly for that purpose. It results in 2 to 3 percent learned per year for patient care. As most of the students need more time to complete their courses at the university, the efficiency is even less than that shown in the graph, but jumps to 15 percent or less for the two practical phases, where learning is only a by-product of patient care without hardly any formal education in Germany. This seems to support the saying

*If we would teach less
the students would learn more.*

The most important learning for practising physicians results overwhelmingly from self-directed learning.

3.2.2 Results from the Group of Medical Educators

From the approximately 50 educators attending a workshop in April at Munich only the answers

from the 17 physicians were analysed, the remaining 10 came from other professionals. As both surveys were done as pilot studies and not set up systematically, statistical comparisons were not applicable. Our results should be viewed as hypothesis-generating rather than hypothesis-testing.

Ranking by order of the means for the 6 or 7 phases and the 10 separate periods is presented in table 1. With the exception of the Practical Year the ranking is the same for both groups. The question posed to the group of educators covered more detailed activities in different periods within the 7 educational phases. The sums of phases plus periods within phases are almost equal to the results of periods as given by the CME-group alone. An example from the group of educators: speciality training plus Post-doc plus gain from research equals 35,2 % as compared to 35.9 % as given by the CME group for speciality training. It becomes clear from this table that the educators answering our questions regard university education not as being more effective. All periods including long lasting contact with patients, like nursing, or famulatur had a much higher efficiency than listening to didactic lectures or having restricted access to patients and hands-on activities in the laboratory.

3.3 Discussion

It was argued that our findings are not valid, as they represent the opinion of doctors, but it is accepted in the social sciences, that self-ratings can give reliable and valid measurements of a variety of constructs. Gonella and co-workers undertook a metaanalysis including our most important finding, that a median of 15 percent of the knowledge and skills used in the practice of the doctors was acquired during medical school training (Gonella JS, Hojat M et al. 1993). They found values indicating that subjective judgements of physicians as reported by us are consistent with objective indices of overlap between assessments in medical school and practice.

Our findings may have been influenced by the quality of teaching typical for Germany, but the findings about the structure of knowledge at the end of undergraduate education and its limited usefulness for problem solving are based on research carried out in the United Kingdom, Canada and the United States.

4. Survey of the acceptance of independent, self-directed learning in groups

We asked in another survey, whether doctors would accept independent, self-directed learning in groups and what they would consider as desirable for it (Renschler HE. 1992). Almost all organised continuing medical education is still done by the lecture method. My next question concerning continuing medical education and its future was what practising doctors regard as desirable for the organisation and performance of study groups, which are presently being introduced in German medicine as "Quality Circles". *Do German doctors see an alternative to lectures?*

4.1 Method

I surveyed three different groups of physicians and health care professionals. Altogether, there were 108 answers. The following alternatives were given as desirable for the solution of a problem arising in the practice of the participants or posed by a central organisation:

1. Presentation of the solution by an external expert in a lecture.
2. The group solving the problem.
3. Availability of electronic literature during the problem solving.
4. Advice about the solution of the group given by an external expert.

4.2 Results

The important results are included in figure 2. Not one of the 108 participants indicated the lecture as the only solution desired. From the 3 different groups 30 percent thought all 4 methods as desirable, 77 ore 71 % marked three or more methods, preferring advice to lecture. 76 percent regarded the availability of electronic literature as desirable.

Attributes of study groups like meeting each month, inclusion of non-physicians, who could also serve as moderators were indicated by a large majority. Topics and groups should be selected by individuals and not by a central organisation.

Survey of Problem-solving in Groups

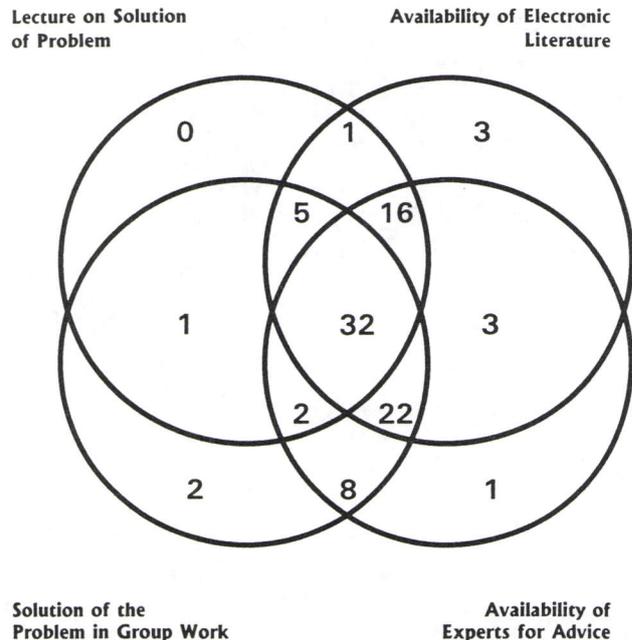


Fig.2

Distribution of 96 answers given by 108 doctors. 12 answers combining two components can not be presented in this diagram.

5. Conclusions

What meaning could all these facts have to change undergraduate medical education?. Only a part of the content and skills taught during undergraduate education are useful for the practice of medicine. A large part of the existing art and science of medicine, which is needed, is acquired later during training and professional practice. Reducing the content of undergraduate education and postponing those different parts which are used only for the practice of specialities should be left for speciality training, and thus could leave more time for a deeper understanding of the content remaining in undergraduate education. New topics from social and behavioural sciences and from information technology could be included (Fig. 3).

Assuming that each speciality needs a different part of the total medical knowledge each represented by an ellipse, a core could be defined which is needed by all doctors and should be included in a reduced curriculum. But it must be assured, that all is learned, that provides the structure for understanding and for later extension. It would be wrong, to cut out a sector from the science and art of medicine from undergraduate education like histology or paediatrics. It is most important to train undergraduates in all formats of information handling. German universities have only 58 % of research departments needed for all the disciplines prevailing in medicine.

Adjusting the Content of Undergraduate Medical Education

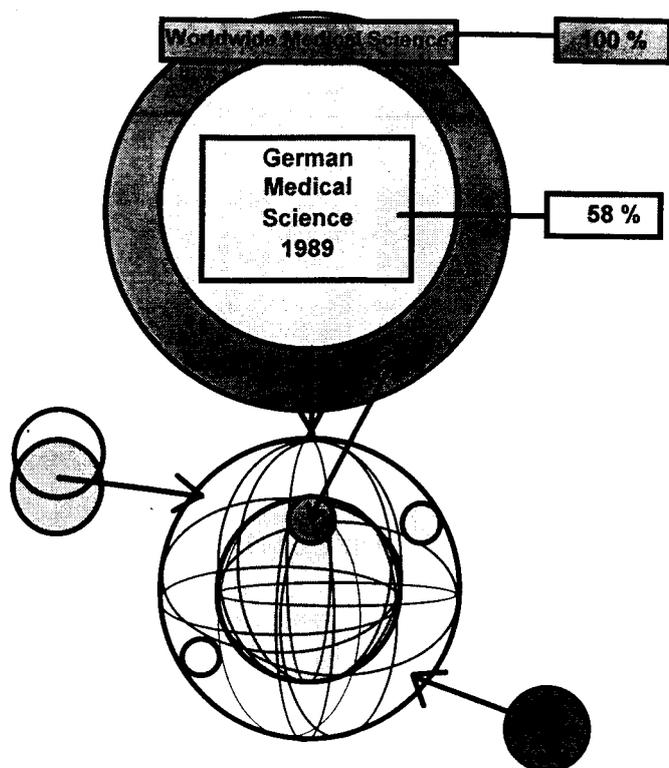


Fig. 3
Adjusting undergraduate medical education by reduction and introduction of new content from outside and/or exchange of students

Computer literacy, including *keyboarding*, is a basic skill, that should be mastered by all before entering higher education. All graduates should also have the ability to organise and work in groups. The most important skill for doctors needed in updating the knowledge is the ability to evaluate the validity of published studies.

All results from surveys amongst many groups of physicians, carried out by many investigators in different countries are in excellent agreement with the presently accepted principles of adult learning, but not with the present practice of continuing education and are not represented in undergraduate curricula. Learning after undergraduate education is most important for updating the competence of all professionals engaged in health care. As people adjust by themselves to meeting the requirements of their profession teaching is of less importance than providing the rewarding and supporting systems.

6. An Eternal Problem

The final question is: How to introduce this change? I have been publishing on the reform of medical education for 47 years (Renschler H. 1947), but spreading of innovations is as old as mankind and quoted in the bible as the parable of the sower (Bible 1). If innovations are met with resistance, "*the care of this world and the deceitfulness of riches choke the word, and he becometh unfruitful*", that means some people go into private practice and do not care about innovations in education. My own fate is typical for another fate of the seeds (Bible 2): "*some seeds fell by the wayside and the fowls came and devoured them up*" - in reality: the budget of my department was devoured up by other departments in Bonn after my retirement in 1990.

Surveying the history of medical education I recognised, that under normal social and political conditions and without a strategy for change it takes at least a century to develop or accept a new academic educational system, even at Har-

vard Medical School. Social upheavals again were the backdrop of the development of problem-based learning. The development at McMaster can not be understood without knowledge of social changes occurring in the late sixties like the student riots at Paris and at the Kent State University of Ohio, the Anti-Vietnam movement, and pedagogical revolutionary ideas, like those of Illich's "Deschooling Society" (Thomas MS, Renschler HE. 1989).

Industry teaches us daily how fast innovative techniques can be implemented. No carpenter is any longer needed to produce a car, but medical education progresses at the speed of horse-drawn carriages. It needs a special strategy to improve medical education at the university level, which is the main purpose of this meeting. My contribution today is to advise you to put more emphasis on those skills, that will be needed in the future to update the professional competence and performance in patient care.

In summary one important outcome of undergraduate medical education needed for lifelong learning is the ability to organise and work in groups using efficiently communication technology. No nation alone can advance on its own in all fields of science. The opportunity to share the progress in research and development world-wide should be given to all students. To support this is another reason for us to meet here.

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Prof. em. Dr. H. E. Renschler
 Schaafhausener Str. 9
 D 53127 Bonn