

Towards a Twenty First Century Medical Curriculum

Report by the International Advisory Board, 2005

Summary

Towards the end of the 1980s a group of medical students in Berlin, together with their Dean, developed a vision of an exciting new approach to the education of future doctors. This curriculum took its inspiration from articles published by forward looking universities McMaster in Canada, Maastricht in The Netherlands and Newcastle in Australia. The students' initiative led to the creation of what is now the Reformstudiengang Medizin (RSM), adopted by the Charité, Humboldt University, Berlin. The first small group of students completed their six year studies successfully in 2004.

Can this success be accepted as proof that the experimental curriculum could now be adopted as the 'blueprint' for a new curriculum for the entire cohort of medical students?

An International Advisory Board was established as one of the conditions which made it possible to modify the Federal regulations governing medical education.

Professors C. Engel (UK), S.Obenshain (USA, Domenica), A.Sefton (Australia) and C. van der Vleuten (Netherlands) met in March 2005 to review what had been achieved and what should be recommended for the future.

The Board has noted that the vision of the Charité is to enhance its leadership in medical education, as well as in research and clinical practice. However, the Charité is faced with major managerial challenges of organising over one hundred specialised clinical and research units from the Free and Humboldt Universities into a small number of financially viable centres. This is the more urgent in view of significant financial constraints within the State of Berlin.

A particular problem for the RSM is that the generous financial support from the Robert Bosch Stiftung, Volkswagen Stiftung, Stifterverband der DeutschenWissenschaft, Carl Gustav Carus Stiftung, Deutsche Ärzte Finanz, Schering AG, Novartis Pharma GmbH, Roche Diagnostics GmbH and Verein der Freunde und Förderer der Charité.was intended to cover only the early years and up to the end of the first cycle of the six year experimental curriculum.

The Board has been most impressed by the creativity and commitment of the core staff of the RSM and its colleagues from the basic and clinical disciplines. They have implemented a reformed curriculum which includes a number of well-proven strategies, such as problem-oriented learning in small groups, laboratory-based introduction to clinical skills, a focus on effective communication, early engagement with patients and the interesting experimentation with 'simulated patients'.

The Model Project of the Bund-Länder Commission for Educational Planning and Research Promotion, the RMS at the Charité, has achieved a great deal in its formative years. However, further development in its curriculum design and its implementation will be needed, if the RSM is to become the blueprint for the 21st Century Medical Curriculum.

The Board has proposed a set of detailed recommendations in its separate report for the RSM.

The Charité is aware that its vision of leadership, as well as present economic pressures, would make an early introduction of a single, progressive curriculum highly desirable. With this undertaking in mind the Board wishes to draw attention to a number of tasks which will need to be undertaken in preparation for the new

21st Century Medical Curriculum. These tasks will also include:

- Active further refinement of the design and conduct of the RSM.
- It will be of utmost importance to ensure that the innovative aspects in the RSM curriculum are not lost in the marriage with the traditional education system. Therefore, a priority task will be to concentrate on staff development right across the Charité. This activity should familiarise all academics with the innovative elements of the new curriculum and their future roles. In addition these academics should be given every opportunity to participate in the development of the new curriculum and thus acquire a sense of ‘ownership’ in this initiative.
- The above involvement of the academic community in the wider spectrum of tasks in medical education – not only in face to face teaching – will need to be based on an increase in the time which each academic is expected to devote to education, and also a reform of the funding of additional time commitments.
- An essential further reform would be to allocate a dedicated education budget to the new Centre for Medical Education, so that it can function as the coordinator of the progressive change from the present parallel curricula to the single new curriculum. This budget will enable the new Centre to recompense other centres for the time which their staff are expected to devote to educational activities.
- An important additional undertaking will be to reform regulations which tend to exert a constraint on innovative education, including, for example the inappropriate character and frequency of examinations.
- A further reform will relate to the quality of the students’ clinical experiences. Substantial reform of the present system would also lessen the burden on other countries which at present accept considerable numbers of German students for their clinical training.
- Members of the Executive will wish to visit innovative medical schools in other countries, in order to study their organisation, management and funding. Senior medical educators from the RSM and other Centres in the Charité should be given the opportunity for pairs of colleagues to spend a minimum of two weeks at innovative medical schools in other countries, in order to study curriculum design, innovative educational methods, facilities, resources and organisation for managing cumulative, integrated, contextual, student and patient centred curricula.
- Leadership in medical education on behalf of Germany would be demonstrated, if the Charité were to initiate the development of what would be seen as ‘The Second Flexner Report’. Appropriate sponsorship would enable an external, wide ranging

investigation into the present and prospective requirements for health care, as well as present and anticipated developments in the science, technology and practice of medicine. These data would form the essential basis for identifying the nature of the education required for future doctors to be able to adapt themselves to change and to participate in the management of those changes.

- Of fundamental importance is the recognition that the development of the desired leadership in 21st Century medical education can only thrive, if it is given active support by the leaders of the Charité and adequate financial support. Both aspects of this support will also be essential for the further perfection of the RSM and the transition to the new curriculum. The Board is confident that the appropriate funding can be made available by the governments of the Federation and the State of Berlin, as well as from the donors who have sponsored the RSM so generously up to now.

The International Advisory Board wishes every success to the further refinement of the Reformstudiengang Medizin and to the development of the Charité's 21st Century Medical Curriculum on behalf of the City of Berlin and the Federal Republic of Germany.

Towards a Twenty First Century Medical Curriculum

Report by the International Advisory Board, 2005

The Model Project of the Bund-Länder Commission for Educational Planning and Research Promotion

The Model Project was originally conceived by medical students, together with their Dean, as an exciting, major step forward for the education of future doctors, especially with a view to the changes which would affect the needs for, and significant advances in, medical care during the new Century. Farsighted and imaginative support on the part of the Federal and State Governments have made it possible for the Faculty of Medicine of the Humboldt University, Berlin to incorporate the Reformstudiengang Medizin (RSM) in its educational program.

The dedicated staff of the RSM have attracted a considerable number of academics and clinicians to adopt a quite radically new approach to teaching and learning.

Particular recognition is due to these members of the Charité for their contribution of time and educational creativity for the benefit of their students and the future of medical care for the population of Berlin and beyond.

An International Advisory Board was constituted to provide advice on the model project of the Bund-Länder Commission for Educational Planning and Research Promotion, financed by the Bundesministerium für Bildung und Forschung in cooperation with the State of Berlin and the Charité in relation to the Reformstudiengang Medizin (RSM) at the Charité, Medical Faculty of the Humboldt University of Berlin. Generous support has been provided by the Robert Bosch Stiftung, Volkswagen Stiftung, Stifterverband der Deutschen Wissenschaft, Carl Gustav Carus Stiftung, Deutsche Ärzte Finanz, Schering AG, Novartis Pharma GmbH, Roche Diagnostics GmbH and Verein der Freunde und Förderer der Charité.

The International Advisory Board thanks all those staff and students who participated in the discussions and provided information.

The International Advisory Board

The Review Board comprised Professors C. Engel (UK), S. Obershain (USA and Domenica), A. Sefton (Australia) and C. Van der Vleuten (The Netherlands). The Board has studied the Fourth Report of the RSM with its very considerable progress. The Board members wish to record their appreciation of the thorough documentation, opportunities for open discussions, and the excellent arrangements for the visit.

The Board is aware that the completion of the first cycle of this innovative curriculum calls for decisions to be made with regard to further development of the RSM and the progressive development of a new curriculum for all students at the Charité.

The Vision of the Charité

The International Advisory Board supports the members of the executive; they have a strong vision of their roles as leaders in medical education in Germany. They have a clear understanding of leadership in medical education for Germany. The developments to date demonstrate that they have the capacity and the will to implement further changes and to achieve their overall aim of a single, modern curriculum. Their approach is forward-looking and encompasses clinical practice, education and research. For the move to an entirely new curriculum special attention will need to be devoted to ensure that the new curriculum is truly innovative and fit for the 21st Century. Experience elsewhere has demonstrated the danger that a relatively small experimental curriculum may become substantially ignored in favour of maintaining the accustomed procedures of the numerically larger traditional curriculum.

The impressive achievements to date in implementing substantial curriculum development provide a unique opportunity for the academic leadership at the Charité to enhance further the institution's role. It has the aim of becoming the leader in medical education throughout Germany and elsewhere in Europe where modern educational change is being initiated. The substantial work already undertaken needs continuing support for the maintenance and ongoing development of the RSM strand. Such support is essential, if the newly developed, effective strategies are to be further refined and implemented across the whole medical education program.

The Board is pleased to note that the experimental program developed so far represents the successful adoption of well-proven medical educational strategies used elsewhere. Substantial initiatives have been introduced. Key elements include problem-oriented, integrated and progressive small group work, skills laboratories, early engagement with patients and the use of standardised patients to contribute to the development of clinical and communication skills. Many teaching staff are research active.

Despite the impressive progress made already in the RSM, substantial further work should be undertaken to consolidate and enhance the program over the six years. New, effective strategies must be applied across all parts of the curriculum in order to unify and integrate the different existing strands. A restricted number of clear, progressive goals – already in preparation - need further refinement in order to provide a simplified underlying structure of four to six “strands” or “themes” to guide progressive learning. Alternatives to didactic

classes would enhance the students' skills in self-direction. The quality of clinical teaching and supervision would need to be organised within a systematic framework. Integration between the different elements needs to be enhanced. Assessment remains a key challenge; traditional methods do not support the new goals and approaches.

A consolidated educational budget needs to be identified and centrally managed. It must be transparent, with services purchased from other cost centres as needed. All aspects of teaching – staff development in education, planning (particularly in integrated settings), delivery, the effective use of information technologies, valid and reliable assessment, and evaluation for continuous quality improvement – must be identified and explicitly funded. Key staff need resources and time to familiarise themselves with appropriate modern international medical educational programs. An effective strategy would be to support pairs of key staff to immerse themselves in the range of educational activities for up to four weeks in research-intensive international institutions recognised for their strong, modern, integrated problem-oriented medical programs (eg Maastricht, Linköping, Liverpool (UK), Sydney (Australia)). Some funding will need to be provided to the selected institutions, but such visits have proved invaluable aids to other institutions in planning an effective curriculum. Close observation and immersion in a functioning program offers significant insights that will contribute to effective decision-making and planning. It may be desirable (educationally and financially) to consider adapting and adopting aspects already developed and demonstrated to be effective elsewhere.

One further and perhaps even more difficult aspect to be managed will be an essential review of the federal and local legal and regulatory conditions which will either facilitate or tragically inhibit administrative and financial conditions for cumulative, integrated, contextual, and collaborative learning which the new curriculum should engender.

The senior (clinical) years will need particular attention. Students reported that they are often poorly supervised in clinical attachments; their experiences are fragmented and variable in quality. They note a lack of both a sense of continuity and of a systematic, progressive development of knowledge and skills. Many German students seek experiences overseas to remedy perceived local constraints. This imposes a significant burden on medical schools, hospitals and community settings in other countries. Additional resources (human and financial) are needed to support the development and delivery of high quality, systematic clinical education in hospitals and in the German community. Successful strategies used elsewhere in the world should be identified, adapted and adopted, so as to ensure a balanced, progressive and professional development of clinical knowledge and skills.

Significant savings could be achieved by adopting a single unified curriculum. The expectations for staff contributions would then be more clearly defined and understood. Academics would be available to undertake specific educational roles within the whole spectrum of academic activity: overall planning and preparation; curriculum design; staff development; face-to-face teaching in classes or in clinical settings; facilitating small learning groups; preparing learning activities; developing and adapting high quality on-line resources; providing academic advice and mentoring; developing, implementing and marking assessments; evaluating all aspects of the program; undertaking educational research and publication.

Into the twenty-first century medical curriculum

If the Charité is to meet modern educational standards into the future, a single high quality integrated and cumulative program will need to be offered to all students. That will require significant consolidation and expansion of the philosophy and practices of the RSM, which now incorporates a number of modern educational strategies and sets new standards.

Any such changes will require staff to be well-trained through programs of systematic staff development. They need help to understand the philosophies of a new curriculum, and to plan, teach, assess and evaluate effectively in classrooms, interactive tutorials and clinical settings, They will also need to master the appropriate, systematic use of modern information and pedagogical technologies.

It takes time to plan, engage and familiarise staff in the development of such a model curriculum, particularly since a majority have not been engaged in the educational developments to date. There is a significant risk that the majority of teachers – who are currently familiar only with the conventional curriculum – might seek to obstruct the development of a modern approach. Effective development for all staff in modern medical education is a high priority.

The new curriculum could readily be developed on the basis of the changes already identified to ensure a smooth progression of knowledge and skills. Learning from the first day for all students needs to be integrated across disciplines, based on common and important clinical conditions and situations. The program design would support the development of advanced skills in using computers. Ideally, the curriculum could be based on a small number (4-6) of themes, domains or strands to extend throughout the six years. Such themes can encompass key aspects important for a doctor – integrating scientific with clinical knowledge; sophisticated communication in a variety of contexts with patients and colleagues, orally and in writing; an awareness of community needs and of the local organisation of medical practice; a progressive understanding of ethical issues, critical appraisal and evidence-based medicine. As at present, students will be supported to undertake research and to develop skills in presenting findings. Encouragement would be offered throughout to support the students' reflection on their experiences and evaluation of their own performance. Outcomes would be specified and staged for each year of the program, to ensure progressive learning.

Assistance is available from the growing literature of medical education. Members of the review team and colleagues, who have instituted educational change in different parts of the world, can provide practical assistance

A simplified management structure would need to be designed and implemented, while over 100 specialised units are organised into a limited number of clearly-defined Centres. The specific roles and expectations of staff performance within the Centres would need to be defined and workloads managed centrally. Accountability would be an essential feature.

Constraints in the Creation of the 21st Century Curriculum in Berlin

The Board recognised that financial resources are likely to be reduced. This poses a serious problem for curriculum designers and teaching staff.

Other issues include national and local regulations that limit flexibility and can seriously inhibit the adoption of effective strategies used elsewhere in new, innovative curricula. Collaborations could be sought with other medical schools in Germany and elsewhere which are implementing educational change. Such a strategy is effective for sharing experiences, reducing costs and overcoming some obstacles.

Progress towards the Development and Introduction of the 21st Century Medical Curriculum

Given the tensions between research, clinical service and clinical teaching, a “blueprint” for the future of German medical education is needed. The recent experiences of the RSM indicate that staff at the Charité have embraced and implemented change. They have the capacity to implement further development as they build on their achievements to date.

It would now be important to undertake a number of specific tasks which should be regarded as essential for the successful introduction and maintenance of the new curriculum.

A major enquiry

It is now almost one hundred years since the Flexner report (1910) charted the outline for medical education in USA. Flexner’s model was based in part on the scientific German tradition at that time. A review is now needed of contemporary changes in the requirements for health and advances in the practice of medical care in Germany, in order to ensure that the education of future doctors enables them to be truly effective practitioners. Such an analysis needs to include a review of the strengths and constraints of current Federal and local laws and regulations. The ultimate aim is to prepare future doctors to adapt to, and manage, the changes they will meet in the first half of the 21st Century.

The Board would urge the commissioning of a major external report to review developments to date and to provide a firm foundation for the future of German medical education, with a focus on integrating the scientific and clinical bases and on problem-solving.

Development of professionalism in medical education

In several countries it is now a condition of academic appointment that new academics participate in an introductory course to familiarise themselves with modern theory and practice in higher education. They will subsequently be expected to participate in 'continuing professional development', not only within their own discipline, but also in education.

Where the curriculum emphasises both horizontal and vertical integration, many medical schools have established matrix management with a hierarchy of non representative working parties or sub-committees. Each such group of academics is responsible for a specific educational task, e.g. assessment, curriculum design, methods of teaching/learning, skills training, evaluation.

The members of such groups are assisted to become experts in the task of their group. The membership changes over time and groups transmit their expertise to other colleagues. In these ways educational expertise is significantly enhanced throughout the Faculty. This, in turn, encourages interest in engaging in research and publication in medical education – an essential requirement for enhancing the reputation and leadership of the Charité. (see: Henry, R, Byrne, K and Engel C. (Eds) *Imperatives in Medical Education – The Newcastle Approach*, 1997. Newcastle University, Australia (ISBN 0725909714); Des Marchais, J. *Learning to Become a Physician at Sherbrooke*, 2001. Network Publications, Maastricht. (ISBN 90-73026-14-8).

Development of robust recognition and reward for creativity and commitment to medical education

Appropriate recognition for work done will take into account the time devoted to educational committee work, planning, preparation of educational resources, facilitation of small group learning, etc. – in addition to face to face teaching. (Majoor, GD, Kollé, LFJThM (1997) Faculty planning and control in problem-based learning. In: *Education for Health*, 1997: 10: 189-198).

The Karolinska Institute, Stockholm has introduced an annual review of several portfolio of the individual academic's activities in research, education and administration (Martenson, D, Dahllof, G, Nordenstrohm, J, *Education for Health*, 1998: 11: 297-304). The information can then be used to manage workloads and to provide evidence for promotion and to manage the redistribution of workloads.

Encouragement of research in medical education and presentation of papers at national and international conferences

The above mentioned development of educational professionalism would need to include overt encouragement of scholarship and research in medical education. This would include assistance with research grants as well as allocation of dedicated time for such research and funding for attending conferences. These initiatives would not only benefit individual academics, they would also contribute significantly to the leadership reputation of the Charité.

Establishment of the Academic Centre for Medical Education and Research

This Centre would be an essential prerequisite for the further development of the RSM and, especially, for the successful introduction and continuation of the new cumulative, integrated curriculum. The Centre would need to have a dedicated budget, in order to purchase the time of academics from the other Centres and to coordinate this new curriculum which cannot be planned or implemented by separate disciplines independently.

Staff development

Successful change from the conventional, familiar teaching to an unfamiliar, innovative approach to assisting students in their learning requires careful familiarisation with new ideas and methods, as well as development of a sense of owning the new through active participation in the planning and progressive implementation of the new curriculum.

This program of staff development and the management of change throughout the Charité will occupy a considerable amount of time from staff in the Centre for Medical Education.

It should be born in mind that these academics will also be involved in the conduct and further development of the RSM, as well as in the development of the new curriculum and its progressive introduction.

Early involvement of IT and Library Staff, as well as Students at all Charité locations

The new curriculum will emphasise 'self-directed learning' in preparation for effective lifelong learning throughout professional life. Students need to have enhanced access to the resources of the libraries, and the wide distribution of the students across the locations of the Charité will call for access to a sophisticated information network, such as the system developed at the University of Sydney.

The involvement of students in design and evaluation will be essential to ensure that the curriculum that is developed will be the curriculum that students will see and experience.

The Tasks of Planning and Developing the New Curriculum

**** Further refinement of the RSM as a base for the development of the new curriculum**

Dedicated time will need to be made available for those with the necessary expertise to carry out the recommendations in the separate report for the RSM.

**** Development of the New Curriculum**

This will require dedicated working parties which will be working in parallel with those who are revising the RSM. However, at least one member of the RSM would also be a member of one of these new working parties.

It would be essential for a coordinating committee to maintain an overview of these planning committees.

**** Progressive change from the present parallel curricula to the new curriculum**

The first step would be the design and agreement of the general plan for the new curriculum.

When the first year of the new curriculum has been designed, together with its staffing, facilities, resources and management, the next intake of new students can enter the new curriculum.

While the new intake of students is in its first year, the planners will be involved with the development of the second year of the curriculum. They will also be involved with the organisation of staff for the second year, as well as the necessary facilities and resources.

In this sequence the other curricula will come to their natural end, when their last intake of students has graduated. The important *caveat* will be to ensure that students in the older curricula do not feel neglected and deprived of the benefits of the new curriculum.

**** Installation of an Intranet and its associate facilities**

The growing number of small groups of students will depend on smooth access to these facilities at every site of the Charité and at the practices in the community.

**** Familiarisation of key staff with educational progress at other universities**

This would be a program to be commenced just as soon as possible, as the understanding, experience and detailed information gathered by the key staff would be essential for an appropriate development of the new curriculum and its smooth introduction.

Time and funding would need to be made available as soon as possible for members of the Executive of the Charité and the key planning staff to travel to appropriate institutions to observe innovative curricula in operation. There would be great benefit in enabling pairs of colleagues to study the various aspects of these curricula, how they were planned, how they were introduced, how they operate and are monitored, how they are organised and managed, as well as the associated facilities and resources, both human, material and financial.

Members of the Executive may wish to concentrate on the administrative, logistic and financial aspects.

**** Appointment of consultants, national and international**

The needs for detailed advice and information can then be established, in order to avoid the unnecessary cost of time, effort and expense. Expertise and information may relate to

cognitive and technical assistance. Collaboration with other medical schools which are involved in curriculum change may well be helpful for sharing experiences, reducing costs and overcoming some obstacles (Prideaux, D, Teubner J, Sefton A, Field M, Gordon J, Price D. The Consortium of Graduate Medical Schools in Australia: formal and informal collaboration in medical education. *Medical Education*, 2000: 34:449-454).

**** Provision of appropriate financial support**

The Board would wish to conclude this report with its appreciation that leadership in education by the Charité on behalf of the State of Berlin and beyond is most desirable in this first decade of the twenty-first century. Not only the local community but also the rest of Germany and other parts of Europe will then be assured of appropriate medical care during a period of rapid and major change in the demands for health care and the development of medical science and practice.

However, this leadership in internationally recognised innovative medical education cannot be achieved without continuing generous financial support. This support will be essential during the critical period of development of, and transition to, the desired Twenty-first Century Medical Curriculum. Such support will be needed for the further refinement of the RSM. In addition the new interdisciplinary system of medical education will depend on realistic funding for the provision of building facilities and material resources, as well as the staffing for its planning, implementation and management.

The International Advisory Board wishes every success for the unique development of medical education in Berlin as a significant model for medical education in Germany and other regions in Europe. This opportunity may not present itself again for a long time to come.

-----***-----

**Further Development of the Reformstudiengang Medicine (RSM) as a
Blueprint for the 21st Century Medical Curriculum**

Report by the International Advisory Board, 2005

The following sections offer suggestions to the leadership of the Charité which relate to the further refinement of the RSM, so that it can serve as the blueprint for a new program across the institution.

Introduction

- Discussions with the RSM students confirmed that they strongly support the program, and they offered many useful ideas and suggestions.
- There is a need to refine the existing RSM (see below), with the ultimate aim of developing a program to be delivered to all students. Maintaining more than one program is unsustainable in the longer term, because of the expense and the “mixed messages” it sends to staff, students and the general community.
- As the RSM is progressively refined, particular effort should be put into those developments that will enhance the final outcomes of a new, integrated program for all students at the Charité. The focus is on the progressive development of independent student-centred learning, based on longer-term plans for a new curriculum that is derived from successful strategies in the development of the RSM to date. Novel, diverse, student-directed activities for the new curriculum can be developed or adapted on the basis of reviews of students’ feedback from the current RSM.
- The Board noted that RSM students reported considerable variability in the quality, depth and supervision of their current clinical placements. In developing a new program, there is the opportunity to design more systematic clinical experiences for all students so as to support the orderly progression of knowledge and skills.
There is a useful literature for clinical teachers, e.g. a series by Ken Cox on Planning bedside teaching, in *The Medical Journal of Australia*, first instalment Vol. 158 (February, 1993).
- Existing RSM staff should be encouraged and supported to continue their active involvement in planning a novel curriculum to be based on the RSM. Their experiences will be invaluable in refining and applying the best features of the RSM to the new curriculum. They need to be assured that their efforts will be appropriately supported by relevant staff development activities, and that such contributions will contribute to career progression. Their commitment to the curriculum needs to be recognised and rewarded in the normal processes of promotion and advancement.
- Change from the traditional curriculum will represent a considerable challenge in itself, made more complex by the need to develop a new integrated curriculum based on the change already instituted in the RSM. Staff from the traditional curriculum as well as the those familiar with the RSM will need new skills. Significant resources will be needed for comprehensive staff development for both groups of teachers. This process requires strong leadership to manage the complex issues of simultaneous change and ongoing development.
- Early in the process, thought needs to be given to the possibilities of partnerships with institutions internationally which have similar missions and are of comparable size, in order to reduce the overall costs of development.

Curriculum

- The first step is to initiate wide discussion – across the whole staff – and to agree on realistic aims or goals of the new curriculum for the 21st century. What will characterise a graduate from the Charité? Attention needs to focus on national and local needs and priorities. A diversity of eventual careers for graduates must be recognised: clinical work in a wide range of settings, research, education, public health, management. Much excellent work in the development of core goals or aspirations has already been undertaken within the RSM. There is merit in developing and refining such goals to apply to all the students by wide consultation within the Faculty. Once there is some initial consensus, further input and comment should also be sought from interested groups: the medical and related professions, the university, relevant governmental departments and the community, including patient support or advocacy groups.
- Once there is agreement on the overall goals, a limited number (no more than 4-6) of key “themes” “strands” or “domains” can be determined. By clustering similar knowledge/skills, a limited number of themes can then provide a vertical structure that extends throughout the six years of the curriculum. For example, such over-arching themes might include: knowledge and understanding of integrated basic and clinical sciences in a context of problem-solving; medical professional skills including communication, clinical examination, performance of basic procedures; an understanding of the local community and its needs; personal and professional issues including honesty and ethical behaviours, the use and application of evidence-based medicine, a recognition of the need for ongoing postgraduate education and development, an appreciation of the role of research in medicine, understanding one’s own learning styles and preferences. The expected skills, knowledge and appropriate professional behaviours at the end of the program can be defined, and intermediate stages can be indicated to determine a rational progression. Such an approach provides clarity for staff, students, employers and the community. Time can then be secured for those aspects, which are considered to be most important at different stages. Staff can then ensure that there is an appropriate progression and extension of understanding and skills. Progressive, higher expectations for standards to be reached at the end of each year can then be determined to provide a clear and fair basis for assessment.
- In an integrated and problem-oriented program, the focal point for learning must be the cases used in tutorial group sessions. All other instructional formats and content should be aligned with those sessions, so that relevant aspects of all the themes or domains (seen above) can be included in the presentation of the problem. The Board had the impression that the multiple components of the curriculum (skills labs, seminars, communication skills and Simulated Patient (SP) program, scientific research methods, fundamentals in medical thinking and performance, health sciences orientation, practitioner attachments, etc) are numerous and complex. They do not appear necessarily to be driven by the POL case or problem in the present RSM curriculum and may, therefore, be perceived as quite dissociated from the students’ studies in relation to the week’s ‘patient problem’. Students’ learning is related to prior experiences and their understanding of a problem-oriented approach (Prosser, M. A student learning perspective on teaching and learning, with implications for problem-based learning. In: *Eur. J. Dent. Ed.* 2004, 8: 51-58.)

- Many of the principles to guide the development of a single curriculum have already been applied within the RSM. A strong base thus exists, from which to plan an overall curriculum. Included in this report are some key references to the now considerable literature on aspects of medical curriculum development.
- Many facets need to be considered in modifying or developing a curriculum. All aspects need to be developed consistently, coordinated and well integrated. (For a recent review, see Sefton, AJ, New approaches to medical education: an international perspective. In *Medical Principles and Practice*, 2004: 13: 239-248.)
- There is a need to increase student control over learning. An essential element of a student-centred approach is that students take responsibility for their own learning. This is central to the development of life-long learning skills. The Board noted that there is still considerable teacher control in the RSM curriculum and substantial structuring of learning content. In part that control is maintained through a rather systematic linkage between tutorial group meetings and seminars and in part through the assessment program. Well-prepared POL problems help students to identify and pursue their own learning needs.
- Additional help for the students in the form of seminars or lectures is only required under circumstances which are mostly related to the complexity of the subject under study (for example the physiology of the renal system).
- To assist students, use can be made of both good quality on-line information prepared by staff., or existing resources from elsewhere can be reviewed and recommended by the staff. The librarians of the Charité can here be most helpful, particularly if the library is represented on relevant curriculum committees. The development of partnership with one or a small number of other medical school(s) could provide access to high quality resources.
- The exclusive reliance on summative block assessments persuades students to study for the tests rather than to build their knowledge progressively. We are aware that the wish for more structuring often comes from the students themselves. This is a natural reaction to rule out insecurity and increase the chance for success in the (block) assessments. Overcoming this insecurity is exactly what student-centred learning should achieve. Some summative assessments can be replaced with formative assessments which do not contribute to decisions about progression or graduation.
- The ratio between contact hours and self-study time needs to be reviewed. There is a negative correlation between the number of contact hours and the amount of self-study (Gijsselaers WH, Schmidt HG. Effects of quantity of education on time spent on learning and achievement. *Educational Research and Evaluation*. 1995: 1: 83-201). In conjunction with the previous point, the Board had the impression that the number of contact hours could be reduced without any loss, and perhaps some gains in effective study time for the students.

- A general overview of the key requirements in the design of the curriculum can be found in Engel, CE, Some thoughts on curriculum design. In *Zeitschrift für Hochschuldidaktik*, 1999: 23; 16-29.

Assessment

- Assessment remains a major focus in all medical schools, in order to ensure the quality and effectiveness of the graduates. It includes both summative and formative elements, to provide good feedback to students and staff on progress towards the attainment of the agreed goals. Good assessment requires a substantial investment of creativity and time. Given the central regulation of German medical schools, it is pleasing to learn that it has been possible to negotiate some flexibility in replacing the Physikum with smaller, targeted semester examinations.
- It is also pleasing to see the continuing development of OSCE examinations and the use of simulated patients for observed interviews using a validated instrument. These are aspects which the RSM students commented on favourably. Recent evidence suggests that the OSCE correlates well with clinical performance (Martin, IG, Jolly, B. Predictive validity and estimated cut score of an objective structured clinical examination (OSCE) used as an assessment of clinical skills at the end of the first clinical year. In *Medical Education* 2002: 36: 415-425), but combining assessments is most predictive of clinical performance (Wilkinson, TJ, Framton, CM. Comprehensive medical assessments improve prediction of clinical performance. In *Medical Education* 2004: 38: 1111-1116).
- The Board noted that there is continuing reliance in written examinations on multiple-choice questions (MCQs) which often focus the students' learning on very specific, narrow recall of individual items of knowledge rather than on problem-solving, critical thinking or demonstrating sophisticated reasoning. They are thus criticised for narrowing the students' approaches to learning. It is, however, pleasing to see that feedback is accepted from students if questions are considered to be unfair or incorrect. Alternative forms of objective questions –mentioned only in passing in the report from RSM - might be considered: Modified-Essay Questions (MEQ) or Extended Matching Questions (EMQ).
- Elsewhere, MEQs are increasingly used; they are only briefly mentioned in the report of the RSM. MEQs reflect clinical reasoning and the POL processes, rather than encouraging simple recall of isolated items of knowledge. They highlight the reasoning process and the application of knowledge, but they need to be carefully prepared. Students have some limited freedom in expressing their understanding. Recent developments of MEQs include on-line formats to allow students to practise and test their knowledge.

The Board recommends that the use of MEQs be explored further.

- Formative assessment (self-assessment without penalty) is now widely offered to students in order to give them practice in the formats and styles of test questions to be expected. The use of formative assessment also encourages students to reflect on their learning and encourages critical thinking. The Board was not provided with information

on whether formative questions have been made available for practice (whether in hard copy or on-line). Students highly value the access to non-secure question banks for practice. Questions can be linked to particular weeks of study or to particular topics or areas, and they can be made available for ongoing self-testing without penalty, ideally on-line. In other schools, such systems are extensively used by students for self-study. Indeed, to guide appropriate and relevant learning, some schools require that opportunities for access to formative questions should precede all summative assessments.

Formative assessment is possible by offering brief MEQs following one or more POL cases. They can also be provided in clinical settings, when staff observe students performing clinical interviews or examining patients and offer targeted feedback. Some OSCE stations can be set up and observed, with feedback offered to students (without penalty).

A more detailed account of the range and uses of formative assessment is to be found in: Engel, CE. Some thoughts on formative assessment. *Zeitschrift für Hochschuldidaktik*, 1999: 23; 51-56.

Monitoring & Evaluation

- The IAB suggests that monitoring and evaluation should be recognised as a central part of the research of the RSM.

Ongoing and regular monitoring and evaluation of the program by students, staff and others is essential. It provides an invaluable means of feedback to managers and teachers of the impact of the program. It contributes to maintaining and improving the quality of the program and the effectiveness of the learning, and offers students the opportunity to make suggestions for improvements. However, students and staff can be overwhelmed by excessive monitoring; so to retain validity, it has to be targeted and relevant to the key issues.

- Brief definitions may be helpful.

Monitoring, as in clinical practice, refers to the process of appraising how a programme or a task is *progressing*.

The primary purpose of *monitoring* is to obtain information to determine which aspects of a programme could be improved in preparation for the next presentation of the programme. Occasionally monitoring will reveal a deficiency which can be rectified while the particular part of the programme is actually in use with the students.

Monitoring is thus a means for *tactical* decision making. It is, therefore, advisable that monitoring should involve all those who will be part of the change process, so that they can appreciate the reasons for the suggested changes.

Monitoring will provide information not only for improving the programme; the information will also help to identify, to diagnose the reasons for successful and disappointing outcomes which have been identified through the evaluation process.

Evaluation refers to appraising the *outcomes* of a programme, such as a medical curriculum. In North America the term 'evaluation' may also be used for the assessment of students' progress and achievement in their education.

The purpose for *evaluation* is to obtain information about the outcomes of a programme, so that *strategic decisions* can be made, whether the whole or a part of a programme should be discontinued or redesigned, whether particular additions should be designed to support the aims and goals of the programme.

- The key questions to be addressed for both monitoring and evaluation are:
 - How *acceptable* is the programme for the students as well as for the teachers?
 - How *effective* is the programme and its separate parts?
 - How *efficient*, how *sustainable* is the programme and its separate parts?

(i) **For monitoring**, the use of questionnaires should be amplified by the application of the Nominal Group Process in which students, in the absence of their teachers, record their views based on their personal aims and their experiences during the preceding semester (In Bettcher, DW, Sapirie, S, Goon, EHT, Essential public health functions: results of the international Delphi study. *World Health Organization Bulletin*, 1998: 51: 44-54).

Questionnaire responses and Nominal Group reports should also be solicited from academic and clinical teachers. In addition, some information can be gathered from patients encountered by the students and supervisors in clinical settings.

The collated responses, together with suggestions for change, would be made generally available and specifically discussed by curriculum managers. Progressive further improvements within the RSM can then be assessed by comparing the most recent report with those from previous years.

(ii) **The evaluation of outcomes** of the RSM would need to be planned for two separate time frames, short and long term.

Short term evaluation measures the acceptability, effectiveness and cost of the six year curriculum, as appraised at the end of every six year cycle.

Short term evaluation would be based on a comparison of the majority of students from the RSM with those from the Regular Curriculum. It will be important to compare not only the results from the Staatsexamen, but also from tests which were designed to assess achievement in abilities and skills which relate specifically to Problem-Oriented Learning.

An important *caveat* would be that reliable conclusions of short term outcomes cannot be based on the performance of the first few cohorts of the RSM, as they need to be regarded as 'atypical'. They lack the guidance of senior colleagues with experience of the entire curriculum and they are unsure of how graduates from the RSM will be accepted by the practising profession. In addition, the teachers are still in the process of perfecting the design and their conduct of the new curriculum.

Long term evaluation measures the consequences of the six year curriculum and any other influences within and beyond the University, in terms of the postgraduate careers of the graduates.

Long term outcome evaluation will also need to be planned as a comparison of graduates from the RSM and the Regular Curriculum, as well as from other medical schools.

Both aspects will require early preparation of an active alumni association for effective follow up of graduates from both curricula. The collection of data on performance during the years of postgraduate education will need to be based on close collaboration with specialty training institutions in Berlin and elsewhere in Germany.

Considerable experience with long term evaluation would be available from colleagues in Australia and the United States of America. Opportunities to visit other medical schools would provide some insights and perhaps lead to partnerships in designing and implementing appropriate evaluations.

Staff development: further familiarisation of colleagues with the various tasks of the RSM and appraisal of actual performance

- Staff development is a crucial element in curriculum change, as has been acknowledged during the development of the RSM. Wide discussions initiated during the process of change offer significant opportunities for staff to become familiar with newer methods for teaching and learning. Staff are brought together, leading to enhanced teamwork and a clearer understanding and appreciation of the different contributions of staff members who teach in different parts of the curriculum. New educational ideas are often generated. Staff development thus occurs in a range of different settings, and opportunities can be made to encourage a wide range of development in different educational and professional contexts (In: Farmer, E. Faculty development for problem-based learning. In: *European Journal of Dental Education*, 2004: 8: 59-68; Wilkerson, L-A and Irby, DM. Strategies for improving teaching practices: comprehensive approach to faculty development. In: *Academic Medicine*, 1998: 73: 387-396.)
- One significant result of interactions between staff in designing new curricula in a number of schools has been the stimulation of new ideas. Not only are novel approaches to teaching generated, but the interactions have also led to interdisciplinary collaborations in scientific or clinical research.

Incorporating Information Technology

- Modern university programs make extensive use of information technology (IT) to support students' learning. Experience has shown that if IT is to be maximally effective, an integrated and progressive approach is essential, ensuring that IT supports the curriculum and its goals. (In: Carlile, SC, Barnet, S, Sefton, A, Uther, J, Medical problem-based learning supported by intranet technology: a natural student-centred approach. In: *International Journal of Medical Informatics*, 1998: 50: 225-233.)

- Good quality educational IT supports students' learning in many ways. The emphasis, however, must be on quality control, with strict processes to ensure consistency, currency and relevance. Examples of valuable on-line resources include:
 - information (text and/or images) either prepared by staff or linked to external on-line learning resources, including timed access to information and resources relevant to problem-oriented learning;
 - access to library resources, essential not only for finding information, but also for learning the skills of critical appraisal and evidence-based medicine;
 - image banks and learning resources that support learning in basic sciences and clinical medicine;
 - formative assessment tasks – i.e. to focus on relevant learning and to encourage practise, so as to develop skills of ongoing self-assessment;
 - communication between and amongst staff and students (particularly important when students are in distributed placements or in remote sites);
 - on-line evaluation of curriculum and resources by students and staff.
- Modern evidence-based medical practice requires the skilled use of computers, and hand-held devices are increasingly used by staff and students in clinical settings. Librarians play a key role in these aspects of students' learning and support the staff by providing access to good quality resources. They can teach relevant skills to students and staff. Librarians are particularly valuable as members of curriculum committees, to ensure the relevance and currency of curriculum resources.
- Computers are also, of course, used by academic, clinical and administrative staff in many aspects of curriculum management. Well-designed data sets will support educational research.

Research & Development

- Educational research is imperative to drive educational innovation in the long run (cf. Thematic Volume 10 of *Academic Medicine* in 2004). Such research will contribute significantly to the capacity of staff in Berlin to take a leading role in medical education in Germany and abroad. The accomplishments of the Berlin group so far are highly commendable but require further strengthening. There is a growing movement to establish new standards and evidence-based resources for research in medical education. See, for example: Group, Best evidence medical education (BEME); report of a meeting 3-5 December (2000), *Med. Teach.* 2000: 22: 242-245; Harden, R, Grant, J, Buckley, G, Hart, IR, BEME Guide No. 1: Best Evidence Medical Education, 1999: *Med. Teach.* 21: 553-562; Van der Vleuten, CPM, Dolmans, DHJM, Scherpbier, AJJA, The need for evidence in education. *Med. Teach.* 2000: 22: 246-250). Protected time and access to relevant resources are both essential if staff are to undertake educational research.
- Educational research should not only be carried out by members of the academic medical education unit but should preferably involve other members from the academic

community of the medical faculty. Interested students can usefully contribute as members of the team. Recent publications on Best Evidence Medical Education offer some new approaches to educational research.

The type of research should closely link educational theory with education practice; see Design-based research collective, Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher*, 2003: 32: 1: 5-8; Barab, S, Squire, K, Design-based research: Putting a stake in the ground. *The Journal of the Learning Sciences*, 2004: 13: 1-14.). Some potential research topics are:

- RSM as a case study for changing a traditional program to a student centred program.
- Assessment strategies for non-cognitive competencies (professional behaviour, reflective and metacognitive skills); see also the list of competencies developed by the curriculum committee.
- Effect studies of PBL and non-PBL students on non-cognitive competencies (clinical skills and other competencies listed above), and motivation.
- Use and effect of quality assurance procedures in assessment.
- Effect of teacher involvement in student-centred programs on teachers' perceptions (on learning and teaching) and teachers' competencies.
- Use of progress test for feedback, impact on learning styles and predictive validity in relation to national qualification examinations.

Selection of students

- The development of effective strategies to select students with an aptitude for medicine has resulted in gains in efficiency, leading to fewer failures and discontinuations. Students can be matched to the particular program at a specific institution. It would be worthwhile exploring the published literature in the growing area of selection of medical students to see if any of these modern approaches might be applicable to the Charité.
- Professor D. Powis and colleagues at the University of Newcastle (Australia) have developed robust selection methods for medical schools. The methods include a validated pencil and paper test administered to applicants for undergraduate entry medical programs, widely used throughout Australia. (Powis, D, Rolfe, I, Selection and performance of medical students at Newcastle, NSW, *Education for Health*, 1998: 11: 15-23). Professor Powis is currently developing a promising instrument that identifies applicants with characteristics known to correlate with poor performance in medical practice.
- The use of a structured, objective interview has also been validated for selecting students (Powis, DA, Waring, TC, Bristow, T, O'Connell, DL, The structured interview as a tool for predicting premature withdrawal from medical school. *Aust. NZ. J. Med.* 1992: 22: 692-698.)

- The Graduate Australian Medical Schools Admission Test (used not only in Australia but also in UK and some other countries for entry to the graduate-entry medical schools) is used to establish that graduate applicants have an adequate background in relevant sciences, can reason well and are able to express themselves effectively in writing. (Aldous, CJ, Leeder, SR, Price, J, Sefton, AE, Teubner, JK, A selection test for Australian graduate-entry medical schools. *Med. J. Aust.* 1997; 66: 247-250.)
- At present, a new approach is under trial in a number of different countries by Professor Powis. It entails the use of some well-validated psychometric tests that can identify extreme behaviours and characteristics that correlate with poor clinical performance – “selecting out” rather than “selecting in”. We encourage interested staff to keep the issue under review.

Rationalisation of Consultations offered by the RSM

- Leadership by the Charité in education as well as in research and clinical excellence suggests that the dissemination of information on the theory and practice of Problem-Oriented Learning should be a recognised responsibility of the RSM.
- The capacity of the staff of the RSM will be limited in providing consultation and outreach programs for other staff. Their time would be most effectively devoted to the provision of workshops, rather than a dilution of effort for the benefit of individual visitors. Such one- to three-day workshops could be arranged for groups of colleagues within the Charité, for groups from other institutes in Berlin, and perhaps once per year for academics from other medical schools.
- Information on the planning, conduct and management of such workshops would be readily available from colleagues at the Universities of Dundee (UK), Harvard (USA), Maastricht (The Netherlands), Newcastle and Sydney (Australia).

Publications by the RSM

- A deliberate programme of educational publications would be desirable, in order to enhance and consolidate the reputation of the Model Project as a unique initiative of the Charité.
- In addition to research papers in national and international peer reviewed medical and educational journals, the programme of publication could include:
 - Short guides to specific aspects of POL, for example POL scenarios, tutor guides, training and application of Simulated Patients
 - A bimonthly newsletter would include information about the RSM and changes in the Regular Curriculum, as well as announcements of meetings and workshop as suggested in ‘Rationalisation of Consultations’ above.
 - A Website would offer ready national and international access to information about the educational activities of the Charité.

- The appointment of a combined Information Officer and Web Editor would be justified to ensure the effective conduct of the publication programme, with appropriate supporting technical staff. The Information Officer would also be responsible for the urgently needed central management of the wealth of interrelated information of the horizontally and vertically integrated curriculum, as well as for the organisation of the workshops, suggested in the paragraphs ‘Rationalisation of Consultations’.

Facilities at the TÄF

- Members of the IAB were impressed with the thoughtful development and application of Simulated Patients (SP), a facility which has also come to be used by students from the Regular Curriculum.
- The IAB would suggest the addition of one-way mirrors for one or more rooms in this area. Such a facility would be of particular value for unobtrusive observation during a wide range of research initiatives. In addition, the training of small-group tutors/facilitators, the training and supervision of simulated patients, as well as non-intrusive observation by a group of students while one of their colleagues conducts a patient interview. These are examples of the day to day use of one-way mirror installations.
- The International Advisory Board wishes every success to all who contribute to the Reformstudiengang Medizin. The Board is confident that the necessary additional administrative and financial support can be made available to enable the RSM to develop further and thus to become the model for the 21st Century Medical Curriculum of the Charité, Berlin.