

The undergraduate medical programme Faculty of Health Sciences Linköping University

Application

Award for Excellent Quality in Higher Education 2007

Dnr 64 183-07



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Attachments:

- Syllabus for the Medical Programme
- Syllabi for Phase I, Phase II and Phase III
- Suggested list of literature for the Medical Programme 2006-07

For further information see:

- Home page of the FHS: <http://www.hu.liu.se/>
- Home page of the medical programme: http://www.hu.liu.se/lakarprogr/om_lakarprogrammet
- Planning documents: <http://www.hu.liu.se/lakarprogr/planeringsdok>
- EDIT web scenarios: <http://www.hu.liu.se/edit>
- Rules for clinical clerkships: http://www.hu.liu.se/lakarprogr/klin_handl
- Results from evaluations by alumni 2004-04 and 2006 organized by the Swedish Medical Association:
<http://www.hu.liu.se/lakarprogr/alumni>
- List of publications in pedagogy from FHS:
<http://www.hu.liu.se/content/1/c6/03/66/69/Publikationslista%20pedagogik%20HU%20060906.pdf>
- List of publications on line: http://www.hu.liu.se/pedagogisktcentrum/pub_online





Figure 1: The concepts of teaching and learning.

Application highlights

This section extends a brief overview emphasizing why the medical educational programme at the Faculty of Health Sciences, Linköping University, provides an outstanding learning environment:

- Unique and systematically developed curriculum that integrates subjects/topics, as well as pre-clinical and clinical fields
- Consistent implementation of problem based learning favours deep and self directed learning
- Strong alignment between competence-oriented goals, learning and examination methods
- Training in critical appraisal and scientific methods throughout the programme, including a 30- ECTS point student research project
- Professional attitudes, patient communication and inter-professional skills are systematically trained in innovative ways from the first day of the programme
- Relevant clinical training in hospitals as well as in general practice, acquainting students with common health problems
- Infrastructure with modern library and IT resources, innovative web-based scenarios for PBL tutorials, renewed localities and meeting places
- Organisation and quality assurance involving many teachers and students active in leading and supporting the curriculum
- Superior results in national evaluations, evaluations by alumni and in national licensing tests compared to the other medical schools in Sweden
- Ability for renewal is proven by curriculum development actions.

Introduction

The Faculty of Health Sciences; experienced but still as creative as ever

In the autumn of 2006, the FHS celebrated its 20th anniversary. The medical faculty, however, had started already in 1969; when medical students from Uppsala spent their last seven semesters in Linköping. After some years, the new faculty, together with the County Council of Östergötland, realized the potential benefits of a complete undergraduate medical programme at Linköping University (LiU). Inspired by McMaster University in Canada, Maastricht in Holland and Beer Sheeva in Israel, new educational ideas and ideals were gradually turned into reality.

At the start in 1986, the FHS included programmes for nursing, occupational therapy, physiotherapy, medicine, social welfare and laboratory technology. Programmes for public health and speech and language pathology were added later, and the programme for laboratory technology has been replaced by a master's programme in medical biology. Inter-professional integration between students from different programmes is an important basis and profile of FHS educations.

The pedagogic model; based on scientific evidence and best practice

A number of important educational ideas, based on education research and theories of learning, are included in all programmes. Problem based learning (PBL) is a student-centred educational approach selected as the fundamental basis for organising studies.¹²³ The cartoon shown above in Figure 1 became, and still is, an important symbol for these efforts. This method, focusing on learning in contexts and in interaction with fellow students in groups, leads to deep instead of surface

¹⁾ Barrows HS and Tamblyn RM. Problem-based learning. An approach to medical education. New York,: Springer Publishing Company, 1980

²⁾ Norman GR and Schmidt HG. The psychological basis of problem-based learning: A review of the evidence. Acad Med 67: 557-565., 1992

³⁾ Schmidt HG. Foundations of problem-based learning: some explanatory notes. Med Educ 27.: 422-432., 1993.

learning, and a higher retention of knowledge than in traditional teacher-centred approaches toward learning. PBL also transfers the main responsibility for obtaining study goals from the teacher to the student⁴⁵. The process in PBL has many positive spin-off effects like students' learning to cooperate in groups.

In PBL, teachers focus on facilitation of learning rather than provision of information. They are also expected to cooperate over departmental borders as well as between preclinical and clinical disciplines. This way of working together often produces positive spin-off effects extending to research. There are many different teacher roles as e.g. planners, term coordinators, tutors, lecturers and clinical supervisors. Continuous staff development is critical and has a prominent place at FHS.

Other important elements are so called vertical and horizontal integration. In vertical integration, i.e. between basic and clinical sciences, different areas and subjects are interwoven with clear progressive shifts over phases and semesters. This has also shown to stimulate a deeper, more profound learning process. Horizontal integration means simultaneous learning of contents from several subjects needed to understand and explain the scenarios used in subject integrated themes. Exemplarity in both curriculum planning and in learning is a basic principle.

Analysis: It was a delicate process to consequently implement these principles for education and reach this high grade of integration. Good educational leadership has made this possible. It was also an advantage to build the curriculum partly from scratch.

To stay in the forefront - with a mission to foster the very best in health care

FHS was among the world's pioneers in introducing new ways of health care education. The medical programme was the second in Europe to systematically apply PBL. Despite significant scepticism at the start, the medical programme became a success. Our aim is to keep a standing among the most progressive medical schools worldwide, which demands continuous evaluation and development. Our mission is to foster the very best in health care and to be well prepared for future demands. We continuously improve and develop our educational methods. Cooperation at the faculty level has been successful and we provide teachers with credits for their efforts.

⁴⁾ Maudsley G. Do we all mean the same thing by "problem-based learning"? A review of the concepts and a formulation of the ground rules. *Acad Med* 74: 178-185, 1999.

⁵⁾ Schmidt HG and Moust HC. Factors affecting small-group tutorial learning: A review of the research. In: *Problem-based learning: A research perspective on learning interactions*, edited by Evensen DH and Hmelo CE. Mahwah: Lawrence Erlbaum, 2000, p. 19-52.

Analysis: Our complete model is still unique in the world. Running a fully integrated medical programme aimed at preparing students for their profession, with broad demands for competence and personal development, is challenging. Reasons for the pendulum to swing back to more traditional solutions of educational matters abound. Rules, freedom and staff development are needed in a balanced mixture.

Principles of the medical programme

Main characteristics

The programme lasts 5.5 years and comprises 11 terms (I) (each 20 weeks) and 330 European credits points. Characteristics are life-long learning, critical appraisal, a global perspective, early patient contact, communication skills, inter-professional competence, health promotion and prevention and clinical clerkships in hospitals as well as in primary care. Theory and practice are integrated during the entire programme as shown in Figure 2.

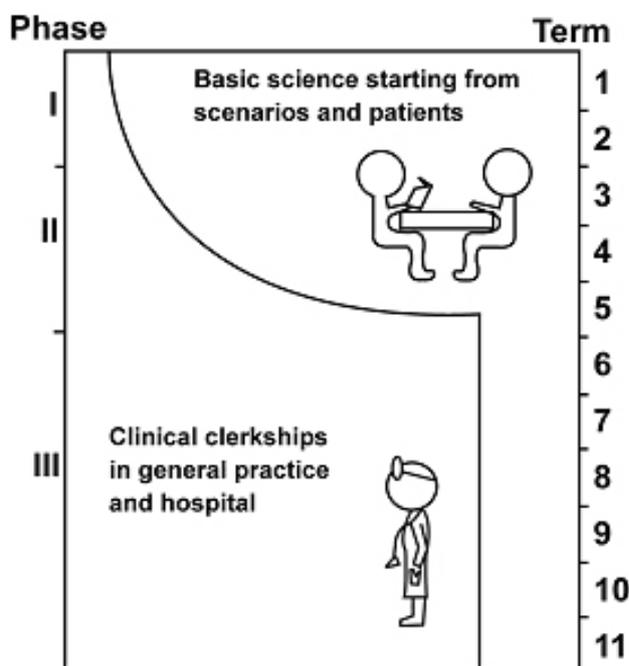


Figure 2: Integration of theory and practice.

Creating the revised medical curriculum; more decisive use of the original principles

After 15 years of running the PBL curriculum there were several reasons for a major curriculum reform. Problems concerning vertical integration were evident, as preclinical areas had not been given the originally planned place in clinical terms. Furthermore, clinical clerkships during this phase had become discordant implying a lack of continuity. Scheduled hours in early terms had increased above the frames set, which could decrease self-directed learning. Some teachers experienced a lack of identity and motivation partly due to weak subject identity in the integrated, organ-based curriculum.

The faculty board appointed a group of teachers and students to analyse the situation and to propose a renewed

curriculum. Their report from late 2002 was based on the prior experiences of the faculty and visits to internationally leading medical schools. The backbone of the proposal consisted of suggestions for more decisive use of the original principles of the FHS from 1986, adapting them to the current circumstances and, more directly and extensively, involving teachers and students in running the curriculum. The new programme was implemented starting with term 1 and 6 in 2004.

In order to promote subject integration and progression, seven multi-disciplinary theme-groups (6-10 teachers and a student), mainly based on organ systems, were created, given resources and responsibility to plan and organize learning activities during the time allocated to each respective theme throughout the programme. The terms, composed of three to four themes, are the main entity for students rather than the themes. The theme groups and their allocated time for mainly theoretical studies are:

- Life cycle-Endocrine-Reproduction-Neoplasia, 16 weeks
- Gastroenterology-Nutrition-Metabolism, 11 weeks
- Circulation-Respiration-Kidney-Erythrocyte, 20 weeks
- Immune system-Dermatology-Infectious diseases 13 weeks
- Neurology-Sense organs-Psychiatry-Locomotion, 21 weeks
- Disease mechanisms-Diagnostics-Treatment, 10 weeks
- Professional attitudes-Public health (including scientific and professional development and inter-professional training), 18 weeks

The principles of time for self directed learning activities were reinforced; the maximum amount of scheduled time is 15 hours per week during theoretical studies and 30 hours during clinical clerkships. PBL was strengthened by the systematic use of Web-based scenarios, which form the hub for studies.

Analysis: The organisation with theme groups has functioned very well and increased the broad, active involvement of teachers. The theme of professional attitudes and public health has the most complicated planning task with several strands established. A revision, based on present experiences, is in progress. The change process was performed within ordinary funding.

Overview of the new curriculum; progression, relevance and personal development

An overview of the 11 terms with their thematic contents and clerkships is attached to the Syllabus for the Medical Programme (Attachment 1).

Phase I, Health and Biological function; T1-2, focusing mainly on basic science concepts and an overview of the organ systems in realistic contexts of mainly patient related problems and situations. The studies of pathophysiology in Phase II, Health and Disease; three terms, is integrated with details of normal structure and function to achieve a deeper and more contextual understanding of diseases, their causes, mechanisms,

manifestations and the principal options for treatment and prevention.

Phase III, Patient and Prevention; T6-11, starts with a term involving student research projects. The structure of the other terms alternates between four-week periods of four week clinical practice (in all 60 weeks) and two weeks of theoretical studies (in all 30 weeks). The theoretical studies include basic sciences and pathophysiology in clinical contexts. The Web-based scenarios are important means to achieve this.

The study of common clinical problems is, to a greater extent than before, left to independent student studies partly related to weekly “clinical base-groups” during practice periods. Focus is on fewer but longer periods of clinical training. Written reports and oral presentations have been increased by so called field studies each term at two of the four-week periods of clinical practice.

There is a systematic training in inter-personal skills and professional attitudes. Twelve weeks deal with inter-professional training. “The Strand” in patient communication runs the first four terms and recurs as a concentrated week during Phase III (in all ca. 180 hours). Critical appraisal/evidence-based medicine (EBM) is another strand during the entire curriculum.

Analysis: The programme contains many learning components documented as best practice.

Aims and objectives; competence oriented and involving student judgement

The outcome of the programme is directed according to national and local aims. The aims for each phase and the objectives of the terms were revised when starting the new curriculum. Objectives stating competence according to the SOLO-taxonomy (Structure of the Observed Learning Outcome) in relation to relevant medical problems are grouped in four domains: Science and learning, Professional Attitudes, Medical Science and Clinic, and Community and Population Health. To support the teachers’ planning activities, aims and objectives for each of the four domains over the three phases

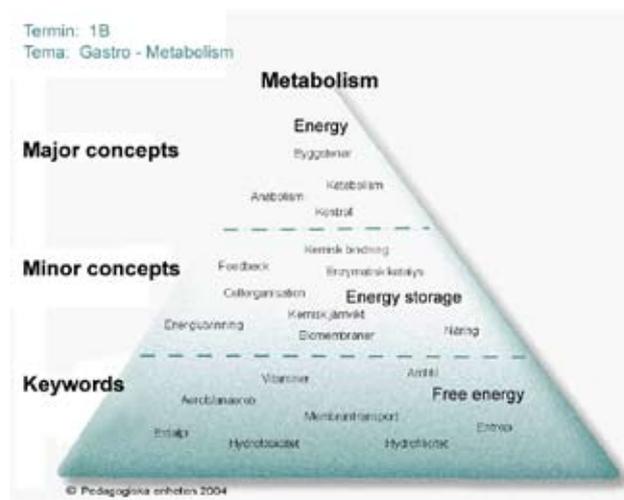


Figure 3. Concept pyramid from term 1.

are organized in “progress documents”. Furthermore, “theme plans” give an overview of all the main goals and organized learning activities.

The aims of a phase, state, in general terms, the competence intended in the four domains. In this way, they guide studies of the task oriented term objectives, which are presented at three competence levels. Furthermore, goals are given as “concept pyramids”, see an example in Figure 3. Main concepts are at the top followed by related concepts given in the middle, and key words in the low level.

During Phase III, various tasks and skills (symptoms, diseases and other situations) that should be handled in accordance with the aims of the phase are given in the four domains, again in three levels with a progression over terms. A theoretical underpinning is demanded in all tasks; however, the concept pyramids here contain mechanistic preclinical concepts in clinical contexts where deeper understanding is demanded.

The objectives are deliberately not detailed. Students are expected to work-on and make-up their minds to the objectives rather than being given a checklist, i.e. by considering various connections between concepts. To increase the use and guidance of these goals, students develop individual learning plans, to be discussed with their clinical tutors, prior to starting clerkships.

Analysis: Students gradually adapt to this active way of interpreting goals. New students (and teachers as well) often want detailed content related goals, which would not be consistent with our explorative PBL model. By using competence objectives and the extent of student research projects, the medical programme fulfils the demands of the Bologna process.

Organization

Managing the medical programme; a balance between tradition and dynamic change

An overview of the organisation is given in Figure 4. The Faculty board has delegated part of its decision power to the Board for undergraduate education and to programme committees. Programme directors (PD) are appointed by the Dean. The Board for undergraduate education has committees for examinations, course plans, inter-professional integration, internationalisation, clinical placements and quality assurance. Students are members of all boards and planning groups, and also have meetings with the Dean on a weekly basis.

The board for undergraduate education appoints, on recommendation from the PD of the medical programme, members of a Programme Committee (PC), which consists of the PD, associate PD, three phase coordinators (PhC), a teacher for pedagogic development, programme administrator, student councillor and two students. The PD appoints individuals and groups for

advice and support for the implementation of the programme. The associate PD is responsible for recruiting tutors and is recourse for curriculum development. The PD appoints, in cooperation with the department chairmen, term coordinators (TC) and chairmen and vice chairmen of the theme groups (TG). PD, PC, TCs and TGs have regular meetings in different constellations.

The Medical Programme Advisory Board is a larger reference group appointed by the PD with persons being responsible for different teaching activities, library and clinical clerkships in adjacent counties. Students are represented in all advisory groups, theme- and semester groups.

The TC is the pedagogical leader and examiner of the term, and is subordinated by the PhC. There are written instructions for each of these functions. The PC is responsible for co-ordination between the TGs and the way educational principles are developed and implemented. Each term has a part time administrator. The central administration is shared with other programmes; however, one programme administrator and one student councillor work for the medical programme.

Principles for economic steering; activity related funding

LiU receives funding for medical education from the state government. After deductions at the central LiU level, a sum is distributed to the FHS. After financing the leadership, administration, Students’ affairs office, Pedagogic centre, PDs and teachers for inter-professional education, 58% (SEK 59.7 million) of the originally allocated funds are distributed to the departments.

The TGs plan their respective theme and propose teachers for different tasks. PD puts all tasks together and then orders and negotiates certain positions with the department chairmen who finally decide staffing of positions/tasks. All educational tasks are given full payment according to a “point system” where different tasks have been assigned a specified numbers of points; there is no fixed basic financing from the programme to teachers.

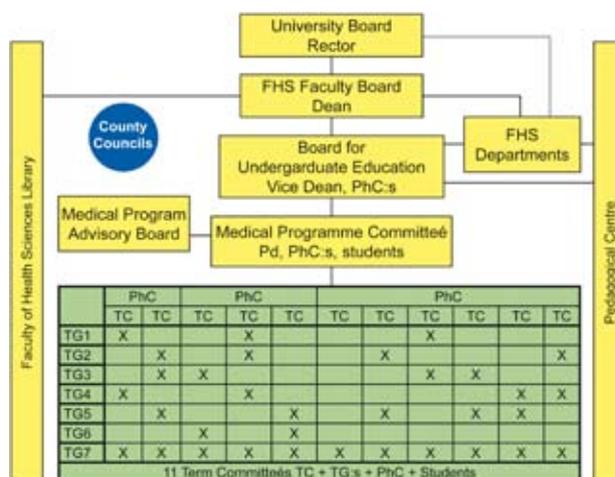


Figure 4. Organization scheme of the FHS and the Medical Programme.

The drawback with this system from the departments' point of view is a less predictive economy, which is why distribution to the departments has been "frozen". This means that the PD must consider that no dramatic changes between departments in the ordering of educational tasks take place, which decreases the dynamics of planning.

Funding from the state also goes to the County Council as a compensation for research and medical education. The total sum in 2007 is SEK 164.8 million; SEK 27.7 million was used for educational activities performed by their employees in the medical programme, SEK 11.3 million is capital costs and equipment and SEK 31 million is for localities. Educational tasks are paid by performance; a clinic gets for example four points (SEK 1920 plus SEK 640 in general research support) per student-week.

Analysis: the "point system" gives strong incentives both for teachers and departments to take on various tasks. The medical programme has, contrary to most of the other programmes, a free standing in relation to the departments, which is most important for its function and development.

Systems for quality assurance

Quality assurance at LiU; great emphasis on this process

LiU's status in terms of quality assurance was assessed by the Swedish Agency for Higher Education which, in 2003, provided a positive report with some recommendations. The Rector's Management Council is responsible for overseeing quality assurance regarding these recommendations. The Vice-Rector for quality development for education is the primary speaker and, to that end, leads a reference group comprising those responsible at the faculty level and the student unions. The aim is to develop interchange and cooperation across faculty boundaries concerning examinations and principles involving course evaluations. A FHS policy document unites these principles as well as a memorandum for semester evaluations. The Board for undergraduate education at FHS has an established committee for quality assurance.

Quality assurance of the medical programme; close contact with students

The programme design, involving small group activities, allows for a close contact between students and teachers. Web-scenarios are coupled and provide feedback via e-mail. Recurrent evaluations include students' evaluating their base group-process and themselves concerning how well they have prepared and if they have obtained the determined goals. During T1-5, a more comprehensive, mid-term evaluation is made of both the base-group and the tutor.

A number of terms have recurrent meetings between the TG and student representatives. During some terms, the outcome of base group-work and other learning activities are coupled via e-mail each week. Students also provide feedback to TGs. Extensive evaluations take place at the end of each term and, using standardized formulation, results are published on associated term web-pages. During clinical rotations, both students and clinics are evaluated using standardized forms, which will also be web-based. Results are coupled to clinics.

On the university and faculty level a web-based questionnaire has recently been introduced and has been tested on the medical programme with a response rate of about 75%. It comprises two questions posed to all students at the university (how good was the course and how much time did you spend on studies) and, based on FHS, includes an additional eight questions. From these simple data, conclusions can be drawn about the "health" of the educational efforts in each programme.

Members of the PC including a student have meetings with TCs, one at the time, to discuss the functioning of the respective terms and how to improve quality. From this year, TCs will also make up a short term balance sheet stating problems and suggested solutions.

LiU/HU has a policy against personal infringement regarding discrimination related to physical/psychological handicap, gender, ethnic background and sexual disposition. Most FHS employees have taken part in a course on sexual harassment issues. Gender perspectives in the medical programme also include topics regarding equal rights.

Analysis: Close contact with students is a prerequisite for continuous development. Students grow tired of term evaluations occasionally leading to low response rates. To combat apathy, we are presently in the process of giving students a shared responsibility for evaluations. The importance of the rector's quality measurement is to rapidly identify problems. It should be added that the recently launched national evaluation for quality assurance at the medical programme is judged as very good.

Teachers and students

Teachers and their competence

The medical programme has approximately 100 permanent teaching staff of which 67 are professors, 30 are lecturers and two hold adjunct positions. Scientific as well as pedagogic competence is required. For appointment, teachers must take a two day course on tutoring base groups and two out of three elaborate university teacher training courses, involving ca. 15 university credit points. They involve pedagogy and didactics, leadership, planning, examination, evaluation and tutoring PhD students. The same criteria are set to achieve an associate professorship (docentur). Pedagogic portfolios, covering pedagogic experience and merits,

are being planned for all teachers at the FHS.

The ratio of teachers to students has recently decreased, in part as a result of rising student numbers. Traditionally, as well, the FHS receives fewer governmentally appropriated funds (MFF-grants) than other Swedish medical faculties, directly influencing the density of teachers. Nonetheless, excellence in subject competence and pedagogic training compensates toward effectual education. The programme's feasibility regarding theoretical facets is dependent on teachers from county council corresponding to 20 fulltime equivalents – one third of the total amount, clinical preceptors not included.

In general, teachers show positive approval regarding FHS's pedagogical approach. According to a self-evaluation in 2005, the FHS faculty allotted, on average, about a forth of their time to research and research education, and 40% to undergraduate education which includes planning. Overtime exceeding 40 hours/week was frequently stated. Time allotted for supplementary pedagogic education averaged nine days during 2001-05.

Analysis: The competence to run the medical curriculum is generally good. Low research funding from the government compared to the other Swedish medical schools is a drawback. FHS has strengthened its subject competence by hiring topic experts from the University Hospital, which is viewed as strength.

Students and their characteristics

Student admission per term increased to 50 in 2000, 60 in 2001 and 65 in 2007; plus an over-admission enrolment of ca. 10 students. Median and mean ages were 22 and 23.5 years, respectively, showing no overall tendency for change. During the last decade, female enrolment has accounted for an average of 57%. Since 2001, 2-5 students/term have been accepted to advanced levels of the programme.

FHS employed special enrolment criteria in 1991-2004, but according to different principles before and after 1997. Differences in study-results between admittance groups have been minimal.

The majority of students have good educational qualifications. Student flow, i.e., those continuing through the education programme, is about 85%, with the initial dropout rate compensated by an over-acceptance. During more advanced levels of study (i.e., Phase III), student decisions to dropout are often associated with moving or transferring to other study-locations and generally based on social reasons. Studies are often disrupted due to educational thresholds. No differences have been noted between the sexes regarding dropout or graduation rates relative to student enrolment prior to the year 2000.

Analysis: An investigation is ongoing into the principles for acceptance, lottery avoidance and selection of students motivated for FHS's pedagogical model.

Infrastructure of learning resources

Pedagogic centre; supporting best practice and research

Support for implementation and development of undergraduate programmes and pedagogic research are organized at the Pedagogic Centre. It includes four parts: Pedagogic development and research, Learning lab, development of Webb-scenarios (Educational Development using Information Technology; EDIT), and running of inter-professional education. The vice dean for education is the chairman of the steering group.

Through independent studies and contact with international research in the field, PBL at the FHS has been reviewed and improved. The Pedagogic centre continually reviews and defines courses, consultations, and support toward developmental projects and research. Several projects have received support from the national Council for the renewal of higher education. Courses are given in cooperation with the Centre of teaching and learning at LiU (CUL), and with our partners in Jönköping and Örebro counties.

The FHS reports pedagogic research and development in international and national journals, books and at conferences. Research capacity has recently been strengthened with the addition of four professors in pedagogic from the Faculty of Arts and Sciences at LiU having been appointed to the Pedagogic centre at a combined 70% of fulltime.

The numbers of publications on education since the start in 1986 are: PhD theses 7, peer reviewed international journal articles 29, other international publications and book chapters 5, peer reviewed national journals 17, other national publications 17, books 2, and numerous conference reports.

Web-scenarios; building on reality and supporting the PBL structure

EDIT is a tool to produce and present Web-scenarios for PBL. They were introduced in T5 in 2001, and since then, they have been implemented in all terms, usually two per week and in fixed order. The medical programme has access to 10-12 group rooms equipped with computer, projector and white board.

A total of 172 scenarios are presently used. They are chosen to reflect common symptoms, health problems and concepts related to basic science. Most scenarios represent patient cases, but some examine social and population problems. Patient cases vary according to age, sex and background. Scenarios contain hypertext, diagnostic material, pictures, video films, etc. Multimedia materials are used to enhance realism, stimulate the senses and evoke feelings.

Triggers should function to advance questions, not provide answers; an example is shown in Figure 5. The



Tutorial group working with a Web-based scenario.

Despite problems in some clinical specialties, FHS students are few at each rotation in comparison with other medical schools in Sweden.

Basic learning activities

The tutorial group; students' learning and responsibility in focus

The base-group (7-8 students and a tutor) is the nave of student learning. Their understanding of various concepts is questioned and tested relative to real-life situations. Focus is to stimulate learning independence and reflection regarding self- as well as group-learning processes.

During Phases I and II, groups meet with their tutors for two hours, twice weekly. With their starting-points derived from web-based scenarios, the groups inventory their existing knowledge, formulate questions surrounding case issues and attempt to identify their learning needs according to a modified seven step model. The students individually decide which literature to use; textbooks, reviews or original papers and other resources. After independent studies and associated lecture sessions, the students re-group and, applying newly gained information, critically evaluate and discuss the case.

During Phase III, web-based scenarios during theory-

weeks provide focus on selected theoretical mechanisms in relevant patient-cases (three scenarios/two weeks); supervision is rotated between the students. In this way theoretical, basic knowledge, essential for understanding clinical concepts, is emphasized. During clinical clerkships, students establish new "clinical base-groups" and meet once a week dependent on their placement regarding clinic/location.

Much effort has been placed on improving work in small group tutorials by circumventing stereotypical ways of using problem solving processes and encouraging discussions about learning. Tutors are expected to be active. They should challenge student critical awareness and facilitate advancement in developing processes integral to problem solving and independent learning.

Working in base-groups has many positive spin off effects on students' personal development. It strengthens the ability to cooperate, increases confidence for argumentation for one's interpretation of data, enhances listening skills, increases the understanding for a humble attitude that the truth is not always absolute, and provides insight towards group dynamics. It always includes evaluation and feed-back on the fulfilment of tasks by oneself and others.

Lectures and recourse sessions; selecting difficult areas, not covering contents

Since students have different learning styles, a buffet-like, Swedish “smorgasbord” of different learning activities should be available to complement their studies in base groups. Lectures and other learning resources are planned according to the sequence of scenarios, which constitute the framework for the terms.

In relation to a scenario, lectures etc. are carried out influencing the work in base-groups, which places demands on the organizers; importance being placed on time-effective planning. Lectures should provide an overview of an area/theme, facilitate work in topics that are difficult to comprehend or requiring fast-paced learning, or reflect question-based resource sessions.

During Phase III, the number of lectures has dropped when compared with the older curriculum, with greater responsibility being placed on student independence in reviewing common illnesses; intended to reflect progress regarding degree of difficulty and maturity in preparation for life-long learning.

Students also re-work and cultivate informational content through a variation of practical work forms such as laboratories based on foundational or patient-oriented work, demonstrations and autopsies.

Analysis: Learning in base-groups is central in PBL, but current research indicates that the idea of learning should be as well applied in all sorts of learning activities. The unifying idea is to provide opportunities for the learners’ inquiring approach and responsibility. To “think learning” implies taking into account that learning is an active process and always starts from learners’ pre-understanding.

Critical appraisal

The Scientific theme; training tools for life long learning

There are many similarities between PBL and research. A theme of research methods and scientific attitude runs throughout the curriculum. Techniques for searching bibliographic and other databases are introduced in the first term and students are expected to search and read original scientific literature.

Students are also trained in the ability to critically read and appraise scientific publications in seminars and by Web-scenarios in base-group sessions. Scientifically qualified/advanced teachers and tutors make it possible to discuss research problems in tutorials and recourse sessions.

Quantitative medical research topics involving statistical and epidemiological tools are covered, as well as basic concepts from qualitative research. At the Phase I exam, the means for gathering information is in focus and at the end of the programme, there is an examination testing in analysing a scientific paper.

Written and oral reports have increased in the new curriculum, individually as well as in groups, i.e. accounts of seminar tasks, laboratory work and autopsies. Evidence-based medicine (EBM) is an important concept, which is actively implemented during Phase III. During two, four-week clerkships in terms 7-11, a field study is performed and presented in writing and at a seminar. At least one field study per term is related to EBM; many of which originate from questions raised by students during patient contact.

The student research project; a first hand experience of scientific work

The most extensive part of the scientific theme is the scientific project which comprises, at present, 15-30 credit points in T6. The students have the option to take part in an elective course (30 European credit points) related to the Master programme in medical bioscience. The aim is to give students first-hand experience in the scientific process by carrying out projects that constitute real research.

Most projects involve medical research, clinical as well as pre-clinical studies, but research projects in other disciplines, relevant to medicine, are also accepted. Tutors are required to have a doctoral degree. The examination includes a written report, in a form suitable for submission to a scientific journal, and an oral presentation and defence, with fellow students acting as opponents. A number of projects result in publications.

Analysis: The placement of the scientific project as early as T6 provides increased possibilities to recruit research students. For students admitted autumn 2007, the scientific project will be 30 credit points according to the Bologna process.

Professional attitudes

Ethics, humanism and leadership

Ethics and a holistic patient approach are in focus during the introductory course Health, Ethics and Learning (HEL-I), described below. Medical students gain a patient perspective by following patients through the emergency ward process and also by making patient home-visits, and later in follow-up calls together with general practitioners (GP).

T2 also provides opportunities for an evening meeting allowing students to express their thoughts regarding the medical profession in discussions with GPs. A humanistic strand is undertaken during T1-4. During T1-2, students read fine-literature and later hold discussion groups with supervisors; during T3-4, ethical problems are discussed in a similar manner. Open ethical seminars (Etiskt forum) on special issues, with invited guests, are given several times per term.

In T9, students partake in an outing “internat” that concerns professional roles and leadership. The problems related to professional roles are also treated in

web-scenarios and during clinical clerkships including inter-professional activities. Furthermore a mentor program is given, presently only for female students, in T10-11 to support their transition to professionals.

Communication training; the key to managing patient problems

The model used is called “the Strand for interpersonal skills training”. The Strand, starting in T1 and continuing over four semesters, use couples, involving a behavioural therapist and a GP, as tutors. The same student group attends a primary care centre every second week, individually meeting patients before the GP. The student-patient communication is videotaped and then the students attend their patients’ consultation with the GP. Afterwards, the students and the two tutors analyze the student-patient interactions.



Communication skills training in “the Strand” (T10).

In the revised curriculum more theory has been introduced regarding doctor-patient relationships within a model of patient centred clinical work. The Strand continues in T9 or T10 with focus on the closing of the consultation, informing the patient and reaching common ground considering treatment; essential parts of shared decision-making. This training takes place during an intensive week, with students, in groups of five to six. The training starts with role-play using common situations from general practice, followed by training with simulated patients acting-out a designed patient role. The study-week ends with students seeing real patients in general practice.

Analysis: Using simulated patients along with real patients has added a new dimension and provides new possibilities helping to further improve our unique training for doctor-patient relationships. This training design has received positive reception, both from students and teachers being consistently rated as one of the most useful learning experiences. A common external concern has been whether it is appropriate and timely to train students in communicating with patients so early in their education. However, this design has led to highlighting the relationship of greater focus on the patient than the disease.

Clinical training

Early clinical skills training

Students are guided in skills associated with physical examination according to various themes during Phase I and II. In T5 the students are trained to perform physical examinations and in writing patient records using professional subjects. Professional patients are also used when training students to investigate gynaecological status (T4 and 11) and in performing breast examinations (T4).

Clinical clerkships; new rules launched

Our students are accustomed to being responsible for their own learning, a fact that also needs to be considered in the clinical setting. The clerkships in Phase III had previously not been changed to the same extent as other learning activities. With the new curriculum the students are at clerkships five days per week, and for longer periods, and can thereby be more effectively integrated into medical teams. Emphasis is placed on work with patients and students are provided with supervision.

There is a mutual document regarding recommendations and rules for clinical clerkships, between the FHS and the County Councils involved. These rules were launched in early 2006. The theoretical basis for the suggested changes relates to the idea that the relationship between supervisor and student is essential for learning. Students should identify their learning needs when starting a clerkship and at the end of the process discuss, with their tutors, whether and how those needs have been reached. Mutual respect, feedback and the possibility for the supervisor to challenge the student’s knowledge and to be familiar with the level she/he has reached are important.

Each clinic appoints one physician as being responsible for the students and time should be allotted to achieve this mission. Also, every student has a personal tutor during a rotation and at least one “student out-patient clinic” for every two-week period. At so called “sit ins”, the student has the primary responsibility for registering a patient’s medical history, performing physical examinations, and for providing the patient with information, prescriptions and advice, with the personal tutor acting as observer. Evaluations and formative assessments of clinical skills are performed continuously during clerkships by means of direct observation. At the end of the clerkship, the supervisor and student each fill out a questionnaire covering essential parameters.

The arrangement of workshops on “how to support learning during clinical clerkships” is a way to support the changes. They are led by students and experienced academic teachers. It is important to clearly stress all the potential advantages associated with welcoming new students and in providing sound supervision. The economical system emphasizes mutual responsibility.

Analysis: Student outpatient clinics function well at several clinics. However, to implement the principles described above, it is essential to gain broad acceptance among the faculty, as well as the health care staff and to have a long-term perspective. Despite consensus at the County Council and at the FHS level, that basic education and research be given equal priority in weight relative to health-care, these intentions are difficult to fully implement at the work-activity level. A large turnover rate relative to clinical supervision, patient load and focus on research are complicating factors.

Primary health care; focus on common health problems in the community

There are two weeks of clerkship in primary care during each of T7-10. The students attend the same primary care centre during T7-8, and then change to another in T9-10. Repetitive design allows students to bring new knowledge and competences, and use them in practice, along with training of personal competences, with a continuing tutorship.

The clerkships in primary care are part of the community orientation of the programme. It is complementary to theoretical parts in epidemiology and health promotion and prevention during the thematic group Professional Attitudes and Population Health. Study visits are arranged to provide experiences with concepts, tools and resources related to healthy communities (T9).



Inter-professional training at the Student ward.

Analysis: Students are exposed to common health problems existing in society, not only the problems found in hospitals, where care is becoming more specialized.

With an increasing amount of students this becomes an even more important task for the GPs. This has been made possible by an enthusiastic effort by GPs in the County of Östergötland, and by expanding to neighbouring counties. The already present culture and experience of one-to-one tutoring in primary care from “the Strand” has also been important in achieving the exhibited level of quality regarding student practice.

Emergencies; response to student concerns before starting internship

Our senior students requested more emergency medicine: algorithms of emergency treatment, additional practical skills, and more hands-on training before starting internship. From 2007, the last semester includes a four week training period in emergency medicine; two weeks are a rotation in anaesthesiology. Educational training is hands-on using mannequins, computer simulation programs and role-play. The training highlights the most common emergencies in each field of medicine.

Inter-professional training

Definitions

The inter-professional section element may extend to two, a few, or even all educational programmes. At the FHS, three steps of inter-professional activities comprising all programmes are defined.

HEL I

All students starting health science programmes participate in an eight-week common introductory course labelled Health-Ethics and Learning Part I (HEL I). The students work in tutorial groups together with students from other programmes with problems given in a specially produced “newspaper” on health issues. The course implies shared learning aiming to be a platform of common value to facilitate inter-professional learning in subsequent parts. The students also become accustomed to working with PBL tutorials.

An elective course in cell biology and biochemistry, taking place in parallel with HEL I, was started 2006. Planned changes are on-going, and among other things, the concept “Quality improvement” has been introduced. This means methods and tools to fill the gap between what we should do according to EBM and what we actually do in clinical practice. The plan is that this will be an inter-professional education improvement that comes back throughout all programmes with increasing realism and complexity.

Analysis: HEL I is a course that awakens many feelings and even some criticism. Many teachers and students in the medical programme feel that HEL-I takes too large



Round at the Student ward.

a proportion of T1 and extends a low study-pace. One reason might be that some students feel dismay as part of the difficult process in cooperating with students from other programmes and in acquiring knowledge in fields that are less fact-based in character.

HEL II

After about two years (T5 for medical students), students participate in the two-week course Health-Ethics and Learning Part II (HEL II) with the present theme sexology, studied in tutorial groups with at least one student from each programme. The theme sexology was chosen as it cuts across all programmes. The aim is to strengthen the students' own professional identity through interaction and reflection, to gain and increase inter-professional competence, and attain knowledge in sexology.

The training of professional and inter-professional communication is done by means of role-play in a group of eight students and a supervisor, focusing sexual topics related to the students' future professional roles. The aim is to help students to pass a threshold of shyness when discussing sexual topics. Each student solely decides the subject for her/his role-play, with a focus related to plausible situations, i.e. a clinical situation or even a general ethical discussion involving research colleagues or journalists.

Analyses: HEL II is well appreciated among students. It provides an opportunity to deepen knowledge and understanding of other professions.

Student education wards; first in the world

In 1996, the first student training-ward in Sweden, and in the world, started in Linköping. Several clinical education wards have started since, both in Sweden and abroad. In Linköping, and later in Norrköping, students at the end of their education in the nursing, occupational therapy, medicine and physiotherapy programmes form inter-professional teams with 5-8 members at orthopaedic wards and recently also at a geriatric ward. Two or three teams are in charge of a ward, in alternating turns, and supported by clinical tutors. The teams organise and carry through care, rehabilitation and treatment within the expected level of competence. The majority of the patients are elderly having complicated medical records apart from their orthopaedic-surgical problems.

The two-week placement ends with a seminar. Reflecting on actual experiences, each team selects a problem, makes a presentation and leads a discussion for 30-45 minutes. Finally, they summarise the issue with special attention to differences and similarities between professions, and make conclusions relevant for their professional practice to come.

Student/patient encounters constitute the majority of items raised. Commonly, ethical issues, such as patient integrity and paternalism, are taken into consideration. Another frequent item is communication, both spoken and written, within and between professions and teams, and with patients and their families. Different languages used in meetings between people from different backgrounds, whether ethnical, professional

or social, must be interpreted and understood by those involved. Developing an identity as a professional is a common undertone in many presentations. Discussions often deal with the experience of not being trusted by tutors in certain situations, the risk of developing unfavourable attitudes in professional life in spite of being critical to them while being a student, and the probable future capacity as a tutor/senior colleague/advisor." An example is given below:

Is it possible to protect patient integrity in a 4-bed room? Withdrawing of a urinary catheter behind a thin curtain, using a bedpan, handling delicate items emerging in a conversation are mere examples of episodes from one room.

Do we, as representatives for the health care system and our professions, act paternalistically by forcing the patients to stay in rooms together with other patients? If we don't have the power to change the situation, how should we solve everyday problems?

But some patients seem to benefit from having company, by gaining support and motivation. Maybe 4-bed rooms aren't altogether bad? What would I like as patient?

Analysis: The empowerment of the student by this type of training is obvious in the sense that his/her own experiences are accounted for and respected. Engagement and participation in the seminars is generally equally spread, and no profession dominates. Visitors typically comment that the students are good at expressing themselves and that the open attitude surrounding discussions is impressive. Other comments: "It is easy to see that you are accustomed to working together."; "Discussions like these ought to be held in every workplace"; "You are welcome to work with us."

International aspects

Student exchange; ways to broaden the perspective

The international exchange programme began in the 1990's and has developed to include numerous added countries. During the last academic year, 30 students have studied abroad via programmes; 65% via Socrates, a number via the Scandinavian Nordplus and others have travelled to Japan, India and Kenya. About 20 students per year selected to spend their free-period in clinical practice abroad ("free-movers").

The FHS has a close cooperation with mutual student and teacher exchange and research with the corresponding FHS in Eldoret, Kenya. The building up of this faculty is supported by SIDA (Swedish international development cooperation agency). Eldoret has in many ways become our African copy.

Interest for the exchanges program has diminished primarily due to a highly attractive 10-week course in global medicine held jointly with Jönköping (since autumn 2004, 21-25 students/term) where students travel, along with their supervisors, to underdeveloped countries.

The number of incoming students is about 50 per



Student exchange with Eldoret in Kenya.

year, most of them travelling via the Socrates programme. T8 is given partially in English. Global health problems are also considered under different themes. Examples of web-scenarios are malaria, HPV- and EBV-virus, hunger and poverty.

Analyses: The programmes for student exchange are well developed while teacher exchange is low. Global aspects also have a role in the regular programme.

Examinations

Aims and rules

Examinations should reflect the goals and values of quality in basic education, support learning and through their basic design, direct study strategies for effective learning. Exams are cumulative and embrace whole terms and phases; with practical tests included. Contents from earlier terms can also be incorporated. The grades are given as pass/fail. Both preclinical and clinical teachers take part in all examinations.

Alignment with programme principles and variation in form is aimed at; student legal rights and teaching work-loads as limiting factors. Examinations are based on goal-descriptions rather than classroom activities. The exemplary principle applies i.e., the share of points in one area need not be proportional to their length during the term. The contents of different themes during a term are integrated in the most suitable manner. The cumulative exams, primarily given at the end of each term or phase, are focused on ensuring educational quality according to the following principles:

- to be liable (reliable) and measure relevant knowledge (valid)
- to measure the ability to apply facts and understanding toward relevant situations
- to measure the ability to understand and explain connections between concepts and mechanisms
- to measure the capacity for self-evaluation in understanding and the ability to define needs for continued learning
- to measure the capacity to seek and evaluate new information regarding EBM

- to contain different defined, obligatory moments relative to respective course-sections
- to be resource effective

Definition of essay methods

Short Essay Questions (SEQ): Short essay questions introduced by a short text describing the problem (T1-2).

Modified Essay Questions (MEQ): Essays are based on patient cases, where gradually more information is provided. Questions are given based on the actual information on a page, on the next page previous information is repeated, some feedback given on questions from the previous page, new information given and new questions put forward, etc. The students are not allowed to go back to previous pages. Questions may concern clinical as well as problems involving basic sciences and community medicine. MEQ is used in T3-11 and as part of the Phase II exam.

Objective Structured Clinical Examination (OSCE): This is an exam built up of different stations (n= 12-15) which are pre-validated and have set performance criteria. The students start at different stations and visit different stations. The practical situations tested are usually related to patients. After short information about a problem, the student has a limited time (5-10 min) for e.g. history taking or physical examination. OSCE is part of the Phase III exam (T9).

Clinical Reasoning Exercise (CRE): Is one part of the examination of Phase III (T10). Questions (n=10-15) start with a picture of a clinical finding, which should be described and analysed in relation to relevant pathophysiological and basic science mechanisms.

Information retrieval: Phase I exam (T2) done in conjunction with the FHS library. Students are given limited problems to search for information.

Communication skills: Analysis of the student's video-recorded patient consultation. The test is part of the examination at Phase II (T4).

Evaluation of scientific articles: A written test which is one part of the examination of Phase III (T11).

Obligatory items

In the new curriculum, demands for obligatory elements during the term have been made more stringent, which contributes to variation in the form of evaluation. Completion is examined under each term. Evaluations may extend to professional attitude and team-work.

Feed back on exams

Marking schemes of suggested answers are available after exams. Review sessions of exams are held during the first week of the following term and individual test answers are available for student review. Oral or practical examinations all incorporate direct reviews where students also perform self-evaluations. Examinations are made available on each term's homepage, where rules and regulations regarding re-test and examinations

can also be found.

Analysis: The programme contains relevant and comprehensive phase and term examinations. Requirements are held at an adequate level which leads to a number of re-tests during Phase I and II; fewer students fail at Phase III.

Enhancing student learning

Real life-long learning; preparation for professional years to come

Modern health care changes rapidly and medical knowledge doubles after only a few years. Therefore, life long learning is a crucial skill for all students within the health care sector and our ultimate goal. To master life-long learning, self-evaluation skills are needed, i.e. to be able to identify own learning needs and competence to find new knowledge using modern technology. The FHS has put efforts on these competences.

Tutorial group sessions, clinical sessions and examinations often include moments of self-evaluation before the tutor/teacher gives feed-back. Therefore, students are used to almost continuous evaluate regarding her/his learning needs. Emphasis is also placed on effective literature search, and librarians from the FHS library participate as teachers to enhance these skills.

Introduction to the programme

Websites for the medical programme are regularly updated and registered students are continually provided information in various ways. During HEL I, new students are welcomed and introduced to university studies and PBL; both the faculty and student union are involved. During T1, additional information sessions are arranged involving topics such as: study-plan principles, base-group-work using web-scenarios, LiU's organization, academic studies and study techniques. Since 1998, senior students have, with faculty support, provided a mentor programme during the first study year.

The portfolio project

During 2005-06, the portfolio project, funded by the Council for the renewal of higher education, was implemented during HEL I. The main objective is to support student transition into higher education by helping students become aware of the beliefs and values they bring, and the demands they will encounter in a student-centred, problem-based, health profession education. The project aims to emphasise essential aspects of PBL.

Student approaches to learning and ideas about their future professional roles, including gender and power issues, are addressed. The students' thoughts are made visible through reflective writing and the use of portfolios, helping students monitor change and increase awareness. Students are requested to keep a "thinking journal." In the first week, students are asked to write a "letter" to them, which will be opened at the end of the

course. They answer questions like: Why have I chosen this education? What is my picture of the profession I have chosen? What experiences and knowledge do I have that may be useful in my learning? What do I think PBL will mean/bring to me?

After two weeks, students write what aspects they found most important and difficult during their first weeks, and also what they think will be most important for them in continuing the course. This exercise is entered as a contribution in their tutorial group as a web-based discussion forum. After eight weeks, students reflect about their development during the course. Their reflections in the web-based discussion forum relates to learning/PBL, their professional role, gender and aspects they carry with them into the next course.

Analysis: Much of the value of the journal and the portfolio comes with the aspect of being able to look back. Students express it for example as: “to see my development, how I thought at that time” and “looking back to become aware of myself”. In all of these aspects, teachers/tutors have an essential role during this important transition through higher education. The intention is to develop reflective tools for entire programmes.

Support to students with study problems

During T1-3, up to 1/3 of students fail their first exam opportunity and a fewer number even fail at further opportunities. The reasons are varied: limited previous knowledge or capacity, inexperience regarding the high study pace, difficulties adjusting to PBL as a working method and selecting the correct learning material from sources, although the majority of students, through time, develop adequate strategies. This process can be supported, but the students themselves must gain the experience and pass through it.

Students have rights to receive support by the term coordinator and after two failed examination attempts, are given assistance in study-techniques. The study-councillors meet students concerning interruptions due to threshold-rules. Students devise a recovery plan that is approved by the PD. Students are given the opportunity to retake certain moments of the term a second time or retake the whole term once.

There also exists a writer’s-cabin, “skrivarstuga,” providing assistance with language issues, study-techniques, reading-techniques, a course called “dare to speak” which helps students in techniques for formulating speech and writing, and courses in stress and sleep management (T2), yoga, as well as the possibility for psychotherapy and religious guidance/counselling.

For students exhibiting poor clinical skill performance, an individual approach is taken by carefully reviewing objective data followed by an educational diagnosis. An individualised learning plan is decided upon, often comprising an extra clinical rotation with an experienced supervisor, and continuous follow-ups con-

cerning student progress.

Analysis: The process for students to achieve safety in self-directed manner can be supported, but the students themselves must develop the various steps. Generally, in more recent years, student-groups seem more heterogeneous regarding their previous background and study-habits, in comparison to students in the 1990’s. Increased demand is put on the medical programme for educational change and support without lowering quality standards.

Campus environment and students’ perspectives

Consensus; a unique student union

Consensus, with 2800 members from nine programmes, is the joint organisation and union for the entire student population at the FHS. Consensus is politically unbound and is devoted to work for the students rather than being politically rhetorical. It fulfils a variety of tasks including quality assurance regarding education in the nine programmes, responsibility for student representation in the executive organs at the FHS/LiU, coordination of welcoming new students into the programmes, as well as supervising social conditions and study environments. Each study-programme has a section which pursues more focused activities and arranges diverse social functions to facilitate solidarity within the programme.

The student union house at FHS hosts a lunch restaurant and café during week-days and a pub night once a week. It is also used for parties and dinners during evenings and weekends.

The Medical Students’ Association

The Medical Students’ Association (MF) is the section for the medical students and comprises many activities. It is managed by term representatives appointed by their colleagues, which supports a broad involvement of the whole programme. Representatives from MF also contribute to govern Consensus. The board of MF works totally idealistic and has weekly meetings. More than 70 students are involved in the various parts of MF’s activities; those taking part in sports are not included in the figure.

MF is active in looking after various aspects of the medical programme from the students’ perspectives. Different boards, groups and investigations all have student representation. Contact with the programme leadership and teachers responsible for terms etc. is very good and abundant. MF also has working groups in charge of festivities and organising welcoming receptions for new students. These activities are much appreciated and have a high participation rate, which creates a base for good future solidarity and identity with the MF and the medical programme.

Other activities surround various sports like volley-



The new Campus US: an important meeting place for students.

ball and football, several times per week that are open to all section members. The international committee takes care of welcoming foreign exchange students and facilitates the process of cultural interchange and interest for FHS students to take study periods abroad.

At Campus US at the FHS/University Hospital area, everything is reachable and closely connected. Lecture halls, group rooms, library, lecture halls, group rooms, library, FHS students' house and the university hospital are situated within a minutes walk. The localities are mostly new and well kept.

Analysis: Consensus is unique compared to other student unions and programmes at medical faculties in Sweden. Students provide a creative influence both formally and informally.

Social and cultural activities

Student social functions take place at the House of Nations (Nationernas Hus) situated in the city centre, which hosts restaurant, night-club and weekly student cinema. A students' house, a former mansion in the biggest student residential area in Linköping, includes another night-club offering regular jazz concerts.

The main University Campus, Valla, offers a wide variety of activities; student organisations for a variety of interests, lectures on different cultural and political subjects organized by students, and parties for all students.

The student union house, located at the main campus, hosts a pub several afternoons per week, and is the site of a student-owned bookshop with a branch at Campus HU.

Analysis: Linköping is well known for an active and diverse student community; students actively seek to live here.

Excellent study results

Own follow up of alumni

Antepohl et al (2003) studied the fate of 446 alumni (response frequency 77%) receiving their diplomas in 1992-99 via a questionnaire on basic education relative to national goals. Two-thirds viewed their education as having well prepared them for internship, in particular with reference to skills associated with patient communication, cooperation with others in care and in critical thinking; 32% had begun or were planning to enter PhD studies. Hospital specialities dominated as the speciality of choice.

National evaluations

At the evaluation by the National Board of Higher Education of all medical programmes in Sweden, conducted for the first time 1996-97, the Linköping programme was clearly ranked at the top. Reasons were listed as the innovative and consequently implemented pedagogic model, effective use of health care for clinical clerkships, primary care and in smaller hospitals, and outstanding evaluations given by alumni post-internship. Critical comments were levelled at a weak decision making process and emphasis on health and prevention issues.

The second national evaluation was performed 2006-07 and the results were recently launched. The FHS medical programme was once more ranked at the top, this time very closely followed by the University of Lund. The programme was judged as having a very high degree of university characteristic and high professional quality, in addition to a good standing in relation to internationally leading medical schools.

The programme contents and structure were evaluated as outstanding; the decision process and economical steering, motivation and competence to deliver quality work, quality of the clinical education were viewed as very good; and prerequisites for pedagogic development and study environment as seen as good.

In the comprehensive conclusions the strong points were identified as: consequent use of modern pedagogic principles for university studies, integration of preclinical and clinical sciences, web-based scenarios, clerkships in general practice, follow up of students with study problems, a programme committee freestanding from departments and strong incentives for teacher participation in education.

It was suggested to increase student support at the

start of the programme and to make the organisation of the programme clear for the students. Furthermore, examination forms could be more varied.

Analysis: After being questioned by many authorities, it was most rewarding to get the top position in 1997. It stimulated new development. The recent evaluation, performed in the implementation phase of the new curriculum, is also rewarding. The PC is aware of processes needing improvement and this work is in progress.

Licensing test

The accumulated results (years 2000-2005) of the graduates in the national exams, when acquiring their licence to practice medicine, were favourable. Alumni from the FHS had on average 62.4 points as compared to 61.7 for other Swedish medical schools ($p < 0.05$). Corresponding numbers for unsatisfactory exams are 3.8% and 5.3% (NS, pers. comm., AT chancery, Karolinska Institute), reflecting a similar trend found prior to 1997.

Enquiries by the Swedish Medical Association

Six national enquiries regarding how junior physicians view their undergraduate education after the internship have been performed by the Swedish Medical Association yearly 2000-04 and 2006 with a response rate of 85-90%. Alumni from the FHS provided markedly higher ratings of their competence in most of the tested eight parameters related to the national goals compared to the other Swedish medical schools. This is most evident concerning general preparation for internship, communication, cooperation with other health professionals, readiness for life long learning and preventive work. Of

the eight parameters evaluated, six times (48 rankings), the FHS has received highest ranking in 41 and shared highest ranking in two. We have maintained that standing but other faculties have attained improved evaluations. Data of mean values from the six evaluations are given in Figure X, for details see: <http://www.hu.liu.se/lakarprogr/alumni>

Employment situation

According to Statistics Sweden, alumni having graduated from FHS in 2002/03 were 99% established on the labour market. The mean figure for the other five medical schools was 95%.

Analysis: The programme has introduced many new learning activities reflecting our emphasis on general aims. However, this seems to have positively influenced the core knowledge in medicine, as measured by the national tests and long term evaluations. The emphasis on general aims seems to have supported student capacity in transition to professional-life as shown in the very high scores given by alumni. The employment situation reflects the great demand for physicians in Sweden and underlines excellent employment opportunities for our alumni.

Success factors

Change and endurance; emphasis on scientific evidence and best practice

The threat of being closed down as a medical faculty in the beginning of 1980's was important in instigating change. Being a small faculty with short communication ways also made the process somewhat easier.

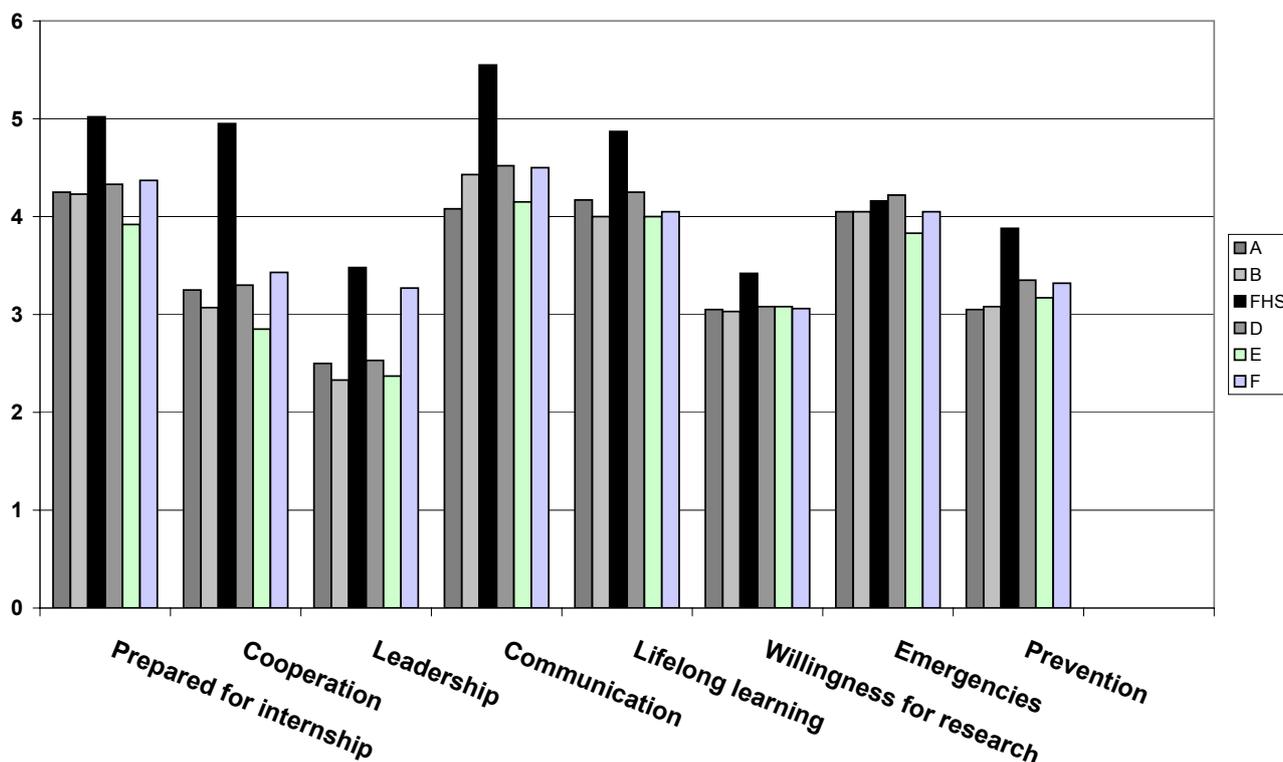


Figure 6. Summary of results from six national enquiries regarding junior physicians' view of their undergraduate education after the internship performed by the Swedish Medical Association yearly 2000-04 and 2006.

Furthermore, cooperation with the County Council of Östergötland was and still is very important; the rapid development of health care toward primary care and out-patient clinics, and the need for inter-professional team work was foreseen at an early stage.

Brave leaders and some devoted teachers, in cooperation with educationalists, dared to leave the common consensus, characteristic for Sweden, and start a new, student centred educational model. At that time, the FHS project was most controversial and aroused a lot of scepticism within the faculty, as well as from the national medical establishment. Fulfilling the complete step has been most important for reaching a positive outcome. Decision making based on scientific evidence and best practice are as important in education as in research and clinical work.

We learnt that change processes take time and a successive maturing of these processes has taken place. Endurance in anchoring the pedagogic model and staff development are important factors for success, as is the readiness for change - in staying dynamic and innovative.

The recent curriculum reform has been an effort accomplished without extra recourse. Introduction of Web-cases has strengthened PBL. Competent programme and faculty leadership are prerequisites extending valuable educational support.

Our curriculum is relevant in exposing students for common health problems; our involvement of general practice with extensive communication training and clerkships is still unique, as is our systematic efforts towards inter-professional competence.

International cooperation; as important in education as in research

Before and after the start of the FHS, inspiration for change in health care and education was given by WHO. The FHS teachers, including the leadership and students, visited many innovative medical universities worldwide and contributed in international conferences

and forums. Recently the Dean was invited as a plenary speaker at the yearly meeting of the North American Accreditation Council for Graduate Medical Education in USA in order to talk about the methods used at the FHS to prepare students for professional work.

The FHS gains insight and interest from many creative visions supporting change. Three key persons for inspiring the medical programme are from Beer Sheeva, Israel, McMaster, Canada and London, UK, respectively, and have been awarded honorary doctorates at the FHS.

In 1995 and 2000, Linköping University hosted international conferences on PBL. The annual AMEE conference and the conference of the Network of Community Oriented Institutions for Health Sciences, now called TUFH, where FHS is full member, were both held in Linköping in 1999. Over the years FHS has also hosted several smaller conferences and has as well received many visitors. In 2008 FHS will host an international conference on inter-professional education in cooperation with Karolinska Institute.

Analysis: We have learnt much from international contacts and networks, received valuable input and inspiration from visitors, and have been able to support educational change at other institutions and universities.

Stimulating students to greater achievement; own responsibility is essential

Our medical programme places high demands on its students. They are, to a large extent, responsible for their own learning and personal development. The goals given provide direction for where to go and the problems to be solved. However, there is no glass ceiling limiting what should be studied in relation to various tasks and how to find information. The information brochure given to students at the start of the FHS in 1986 stated: "Somewhat tougher but much more exciting" - this perception still holds.

