Tuning Educational Structures in Europe

Subject Area Brochure

MEDICINE

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Education and Culture

Socrates – Tempus

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The permission of Dr Anna-Lena Paulsson to include data from the survey of European medical degree nomenclature and structure as Appendix C is gratefully acknowledged

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SECTION 1. INTRODUCTION

Tuning Educational Structures in Europe is a university driven project which aims to offer a universal approach to implement the Bologna Process at the level of higher education institutions and subject areas. The Tuning approach consists of a methodology to (re-) design, develop, implement and evaluate study programmes for each of the Bologna cycles.

Furthermore, Tuning serves as a platform for developing reference points at subject area level. These are relevant for making programmes of studies comparable, compatible and transparent. Reference points are expressed in terms of learning outcomes and competences. Learning outcomes are statements of what a learner is expected to know, understand and be able to demonstrate after completion of a learning experience According to Tuning, learning outcomes are expressed in terms of the *level of competence* to be obtained by the learner. Competences represent a dynamic combination of cognitive and meta-cognitive skills, knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values. Fostering these competences is the object of all educational programmes. Competences are developed in all course units and assessed at different stages of a programme. Some competences are subject-area related (specific to a field of study), others are generic (common to any degree course). It is normally the case that competence development proceeds in an integrated and cyclical manner throughout a programme. To make levels of learning comparable the subject area groups/Thematic Networks have developed cycle (level) descriptors which are also expressed in terms of competences.

According to Tuning, the introduction of a three cycle system implies a change from a staff centred approach to a student oriented approach. It is the student that has to be prepared as well as possible for his or her future role in society. Therefore, Tuning has organized a Europe-wide consultation process including employers, graduates and academic staff / faculty to identify the most important competences that should be formed or developed in a degree programme. The outcome of this consultation process is reflected in the set of reference points – generic and subject specific competences – identified by each subject area.

Besides addressing the implementation of a three cycle system, Tuning has given attention to the Europe-wide use of the student workload based European Credit Transfer and Accumulation System (ECTS). According to Tuning ECTS is not only a system for facilitating the mobility of students across Europe through credit accumulation and transfer; ECTS can also facilitate programme design and development, particularly with respect to coordinating and rationalising the demands made on students by concurrent course units. In other words, ECTS permits us to plan how best to use students' time to achieve the aims of the educational process, rather than considering teachers' time as a constraint and students' time as basically limitless. According to the Tuning approach credits can only be awarded when the learning outcomes have been met.

The use of the learning outcomes and competences approach might also imply changes regarding the teaching, learning and assessment methods which are used in a programme. Tuning has identified approaches and best practices to form specific generic and subject specific competences.

Finally, Tuning has drawn attention to the role of quality in the process of (re-)designing, developing and implementing study programmes. It has developed an approach for quality enhancement which involves all elements of the learning chain. It has also developed a number of tools and has identified examples of good practice which can help institutions to boost the quality of their study programmes.

Launched in 2000 and strongly supported, financially and morally, by the European Commission, the Tuning Project now includes the vast majority of the Bologna signatory countries.

The work of Tuning is fully recognized by all the countries and major players involved in the Bologna Process. At the Berlin Bologna follow-up conference which took place in September 2003, degree programmes were identified as having a central role in the process. The conceptual framework on which the Berlin Communiqué is based is completely coherent with the Tuning approach. This is made evident by the language used, where the Ministers indicate that degrees should be described in terms of workload, level, learning outcomes, competences and profile.

As a sequel to the Berlin conference, the Bologna follow-up group has taken the initiative of developing an overarching *Framework for Qualifications of the European Higher Education Area* (EQF for HE) which, in concept and language, is in full agreement with the Tuning approach. This framework has been adopted at the Bergen Bologna follow-up conference of May 2005. The EQF for Higher Education has made use of the outcomes both of the Joint Quality Initiative (JQI) and of Tuning. The JQI, an informal group of higher education experts, produced a set of criteria to distinguish between the different cycles in a broad and general manner. These criteria are commonly known as the "*Dublin descriptors*". From the beginning, the JQI and the Tuning Project have been considered complementary. The JQI focuses on the comparability of cycles in general terms, whereas Tuning seeks to describe cycle degree programmes at the level of subject areas. An important aim of all three initiatives (EQF, JQI and Tuning) is to make European higher education more transparent. In this respect, the EQF is a major step forward because it gives guidance for the construction of national qualification frameworks based on learning outcomes and competences as well as on credits. We may also observe that there is a parallel between the EQF and Tuning with regard to the importance of initiating and maintaining a dialogue between higher education and society and the value of consultation -- in the case of the EQF with respect to higher education in general; in that of Tuning with respect to degree profiles.

In the summer of 2006 the European Commission launched a European Qualification Framework for Life Long Learning. Its objective is to encompass all types of learning in one overall framework. Although the concepts on which the EQF for Higher Education and the EQF for LLL are based differ, both are fully coherent with the Tuning approach. Like the other two, the LLL variant is based on the development of level of competences. From the Tuning perspective both initiatives have their value and their roles to play in the further development of a consistent European Education Area.

This brochure reflects the outcomes of the work done by the Tuning (Medicine) Task Force of the MEDINE Thematic Network so far. The outcomes are presented in a template that was developed to facilitate readability and rapid comparison across the subject areas. The summary aims to provide, in a very succinct manner, the basic elements for a quick introduction into the subject area. It shows in synthesis the consensus reached by a subject area group after intense and lively discussions in the group. The more ample documents on which the template is based are also included in the brochure. They give a more detailed overview of the elaborations of the Tuning (Medicine) Task Force.

By: The Tuning Management Committee

SECTION 2. TUNING TEMPLATE (with introduction to the subject area)

The Tuning template consists of an introduction to the subject area of Medicine; some detail of degree profiles, credits and quality enhancement; and a brief executive summary of the main findings in later sections of this report.

INTRODUCTION TO THE SUBJECT AREA

Medicine relates to the understanding of human beings in health and illness and the development of appropriate diagnostic and therapeutic skills. It aims to prepare graduates principally for clinical medical practice, but also in some cases for careers in research, education and policy / management. Unlike other subject areas, primary medical programmes are generally self-contained, with courses and topics integrated both vertically (competences are revisited at various points during the programme and gradually developed over time) and horizontally (related content taught simultaneously with clear linkage between subject disciplines). Relevant topics are typically covered in a broad and comprehensive manner. Outcome-based education has been widely adopted in most Universities, with the alignment of teaching, learning and assessment to learning outcomes (Biggs 1999). Because of the close association between medical graduation and the right to practise clinically as a doctor, regulatory and/or Government bodies may develop policy on required outcomes for undergraduate medical curricula (e.g. UK General Medical Council 2003) and may also in some cases influence approaches to teaching, learning and assessment. Thus in addition to gains in knowledge and skill, students are expected to develop appropriate attitudes and professionalism, and may have their 'Fitness to practise' closely scrutinized if they seem to be failing in these areas.

The MEDINE Thematic Network for Medical Education in Europe, 2004-2007 has conducted a systematic survey of degree qualifications in medicine in Europe, under the leadership of Dr Anna-Lena Paulsson, Karolinska Institute, Sweden. The full results of this survey are not yet available for dissemination, but a tabulated executive summary is included in this Brochure as Appendix C. This illustrates the wide variations in nomenclature, duration, and structure of medical degree programmes in Europe at the present time, and the variable extent to which the Bachelor / Master degree structure specified in the Bologna Declaration has been implemented in medicine. Full details of the outcomes of this study will be included in the Final Report of the MEDINE Thematic Network in October 2007.

As described below, Bologna second cycle in medicine maps to graduation with a primary medical degree which typically qualifies individuals to practise as a medical doctor. Bologna first cycle in medicine does not exist in most EU countries, although in some areas this has been taken to represent an intermediate point during the primary medical degree. Bologna third cycle maps onto PhD or MD qualifications in medicine, based on research and a thesis, although it is relatively unusual for medical graduates to study for these degrees. Almost all graduates will undertake considerable further study and assessment in their chosen medical speciality, however this is typically in the context of professional education rather than Higher Education, which is not considered by the Bologna Process and so is not considered to be "third cycle".

The application of certain of the Bologna principles to medical education in Europe has become a controversial topic, with polarised views. For example, the World Federation of Medical Education and the Association for Medical Education in Europe have published a position statement opposing the application of the Ba/Ma

model to primary medical degrees (Christensen 2004, World Federation for Medical Education 2005). However, as shown in Appendix C, some countries have already implemented a 3-cycle model for medicine. Three main arguments have been used to oppose the application of the Bologna principles to medical degrees. Firstly, it is argued that medical education is adequately served by institutional and national standards and regulation. However, there is a long standing requirement under European law for mutual recognition of medical degree qualifications, and a requirement to consider all European medical graduates on an equal basis for medical appointments in any country (EU 1981, EU 1989). Assessing the relative merits and ranking of such applicants fairly in the current context of "un-harmonised" medical degrees is challenging.

Secondly, it is argued that the three-cycle model creates a large number of graduates with Bachelors degrees in Medicine, whose employment prospects and place in health care delivery systems is unclear. However, if it is assumed that the Bachelors degree in Medicine is the necessary prerequisite to a Masters degree in Medicine, at which level graduates are licensed to practise medicine, it is difficult to see why graduates would not progress to a Masters level qualification. For the few students who wish to terminate their medical studies after 3 years, such an exit route can be a useful lead into a number of health care related employment areas. Clearly, the ratio of places on medical Bachelors and Masters degree programmes is relevant, and requires responsible action and use of appropriate admission policies by universities and medical schools.

Thirdly, it is argued that the award of a Bachelors degree after three years of medical study would be inevitably disintegrative, and would undo the progress towards integrated teaching, learning and assessment that has happened in most European medical schools over the last fifteen years. Aspects of curriculum design like early clinical contact and experience, learning the clinical relevance of science teaching at the point of delivery, early acquisition of basic clinical skills, and a curriculum-level focus on personal and professional development are all said to be at risk. However, if appropriately designed learning outcomes for the Bachelors and Masters degree qualifications can be agreed across Europe, this would in fact encourage even greater integration to support the attainment of specifically medical outcomes/competences at each stage.

As a result of these uncertainties, it was decided to focus the first round of work of the Tuning (medicine) Task Force of the MEDINE Thematic Network for Medical Education in Europe, beginning in 2004, on defining learning outcomes/competences for primary medical degree qualifications in Europe. This equates to the point at which licensure to practise medicine and treat patients is normally gained, although this is usually awarded by a body other than the institution conferring the degree. The further exploration and resolution of these issues is a key aspect of the future work of the MEDINE Thematic Network.

DEGREE PROFILES AND OCCUPATIONS

Table 2.1 describes the typical degrees offered in the subject area. Details of the degrees offered differ by country (detailed in Appendix 3). Table 2.2 offers an overview of the typical occupations of graduates from each cycle.

Table 2.1. Typical degrees offered in the subject area

Cycle	Typical degrees offered
[First]	This degree still does not exist in most European countries and does not qualify the graduate to work as a medical practitioner. Where such qualification is offered it is Bachelor of Medicine or Medical Sciences (few insitutions in the UK, Belgium, Switzerland) or 'Master of Science' (The Netherlands). In some countries it is awarded to students deciding to leave a Second Cycle programme before completion of their studies.
Second	Generally this is the primary medical degree which enables graduates to work as medical practitioners and undergo further specialist training in their chosen medical field. The actual qualification received varies by country and includes 'Bachelor of Medicine and Bachelor of Surgery' (UK), 'Master of Medicine' (Belgium, Switzerland) and 'Medical Doctor' (The Netherlands, Italy, Czech Republic).
Higher Professional Training	Medical graduates will usually undergo considerable further post-graduate training to become a specialist in their chosen field, but this typically does not involve a doctoral thesis in a University context, and so is not 'Third Cycle'. In some European countries a form of thesis is required to practise medicine, such as the French 'State Doctorate in Medicine', but this is not equivalent to a PhD thesis and may be more akin to specialist postgraduate training and accreditation in other countries (e.g. MRCP in the UK).
Third	In all European countries doctors wishing to pursue an academic career will be required to engage in doctoral studies towards a PhD. A Doctorate in Medicine (MD) may also be offered as a Third Cycle in some countries, similar to a PhD but often more clinically applied. Third Cycle Doctorate in Medicine should not be confused with Second Cycle MD degrees which have the same name.

Table 2.2. Typical occupations of graduates in subject area (map of professions)

Cycle	Typical occupations of graduates
[First]	Usually still engaged in training for the Second Cycle qualification and the right to practise clinical medicine. First cycle graduates are still very uncommon and so little is known about their occupations.
Second	The Second Cycle medical degree can be considered as basic training for medical doctors. Most graduates therefore will work in clinical practice, starting at junior level then gaining experience and working towards further qualifications in their chosen medical speciality. A few will take non-clinical employment in areas related to medicine or will seek qualifications in other subject areas.
Higher Professional Training	Those who successfully complete higher professional training in their chosen field (e.g. achieving Membership of the Royal College of Physicians, General Practitioners, Surgeons etc in the UK) can seek employment or practice medicine independently at Consultant or General Practitioner level.
Third	The Third Cycle Most graduates will seek clinical academic employment, typically incorporating the triad of clinical practise, research and teaching. A few will choose to focus on only one or two of these areas – for example engaging in full-time clinical practice or research.

ROLE OF SUBJECT AREA IN OTHER DEGREE PROGRAMMES

With the exception of multidisciplinary healthcare education projects in some institutions, medicine does not generally have a role in other degree programmes, because of the separate selection and admission procedures and the distinct evaluation and accreditation processes that apply to medical degree programmes. There is an increasing tendency for medical students to be encouraged to study subjects outside medicine as part of their degree, although because of the large body of medical knowledge required for graduation, these choices are often limited by pressures on curriculum time.

LEARNING OUTCOMES & COMPETENCES (brief summary of survey results)

The Tuning (Medicine) survey consisted of a framework of generic and subject-specific competences which was developed by the Tuning taskforce of the MEDINE Thematic Network. Each was rated on a 4-point Likert scale (1=not important; 2=quite important; 3=very important; 4=essential) by 1302 survey participants. Results were averaged for all respondents and different sub-groups, and competences were arranged in rank order of importance.

Table 2.3 lists the Generic competences in rank order of importance with their average rating from all survey respondents. Many of these would be considered in

existing medical degree programmes under the heading 'Personal and Professional Development', and have only been considered separately from Subject Specific Competences in this research so that comparisons can be drawn between the rankings of Generic Competences across subject areas. Further detail about the development of the Generic Competences, the consultation process and detailed analysis of results are presented in Section 3 of this report. When the findings of Tuning (Medicine) are presented to curriculum developers both Generic and Specific Competences will be combined into a single Competency Framework.

It should also be noted that whilst these competences may be considered 'core' and essential for European primary medical degrees, there may be additional competences which graduates require to work in particular situations or countries. The complete list of Generic and Subject-Specific competences may therefore be considered to be necessary but not sufficient for primary medical qualification in Europe.

Table 2.3. Generic competences in rank order of importance with average ratings of all survey respondents
(1=not important; 2=quite important; 3=very important; 4=essential)

Generic Competency	Rating
ability to recognise limits and ask for help	3.64
probity (honesty, maintaining good practice)	3.59
capacity for applying knowledge in practice	3.59
ability to make decisions	3.57
capacity to learn (including lifelong self-directed learning)	3.57
ability to solve problems	3.48
critical and self-critical abilities	3.43
interpersonal skills	3.37
concern for quality	3.34
ethical commitment	3.29
ability to work in a multidisciplinary team	3.23
capacity to adapt to new situations	3.20
empathy	3.17
capacity for analysis and synthesis	3.16
ability to communicate with experts in other fields	3.08
ability to work autonomously	3.03
capacity for organisation and planning (including time management)	2.93
appreciation of diversity and multiculturality	2.68
will to succeed	2.63
ability to teach others	2.50
understanding of cultures and customs of other countries	2.42
basic general knowledge outside medicine	2.42
initiative and entrepreneurial spirit	2.40

ability to lead others	2.38
knowledge of a second language	2.37
research skills	2.24
creativity	2.23
ability to design and manage projects	2.17
ability to work in an international context	2.15

Table 2.4 lists the Level-1 Subject Specific competences for Medicine in rank order of importance with their average rating from all survey respondents. Further detail of the consultation process and detailed analysis of results are presented in Section 4 of this report, and further detail on the development of the Subject Specific competences can be found in Section 5.

Table 2.4. Level 1 Subject Specific competences in rank order of importance with average ratings of all survey respondents (1=not important; 2=quite important; 3=very important; 4=essential)

Level-1 Subject Specific Competency	Rating
Abililty to carry out a consultation with a patient (history, examination ...)	3.77
Ability to provide immediate care of medical emergencies, including First Aid and resuscitation	3.66
Ability to assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan	3.50
Ability to carry out practical procedures (e.g. venepuncture)	3.36
Ability to communicate effectively in a medical context	3.31
Ability to prescribe drugs	3.26
Ability to apply ethical and legal principles in medical practice	3.26
Ability to assess psychological and social aspects of a patient's illness	3.17
Ability to apply the principles, skills and knowledge of evidence-based medicine	3.02
Ability to use information and information techology effectively in a medical context	2.93
Ability to apply scientific principles, method and knowledge to medical practice and research	2.89
Ability to work effectively in a health care system and engage with population health issues	2.83

WORKLOAD AND ECTS

Cycle	ECTS Credits
[First]	[180-240]
Second (required to practise medicine)	300-360 in total
Third	Doctoral studies of around 3 years

Primary medical qualifications across Europe typically award a Second Cycle degree after 300-360 credits. Some institutions offer 'graduate-entry' Second Cycle programmes to those who have succesfully completed First Cycle in a different subject area, typically consisting of 240 credits. Generally medical graduates continue to undergo further training and gain further qualifications at Second Cycle level (i.e. professional qualifications which do not involve a doctoral thesis), although some go on to do doctoral studies. The ECTS Medicine Task Force of MEDINE has carried out a systematic analysis of current practice in European medical education and will be reporting as part of the final MEDINE report to the Commission in October 2007.

TEACHING, LEARNING & ASSESSMENT

Teaching, learning and assessment in almost all areas of medical education are constructively aligned with Learning Outcomes (Biggs 1999). Three examples of best practice in teaching, learning and assessment in Medicine are given below. Further information on this area is presented in Section 6 of this report.

Best practice in teaching – Clinical skills

The teaching of skills is not unique to Medicine, however clinical skills in medicine are different to skills in most other disciplines in that they may be invasive or painful (such as taking blood or urinary catheterisation), potentially embarrassing for patients and students alike (such as rectal or vaginal examination) and may only be required infrequently (such as first aid and resuscitation). Medical teachers have a duty to ensure students become competent in all these skills, and they also have a duty to ensure that members of the public receive consistently high quality care. Consequently many skills are taught and assessed initially using simulation. Many types of simulation exist, ranging from low-tech sponges and oranges into which students can practise administering injections; through small 'part-task mannequins' which closely resemble certain parts of the body and can be used to teach and learn blood-taking, intravenous cannulation, urinary catheterisation, or rectal examination; to interactive simulators which mimic a real patient complete with heart sounds, pulse, speech and simulated medical emergencies such as cardiac arrest. Simulated patients and actors are frequently recruited to help teach communication skills, and may act and react as patients would in a simulated environment (Snadden & Ker 2005). The idea is that students can gradually become competent in clinical skills in a simulated environment before practising and developing their skills further under appropriate supervision with real patients in a clinical environment.

Best practice in learning – Problem-based learning (PBL)

Problem-based learning has become very popular in medical undergraduate curricula (Sefton 2006). Some medical schools have become entirely 'problem-based', defining their programme in terms of a series of 'problems' or 'cases' (Norman &

Schmidt 2000), although most use PBL in combination with more traditional forms of teaching and learning. Typically students work in groups and are given a realistic problem (e.g. a short history of a patient with clinical symptoms); they then discuss the problem and generate a series of answerable questions which will help them solve the problem; they then go to the literature and other sources to answer their own questions; and then they come back together with the answers to their questions to discuss the problem again and may then repeat the cycle. Problem-based learning seems to help students develop competences in problem-solving, self-directed learning and teamwork which are very appropriate for Medicine. It also encourages many students to personally engage in the material and to make connections between different subjects that they have been learning.

Best practice in assessment – Objective Structured Clinical Examination

First developed in Dundee under the leadership of Professor Ronald Harden, the Objective Structured Clinical Examination (OSCE) has been widely adopted as one of the assessment methods of choice for clinical skills. OSCEs generally consist of a number of timed stations through which students rotate performing clinical tasks and being assessed by means of a standardised mark schedule. Typical stations include history-taking (interviewing) or explanation and advice with a 'simulated patient' who acts out a script; physical examination of an area of a patient such as their abdomen or heart; and practical procedures such as urinalysis, giving injections and intravenous cannulation (inserting a 'drip') which are usually performed on a simulator mannequin. In addition to awarding marks for different components of each task, mark schedules also often include marks for overall fluency, patient-centeredness (such as asking about their ideas, concerns and expectations) and professionalism.

QUALITY ENHANCEMENT

A systematic survey of quality enhancement and quality assurance procedures in medical education in Europe has been conducted by the Quality Assurance Task Force of the MEDINE Thematic Network, 2004-7, under the leadership of Professor Maria Rosa Fenoll-Brunet. The results of this study are not yet available for dissemination, but were presented at the Annual General Meeting of the MEDINE Thematic Network, Oslo, May 2007. In summary, they indicate wide variation in practice across Europe. Many countries have well established national systems of external quality assurance and accreditation of medical degree courses, delivered either by governmental agencies or by professional regulatory bodies. One example is the Quality Assurance of Basic Medical Education (QABME) process run by the UK General Medical Council. However, about 30% of European member states have no such systematised arrangements, and rely instead on internal institutional evaluation and quality assurance procedures and self-reporting by medical schools. Full details of the outcomes of this study will be included in the Final Report of the MEDINE Thematic Network in October 2007.

In the light of this information, the Quality Assurance Task Force of the MEDINE Thematic Network, 2004-7, led by Professor Hans Karle, has produced a set of European specifications of the World Federation of Medical Education Global Standards. The WFME Global Standards are increasingly accepted as a useful tool in the external evaluation of medical education programmes, and have been specified for undergraduate education, postgraduate training, and Continued Professional Development (CPD). The MEDINE European specifications take account of particular factors operative in Europe. For example, many of the *quality*

development (aspirational) global standards are adopted as *basic* (essential) standards for Europe. The European Specifications document has been published in May 2007 and is available from the MEDINE central office.

As a result of collaboration between the Quality Assurance and Tuning Task Forces, under the heading of curriculum content and outcomes, the European specification document refers specifically to the Tuning (Medicine) learning outcomes framework. It is envisaged that future work of the Network will include the promotion, together, of the European Standards document (which is oriented towards educational process), and the Tuning learning outcomes framework (which is oriented towards educational outcome). They will be included in the Final Report of the MEDINE Thematic Network in October 2007. They will be disseminated and promoted jointly as tools to aid curriculum development, quality enhancement, and quality assurance for medical schools in Europe.

SECTION 3. TUNING GENERIC COMPETENCES

INTRODUCTION & BACKGROUND TO THE GENERIC COMPETENCES

The Tuning Project focuses on competences as common points of reference between different subject areas in European higher education, offering a non-prescriptive framework for the academic community (in this case the European Academic Community) and promoting the development of easily readable and comparable degrees. The Tuning taskforce of the MEDINE Thematic Network developed and administered a questionnaire to the European medical education community to gain consensus on the most important competences for medical graduates in Europe. The first part of the questionnaire consisted of an adaptation of the 30 generic Tuning competences reported in 'Tuning educational structures in Europe II: Universities contribution to the Bologna process' (Gonzales & Wagenaar 2005). The second part of the questionnaire consisted of first- and second-level academic subject specific competences, and the third part asked respondents to rate the importance of a range of knowledge outcomes and experiential learning contexts.

This section of the report deals with questionnaire methodology and the results of the first part of the questionnaire on generic Tuning competences. Section 4 reports the rating of the subject-specific competences, knowledge outcomes and desirable learning opportunities. Section 5 details the origins and development of the subject-specific outcomes by the Tuning taskforce.

CONTENT OF THE GENERIC QUESTIONNAIRE

Tuning aims to identify shared attributes which could be general to any degree, and which are considered important by different social groups (particularly former graduates and employers). Certain competences such as 'capacity to learn', 'capacity for analysis and synthesis' are considered common to all degrees. The multinational MEDINE Tuning Task Force carefully considered the 30 Tuning generic competences in relation to the field of undergraduate medical education. After considerable reflection and debate the group chose to use 17 of the Tuning generic competences without modification (labeled 'imp_' below with the 'importance item' unique identifier from previous Tuning literature); 8 Tuning generic competences with slight modification (labelled 'imp_m' to denote the source competence with modification); and developed 4 new 'generic' competences (labeled 'med_') which the group felt were particularly important in medicine but would also be common to almost all other disciplines, unlike the medicine subject-specific competences. The first section of the final questionnaire comprised ratings of the following 29 generic competences:

imp1	capacity for analysis and synthesis
imp2	capacity for applying knowledge in practice
imp3	capacity for organisation and planning
imp4m	basic general knowledge outside medicine
imp7	knowledge of a second language
imp9	research skills
imp10m	capacity to learn (including lifelong self-directed learning)
imp12	critical and self-critical abilities
imp13	capacity to adapt to new situations
imp14m	creativity
imp15m	ability to solve problems

imp16m	ability to make decisions
imp17	appreciation of diversity and multiculturality
imp18	interpersonal skills
imp19m	ability to lead others
imp20m	ability to work in a multidisciplinary team
imp21	ability to communicate with experts in other fields
imp23	ability to work in an international context
imp24	understanding of cultures and customs of other countries
imp25	ability to work autonomously
imp26m	ability to design and manage projects
imp27	initiative and entrepreneurial spirit
imp28	ethical commitment
imp29	concern for quality
imp30	will to succeed
med1	empathy
med2	ability to teach others
med3	ability to recognise limits and ask for help
med4	probity (honesty, maintaining good practice)

QUESTIONNAIRE PROCEDURE & METHODOLOGY

Following a successful pilot, a questionnaire was developed in three languages (English, German and French) using the "SurveyMonkey" online system. An informative e-mail was composed containing a hyperlink to the questionnaire and requesting subjects to participate. One or more academics in almost all participant countries was nominated responsible for identifying appropriate medical academics, graduates (who had gained a primary medical degree in the previous 5 years), employers (generally health services managers), students and professional bodies within their own countries to whom they would send the e-mail request to participate containing the hyperlink to the online questionnaire. Several international networks such as the Association for Medical Education in Europe, the World Federation of Medical Education and members of other Task Forces in the MEDINE Thematic Network also distributed the participation request to appropriate respondents. All respondents saw the same e-mail, participant instructions and questionnaire (although in some cases translated).

Participants were asked to rate each of the generic Tuning competences using a Likert scale of 1 ('not important'), 2 ('quite important'), 3 ('very important') or 4 ('essential'). They were also given an opportunity to write a free-text response on whether they felt there were other generic (non subject-specific) competences which graduates should have which had not been included in the questionnaire.

52 individuals from 21 countries were nominated as 'Primary Contacts' responsible for identifying and inviting appropriate individuals to complete the survey. Because the questionnaire was accessed online by participants, and considered to be potentially sensitive (as reinforced by a number of free-text responses stressing the importance of anonymity), respondents were not absolutely required to submit personal information such as contact details, their academic role or affiliated institution, although most chose to do so when asked. Whilst the absence of this information in some ways makes analysis and quality assurance more difficult, it was felt necessary in order to respect the privacy and explicit wishes of some participants. IP addresses were automatically recorded in the SurveyMonkey system, providing a safeguard against submission of multiple responses. In keeping with previous Tuning questionnaires, participants were grouped according to category of respondent, namely Medical Graduate, Employer and Academic. We have also looked at responses from current Medical Students as there were a large number of these, however other groups (professional bodies, patients and

not-specified) were not analysed separately. Average ratings and rankings of the generic competences were created and compared for each of the principal groups individually and collectively. Further more detailed analysis of patterns and distributions of responses, country effects, and between-group comparisons are ongoing at the time of this report.

For each learning outcome the average importance rating for different groups of participants and for all respondents together were calculated. Average importance ratings were ranked in-order of importance and then rankings were compared between groups. Free text responses were analysed using the NVivo7 qualitative data analysis programme.

QUESTIONNAIRE RESULTS

1302 respondents completed the online survey between April and October 2006. 830 of these completed it in English, with 453 and 19 completing it in German and French respectively.

Demographic results

Demographic data on respondents is presented in tables 3.1-3.3 below.

Table 3.1. Respondent nationality

Austria	32
Belgium	24
Bulgaria	1
Croatia	3
Cyprus	0
Czech Republic	1
Denmark	23
Estonia	0
Finland	10
France	10
Germany	353
Greece	3
Hungary	22
Iceland	1
Ireland	9
Italy	5
Latvia	2
Lithuania	10
Luxembourg	0

Macedonia (Former Yugoslav Republic of)	0
Malta	20
Netherlands	17
Norway	2
Poland	22
Portugal	62
Romania	3
Serbia	1
Slovakia	84
Slovenia	19
Spain	68
Sweden	34
Switzerland	9
Turkey	33
UK	164
Ukraine	1
Non-European	7
Nationality un-specified	169

Table 3.2. Category of respondent

Category of Respondent	Totals
Academic	464
Medical Graduate	169
Graduate Employer	19
Current Medical Student	359
Other (e.g. other health professional, PG student, patient)	43
Category un-specified	248

Table 3.3. Employing or affiliated institution of respondent

Type of Institution	Totals
University with Medical School	919
University without Medical School	13
Medical Employing Institution (e.g. Health Service)	107
Professional Association	20
Other Association (e.g. Charity)	8
Other (e.g. Other clinical institution, PG education, pharmaceutical company)	54
Affiliated institution un-specified	181

Individuals in a very wide range of countries responded to the questionnaire, including representatives of all EU member states except Cyprus, Estonia and Luxemburg responded to the questionnaire.

Graduate and Employer Subgroup Results

Average responses in rank order comparing Graduates with Employers are presented below (Table 3.4).

Table 3.4. Importance items ranking - Employers vs. Graduates

Graduates	Employers
med4 probity (honesty, maintaining good practice)	med4 probity (honesty, maintaining good practice)
med3 ability to recognise limits and ask for help	med3 ability to recognise limits and ask for help
imp10m capacity to learn (including lifelong self-directed learning)	imp16m ability to make decisions
imp15m ability to solve problems	imp28 ethical commitment
imp16m ability to make decisions	imp12 critical and self-critical abilities
imp2 capacity for applying knowledge in practice	imp10m capacity to learn (including lifelong self-directed learning)
imp28 ethical commitment	imp2 capacity for applying knowledge in practice
imp12 critical and self-critical abilities	imp15m ability to solve problems
imp18 interpersonal skills	imp18 interpersonal skills
imp29 concern for quality	imp29 concern for quality
imp20m ability to work in a multidisciplinary team	imp1 capacity for analysis and synthesis
imp13 capacity to adapt to new situations	imp13 capacity to adapt to new situations
med1 empathy	imp3 capacity for organisation and planning
imp1 capacity for analysis and synthesis	imp20m ability to work in a multidisciplinary team
imp21 ability to communicate with experts in other fields	imp21 ability to communicate with experts in other fields
imp25 ability to work autonomously	med1 empathy
imp3 capacity for organisation and planning	imp30 will to succeed
imp17 appreciation of diversity and multiculturality	imp25 ability to work autonomously
med2 ability to teach others	imp17 appreciation of diversity and multiculturality
imp30 will to succeed	med2 ability to teach others
imp24 understanding of cultures and customs of other countries	imp4m basic general knowledge outside medicine
imp19m ability to lead others	imp27 initiative and entrepreneurial spirit
imp4m basic general knowledge outside medicine	imp24 understanding of cultures and customs of other countries
imp27 initiative and entrepreneurial spirit	imp19m ability to lead others
imp7 knowledge of a second language	imp14m creativity
imp9 research skills	imp7 knowledge of a second language
imp26m ability to design and manage projects	imp9 research skills
imp14m creativity	imp26m ability to design and manage projects
imp23 ability to work in an international context	imp23 ability to work in an international context

As can be seen from the table, the rankings of generic competences between graduates and employers is highly correlated with 19 of the generic competences were ranked within two places of each-other. Only 8 are three places apart, and 2 ('ability to solve problems' and 'capacity for organisation and planning') are four places apart. Graduate and Employer averages for each generic competency were also themselves averaged (giving equal weighting to each group) and ranked for comparison with Tuning project findings in other subject areas (Table 3.5).

Table 3.5. Combined average ranking - Graduates & Employers (Likert scale 1 (not important) to 4 (essential))

Description	Ranking
med4 probity (honesty, maintaining good practice)	3.66
med3 ability to recognise limits and ask for help	3.65
imp10m capacity to learn (including lifelong self-directed learning)	3.59
imp16m ability to make decisions	3.59
imp2 capacity for applying knowledge in practice	3.52
imp28 ethical commitment	3.48
imp15m ability to solve problems	3.47
imp12 critical and self-critical abilities	3.45
imp18 interpersonal skills	3.34
imp29 concern for quality	3.29
imp1 capacity for analysis and synthesis	3.21
imp20m ability to work in a multidisciplinary team	3.17
imp13 capacity to adapt to new situations	3.17
med1 empathy	3.06
imp21 ability to communicate with experts in other fields	3.04
imp3 capacity for organisation and planning (including time management)	3.03
imp25 ability to work autonomously	2.88
imp30 will to succeed	2.69
imp17 appreciation of diversity and multiculturality	2.68
med2 ability to teach others	2.45
imp4m basic general knowledge outside medicine	2.34
imp24 understanding of cultures and customs of other countries	2.31
imp19m ability to lead others	2.26
imp27 initiative and entrepreneurial spirit	2.26

imp14m creativity	2.10
imp7 knowledge of a second language	2.09
imp9 research skills	2.05
imp26m ability to design and manage projects	2.05
imp23 ability to work in an international context	1.95

Academic and Student Subgroup Results

Medical academics and current students were asked to rate all 29 competences in the same way as the graduates and employers. Average responses in rank order comparing Academics with Students are presented below (Table 3.6).

Table 3.6. Importance items ranking. Academics vs. Students

Academics	Students
imp10m capacity to learn (including lifelong self-directed learning)	imp2 capacity for applying knowledge in practice
med4 probity (honesty, maintaining good practice)	med3 ability to recognise limits and ask for help
imp15m ability to solve problems	imp16m ability to make decisions
med3 ability to recognise limits and ask for help	imp18 interpersonal skills
imp16m ability to make decisions	imp12 critical and self-critical abilities
imp2 capacity for applying knowledge in practice	med4 probity (honesty, maintaining good practice)
imp28 ethical commitment	imp10m capacity to learn (including lifelong self-directed learning)
imp12 critical and self-critical abilities	imp29 concern for quality
imp29 concern for quality	imp15m ability to solve problems
imp20m ability to work in a multidisciplinary team	imp13 capacity to adapt to new situations
imp18 interpersonal skills	imp20m ability to work in a multidisciplinary team
imp1 capacity for analysis and synthesis	med1 empathy
med1 empathy	imp25 ability to work autonomously
imp13 capacity to adapt to new situations	imp21 ability to communicate with experts in other fields
imp25 ability to work autonomously	imp1 capacity for analysis and synthesis
imp21 ability to communicate with experts in other fields	imp3 capacity for organisation and planning (including time management)

imp3 capacity for organisation and planning	imp28 ethical commitment
imp17 appreciation of diversity and multiculturality	imp17 appreciation of diversity and multiculturality
med2 ability to teach others	imp7 knowledge of a second language
imp7 knowledge of a second language	imp24 understanding of cultures and customs of other countries
imp30 will to succeed	imp30 will to succeed
imp24 understanding of cultures and customs of other countries	imp4m basic general knowledge outside medicine
imp19m ability to lead others	imp27 initiative and entrepreneurial spirit
imp4m basic general knowledge outside medicine	imp19m ability to lead others
imp27 initiative and entrepreneurial spirit	med2 ability to teach others
imp9 research skills	imp23 ability to work in an international context
imp14m creativity	imp9 research skills
imp23 ability to work in an international context	imp26m ability to design and manage projects
imp26m ability to design and manage projects	imp14m creativity

Again there was a high degree of correlation between many of the rankings of the generic competences between academics and students, particularly at the lower ranked competences, with 19 being within two places of each-other. The most striking difference is 'ethical commitment' however, which students rated ten places lower than did academics. 'Capacity to learn', 'ability to solve problems' and 'ability to teach others' were also rated six to seven places lower by students than academics; whilst 'interpersonal skills' was rated seven places higher by students.

Combined Results

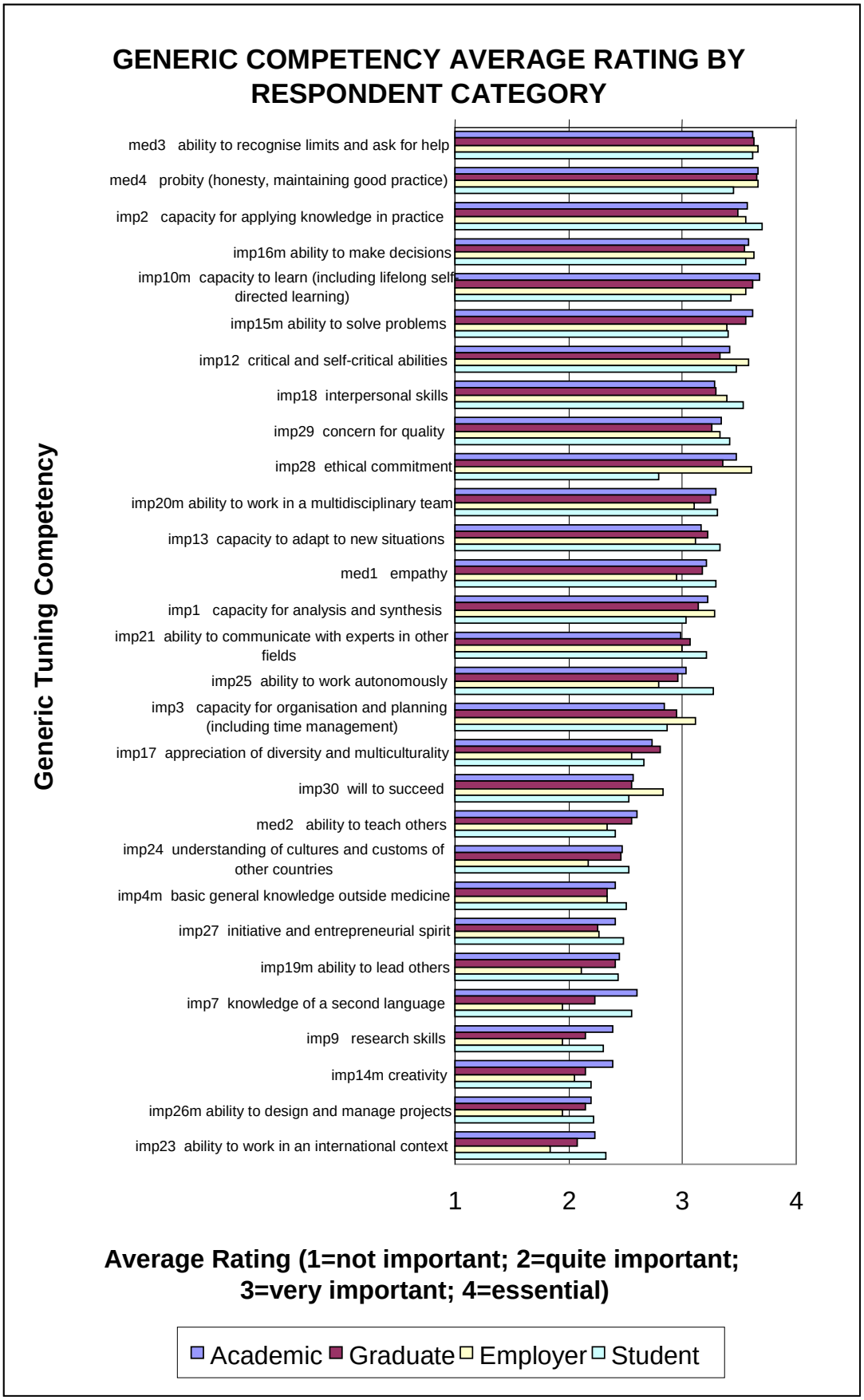
The rankings of each of these groups and the total combined ranking of all responses in numerical order are presented together below (Table 3.7). In calculating the total combined ranking the ratings of all participants were included. Whilst there was some discussion amongst the Tuning Task Force about excluding the very small number of responses which the group felt were extreme outliers, but it was felt that this would be undemocratic and unjustified, and so no respondents were excluded from the final combined ranking of outcomes.

There is good overall correlation of rankings between the different groups of respondents. Only 'ethical commitment' still stands-out as having much lower ranking by students than by other groups (difference of thirteen places between the highest and lowest rankings). 'Knowledge of a second language' and 'interpersonal skills' varied by seven places between highest and lowest ranking, whilst 'capacity for applying knowledge in practice', 'capacity to learn', 'ability to solve problems' and 'ability to teach others' varied by 6 places. 8 competences were ranked within two places of each-other by all groups. This overall similarity can also be seen very clearly when the average responses by different groups are presented in graph form (Figure 3.1).

Table 3.7. Summary Rankings

ID	Generic Competence	Graduates	Employers	Graduates + Employers	Academics	Students	Total combined ranking
imp1	capacity for analysis and synthesis	14	11	11	12	15	14
imp2	capacity for applying knowledge in practice	6	7	5	6	1	2
imp3	capacity for organisation & planning	17	13	16	17	16	17
imp4m	basic general knowledge outside med	23	21	21	24	22	24
imp7	knowledge of a second language	25	26	26	20	19	21
imp9	research skills	26	27	27	26	27	26
imp10m	capacity to learn (including lifelong self-directed learning)	3	6	3	1	7	3
imp12	critical and self-critical abilities	8	5	8	8	5	7
imp13	capacity to adapt to new situations	12	12	13	14	10	12
imp14m	creativity	28	25	25	27	29	27
imp15m	ability to solve problems	4	8	7	3	9	6
imp16m	ability to make decisions	5	3	4	5	3	5
imp17	appreciation of diversity and multiculturality	18	19	19	18	18	18
imp18	interpersonal skills	9	9	9	11	4	8
imp19m	ability to lead others	22	24	23	23	24	23
imp20m	ability to work in a multidisciplinary team	11	14	12	10	11	10
imp21	ability to communicate with experts in other fields	15	15	15	16	14	16
imp23	ability to work in an international context	29	29	29	28	26	28
imp24	understanding of cultures and customs of other countries	21	23	22	22	20	22
imp25	ability to work autonomously	16	18	17	15	13	15
imp26m	ability to design and manage projects	27	28	28	29	28	29
imp27	initiative and entrepreneurial spirit	24	22	24	25	23	25
imp28	ethical commitment	7	4	6	7	17	13
imp29	concern for quality	10	10	10	9	8	9
imp30	will to succeed	20	17	18	21	21	19
med1	empathy	13	16	14	13	12	11
med2	ability to teach others	19	20	20	19	25	20
med3	ability to recognise limits and ask for help	2	2	2	4	2	1
med4	probity (honesty, maintaining good practice)	1	1	1	2	6	4

Figure 3.1. Average rating of generic competency by respondent group



Qualitative responses

Participants were also asked "Are there any other generic competences / outcomes which you think might be relevant for medical graduates?". 343 free text responses to this question were compiled, translated into English and analysed thematically using NVivo7 software. Free text responses were considered against the existing competences, and these were categorised systematically under existing competences where possible.

The majority of these could be categorised under the existing generic competences, although some extended these competences somewhat - for example, "*Openness and the will to undertake further education*" extended the category 'imp10m Capacity to learn (including lifelong self-directed learning)' to include graduate attitudes towards learning in addition to the capacity itself. In a similar way many responses (n=95) were specifically related to medical graduates and could be categorised under existing subject-specific competences stated later in the questionnaire. Others were categorised under existing knowledge outcomes (n=17) or desirable learning opportunities (n=3) later in the questionnaire. A number of apparently new generic themes emerged however, and these are listed below:

- Ability to work hard despite adversity
- Ability to manage uncertainty
- Numeracy
- Business management skills

AGREEMENT OF RESULTS BY MEDINE THEMATIC NETWORK

Average rating and ranking of the generic competences were presented to members of the MEDINE Tuning Task Force in Oslo on 12th May 2007 for all respondents and for employer, graduate, academic and student groups. Participants felt that there was considerable face validity in these results in relation to current undergraduate medical education. It was decided that the whole list of generic competences should be published including sub-group results so that these could be compared with Tuning results in other subject areas. It was agreed after discussion and review that the above new themes could be mapped on to existing generic or subject specific competences, and that it was not necessary to separately add them to the list. Free text comments on Numeracy, for example, all related to the subject specific competency 'Ability to prescribe drugs' and so it was mapped to that competency.

DISCUSSION AND CONCLUSIONS

The Tuning Project seeks to promote debate and reflection on competences both within and between subject areas at a European level. It was recognized by the Task Force that many of the generic Tuning competences would be considered in medical degree programmes under the heading of 'Personal and Professional Development'. In relation to the "3 circle model" of medical competence published by Professor Ronald Harden, and incorporated into the "Scottish Doctor" framework, these outcomes would come under the heading of "The Doctor as a Professional". Most European medical schools now take the issue of PPD and fitness for practice very seriously. It will be of interest for schools to examine how the outcomes of their PPD themes relate to the Tuning framework, and this may be a useful aid to curriculum development in this area.

SECTION 4. SUBJECT SPECIFIC COMPETENCES FOR MEDICINE

INTRODUCTION

Because of the complex nature of medical studies, and the considerable body of work already undertaken in the discipline towards establishing and refining common learning outcomes both nationally and internationally, the Tuning project for medicine was considered to be an ideal opportunity to draw on this pre-existing work to gain true consensus on priority outcomes in a democratic manner across the whole European medical education community. The subject-specific components of the Tuning questionnaire were defined after a review of existing learning outcomes for medical degrees and a series of Tuning Task Force workshops, detailed in Section 5. They consisted of 'Level 1 competences' (top-level curricular outcomes), and the more detailed 'Level 2 competences' which described discrete, specific learning outcomes within each of these. This structure corresponds to that of most existing competency/outcomes frameworks for undergraduate European medical degrees.

Details of the background to the questionnaire survey, and how the subject-specific outcomes were developed, can be found in Section 5 of this report.

Although not part of formal Tuning methodology, the questionnaire also asked respondents to rate the importance of specific knowledge outcomes, and desirable learning opportunities and clinical environments for undergraduate medical education. These results are included as Appendices A and B for information.

SUBJECT SPECIFIC (LEVEL 1) COMPETENCES FOR MEDICINE

Following the series of Tuning (medicine) workshops detailed in Section 5, twelve "Level 1" subject-specific competences were agreed. These constituted large, important areas of teaching, learning and assessment. Along with the generic Tuning competences they were felt to encompass all of the competences required by new medical graduates. They formed the second section of the Tuning questionnaire, as follows:

- Ability to carry out a consultation with a patient (history, examination ...)
- Ability to provide immediate care of medical emergencies, including First Aid and resuscitation
- Ability to assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan
- Ability to carry out practical procedures (e.g. venepuncture)
- Ability to communicate effectively in a medical context
- Ability to prescribe drugs
- Ability to apply ethical and legal principles in medical practice
- Ability to assess psychological and social aspects of a patient's illness
- Ability to apply the principles, skills and knowledge of evidence-based medicine
- Ability to use information and information technology effectively in a medical context
- Ability to apply scientific principles, method and knowledge to medical practice and research
- Ability to work effectively in a health care system and engage with population health issues

QUESTIONNAIRE PROCEDURE AND METHODOLOGY

The same procedure was employed for the subject-specific competences as for the generic Tuning competences in medicine. This is detailed in Section 3, together with the demographic details of respondents.

QUESTIONNAIRE RESULTS

All of the proposed Level 1 outcomes were rated, on average, in the range of "very important" to "essential". Average rating scores ranged from 2.83 to 3.77 on the Likert scale of 1 (not important) to 4 (essential). The resultant rankings are shown in Table 4.1. On the basis of these results, it was decided that all of these Level 1 outcomes should be retained in the Tuning (medicine) outcomes framework.

Free text responses to the question "*Are there any other areas of subject-specific competences / outcomes for medicine which you think are important?*" were analysed qualitatively, using the NVivo7 software tool, and the results were discussed at a Tuning (medicine) Workshop in Oslo, 11th May 2007. No new or additional Level 1 outcomes were identified by this process.

This list and ranking of Level 1 outcomes for medical degree course in Europe was therefore agreed by the Tuning (medicine) Task Force and by the MEDINE Thematic Network at their Annual General Meeting, Oslo, 11/12th May 2007.

Table 4.1. Level 1 Subject-specific outcomes average ranking all respondents. Likert scale 1 (not important) to 4 (essential).

Competency	Rank
Ability to carry out a consultation with a patient (history, examination ...)	3.77
Ability to provide immediate care of medical emergencies, including First Aid and resuscitation	3.66
Ability to assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan	3.50
Ability to carry out practical procedures (e.g. venepuncture)	3.36
Ability to communicate effectively in a medical context	3.31
Ability to prescribe drugs	3.26
Ability to apply ethical and legal principles in medical practice	3.26
Ability to assess psychological and social aspects of a patient's illness	3.17
Ability to apply the principles, skills and knowledge of evidence-based medicine	3.02
Ability to use information and information technology effectively in a medical context	2.93
Ability to apply scientific principles, method and knowledge to medical practice and research	2.89
Ability to work effectively in a health care system and engage with population health issues	2.83

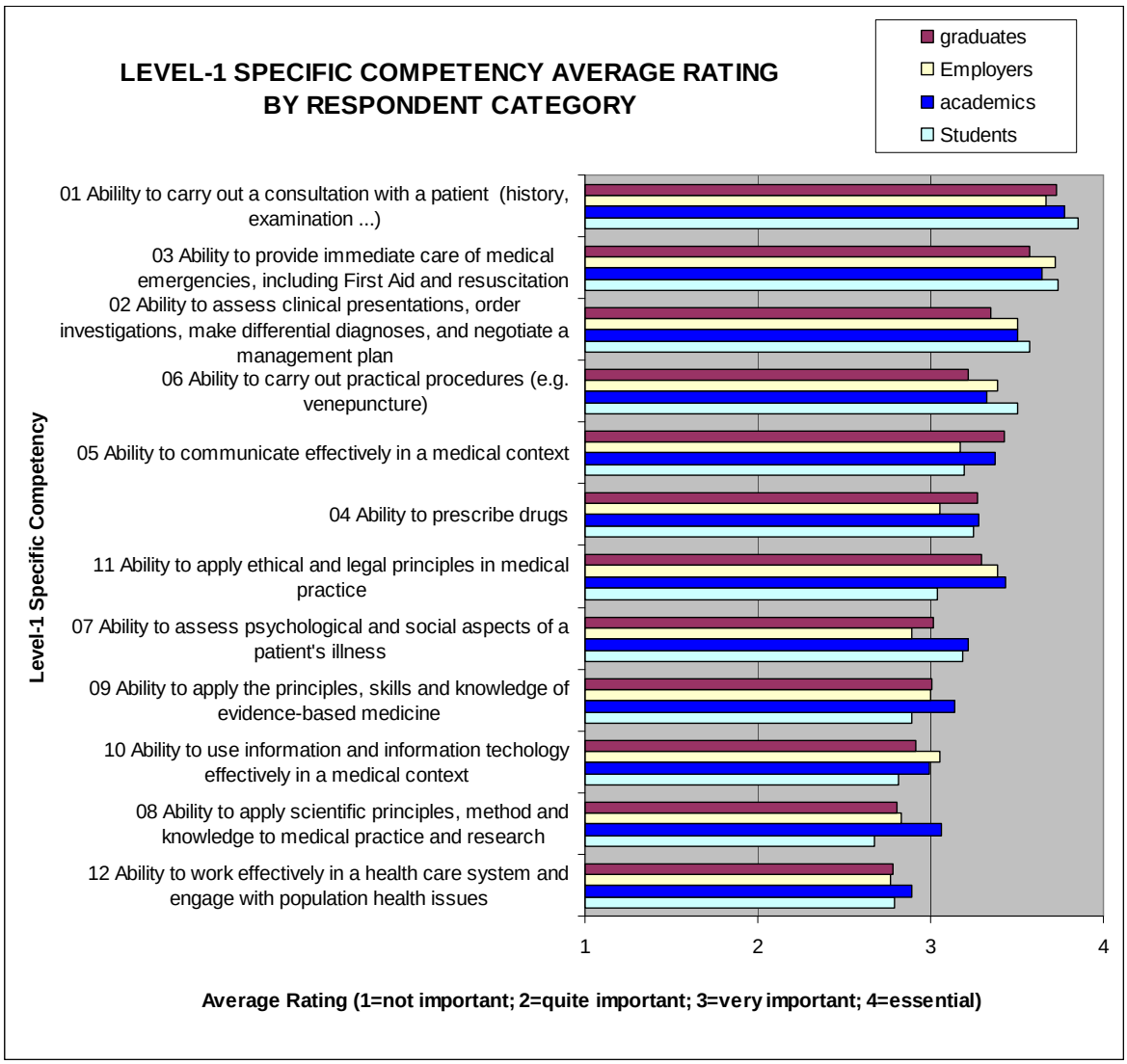
Sub-group analysis

Comparisons between groups of respondents indicated a generally high degree of concordance, as shown in Table 4.2 and Figure 4.1. Graduates ranked "Ability to communicate effectively in a medical context" higher, and "Ability to carry out practical procedures" lower, than other groups. This may reflect the new reality of medical practice - many practical tasks have been taken over by other professional groups, whereas doctors remain at the forefront of communicating with the patient, synthesizing complex information from diverse sources, and aiding the patient in medical decision-making. Students ranked "Ability to apply ethical and legal principles in medical practice" lower than other groups. This may reflect the fact that they have not yet been faced with the reality of the ethical and legal aspects of medical practice, and the personal responsibilities that are involved. This clearly echoes the pattern of responsed observed in the generic competency section where ethical awareness was ranked low by students.

Table 4.2: Tuning level 1 subject specific outcomes; rankings by category of respondent

ID	Level-1 Specific Competence	Graduates	Employers	Academics	Students	Combined rank
01	Abililty to carry out a consultation with a patient (history, examination ...)	1	2	1	1	1
02	Ability to assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan	4	3	3	3	3
03	Ability to provide immediate care of medical emergencies, including First Aid and resuscitation	2	1	2	2	2
04	Ability to prescribe drugs	6	7	7	5	7
05	Ability to communicate effectively in a medical context	3	6	5	6	5
06	Ability to carry out practical procedures (e.g. venepuncture)	7	5	6	4	4
07	Ability to assess psychological and social aspects of a patient's illness	8	10	8	7	8
08	Ability to apply scientific principles, method and knowledge to medical practice and research	11	11	10	12	11
09	Ability to apply the principles, skills and knowledge of evidence-based medicine	9	9	9	9	9
10	Ability to use information and information techology effectively in a medical context	10	8	11	10	10
11	Ability to apply ethical and legal principles in medical practice	5	4	4	8	6
12	Ability to work effectively in a health care system and engage with population health issues	12	12	12	11	12

Figure 4.1 – Tuning level 1 subject specific outcomes; average ratings by category of respondent. Likert scale 1 (not important) to 4 (essential).



DETAILED SUBJECT SPECIFIC (LEVEL 2) COMPETENCES FOR MEDICINE

As a result of the large body of previous work carried out in medicine related to learning outcomes, it proved possible for the Task Force to draft and obtain preliminary approval for a second level of outcomes/competences, with a higher degree of detail and specificity. Because of the higher level of detail and narrower scope, these outcomes lend themselves to the design of discrete items of assessment, such as OSCE stations or work place-based evaluations. These formed the third section of the questionnaire.

There was a considerably wider range of ratings for the Level 2 outcomes. Average rating scores ranged from 1.71 to 3.80 on the Likert scale of 1 (not important) to 4 (essential). At a Tuning (medicine) Workshop in Oslo, 11th May 2007, all Level 2 items were reviewed in the light of their rankings, and particular attention was given to low-rated items. Two level-2 competences were also removed as they seemed to be superfluous. As a result, the following Level 2 competences were removed from the final Tuning (Medicine) list:

Ability to provide evidence to a court of law	2.47
Ability to analyse and disseminate experimental results*	2.15
Ability to design research experiments	1.79
Ability to carry out practical laboratory research procedures	1.70
Ability to generate evidence through clinical audit	2.47
Ability to apply statistical analysis to data	2.15
Ability to apply scientific principles to the practice of medicine (same as Level-1)	
Ability to communicate orally (removed as thought implicit to other competences)	

It was decided that all of the other Level 2 outcomes should be retained in the Tuning (medicine) outcomes framework, although some small changes were made to make the wording more accurate such as adding ‘basic’ to ‘The ability to carry out respiratory function tests’; and removing ‘ALTS’ (a trade-name) from the first aid and resuscitation competences.

Free text responses to the question “*Are there any other detailed subject-specific competences for medicine which you think are important?*” were also analysed qualitatively using the same methodology, identifying new emergent themes, and the results discussed at the Tuning (medicine) Workshop in Oslo, 11th May 2007. As a result of that process, the following Level 2 outcomes were added to the list.

Ability to provide care of the dying and their families
Ability to manage chronic illness

This list and ranking of Level 2 outcomes for medical degree course in Europe was therefore agreed by the Tuning (medicine) Task Force and by the MEDINE Thematic Network at their Annual General Meeting, Oslo, 11/12th May 2007. The list is shown, with the average ratings from all respondents, in Table 4.3.

No attempt was made to define more detailed ‘Level 3’ competences below each of the level 2 outcomes as has been attempted by the Scottish Doctor group (http://www.scottishdoctor.org) as it was thought there would not yet be sufficient consensus around these.

* Further discussion of research competences follows at the end of this section.

Table 4.3 Level 2 subject-specific outcomes; average ranking all respondents. Likert scale 1 (not important) to 4 (essential).

'Ability to carry out a consultation with a patient'	
Ability to take a history	3.80
Ability to carry out physical examination	3.78
Ability to make clinical judgements and decisions	3.51
Ability to provide explanation and advice	3.37
Ability to provide reassurance and support	3.30
Ability to assess the patient's mental state	3.22
'Ability to assess clinical presentations, order investigations, make differential diagnoses, and negotiate a management plan'	
Ability to recognise and assess the severity of clinical presentations	3.56
Ability to order appropriate investigations and interpret the results	3.39
Ability to make differential diagnoses	3.46
Ability to negotiate an appropriate management plan with patients / carers	3.22
Ability to provide care of the dying and their families	*
Ability to manage chronic illness	*
'Ability to provide immediate care of medical emergencies, including First Aid and resuscitation'	
Ability to recognise and assess acute medical emergencies	3.77
Ability to provide basic First Aid	3.76
Ability to provide Basic Life Support and Cardio-Pulmonary Resuscitation according to current European guidelines	3.76
Ability to treat acute medical emergencies	3.44
Ability to provide Advanced Life Support to current European guidelines	3.15
Ability to provide trauma care according to current European guidelines	2.91
'Ability to prescribe drugs'	
Ability to prescribe clearly and accurately	3.39
Ability to match appropriate drugs to the clinical context	3.36
Ability to review the appropriateness of medication and evaluate the potential benefits and risks	3.30
Ability to prescribe drugs to treat pain and distress	3.21
'Ability to communicate effectively in a medical context'	
Ability to communicate with patients	3.75
Ability to communicate with colleagues	3.53
Ability to communicate in breaking bad news	3.39
Ability to communicate with relatives	3.33
Ability to communicate with disabled people	3.31
Ability to communicate in seeking informed consent	3.29
Ability to communicate in writing (including medical records)	3.24
Ability to communicate in dealing with aggression	3.17
Ability to communicate by telephone	3.08
Ability to communicate with those who require an interpreter	2.96
'Ability to apply the principles, skills and knowledge of evidence-based medicine'	
Ability to apply evidence to practice	3.00
Ability to critical appraise published medical literature	2.99
Ability to define and carry out an appropriate literature search	2.93

* Added by Tuning Workshop, Oslo, May 2007, based on qualitative analysis of free text comments in Tuning questionnaire.

'Ability to carry out practical procedures (e.g. venepuncture)'

Ability to measure blood pressure	3.61
Ability to carry out venepuncture	3.51
Ability to administer oxygen	3.39
Ability to carry out cannulation of veins	3.36
Ability to carry out subcutaneous and intramuscular injection	3.33
Ability to administer IV therapy and use infusion devices	3.30
Ability to carry out electrocardiography	3.07
Ability to carry out suturing	3.01
Ability to carry out blood transfusion	2.99
Ability to carry out bladder catheterization	2.90
Ability to carry out urinalysis	2.76
Ability to move and handle patients	2.72
Ability to carry out basic respiratory function tests	2.51

'Ability to assess psychological and social aspects of a patient's illness'.

Ability to assess psychological factors in presentations and impact of illness	3.11
Ability to detect alcohol and substance abuse, dependency	3.09
Ability to detect stress in relation to illness	3.01
Ability to assess social factors in presentations and impact of illness	3.00

'Ability to apply scientific principles, method and knowledge to medical practice and research'

No specified Level 2 outcomes

'Ability to use information and information technology effectively in a medical context'.

Ability to keep accurate and complete clinical records	3.50
Ability to use computers	3.48
Ability to access information sources	3.43
Ability to store and retrieve information	3.25

'Ability to apply ethical and legal principles in medical practice'

Ability to maintain confidentiality	3.73
Ability to apply ethical principles and analysis to clinical care	3.48
Ability to obtain and record informed consent	3.30
Ability to certify death	3.28
Ability to apply national and European law to clinical care	3.02
Ability to request autopsy	2.86

'Ability to work effectively in a health care system and engage with population health issues'

Ability to provide patient care which minimises the risk of harm to patients	3.54
Ability to apply measures to prevent the spread of infection	3.53
Ability to recognise own health needs and ensure own health does not interfere with professional responsibilities	3.28
Ability to conform with professional regulation and certification to practise	3.21
Ability to receive and provide professional appraisal	3.10
Ability to make informed career choices	2.85

RESEARCH

A particular focus of discussion concerned the requirement for all medical graduates to carry out research and publish a thesis. This is a core specification for medical degrees in some countries, such as Austria, but not others. The consensus of the Tuning group was to leave "Ability to apply scientific principles, method and knowledge to medical practice and research" as a core subject-specific level 1 outcome, but not to specify it further at Level 2. "Research skills" remained in the list of generic Tuning competences common to graduates in all disciplines, again without further specification. Since the aim of Tuning is to define levels of agreement across Europe, rather than make recommendations, it seems that this may be the level at which consensus can be reached on this important topic at the present time. Clearly, the ability to carry out original research is likely to be a core competence for third cycle degrees in medicine.

SECTION 5: BACKGROUND TO SUBJECT SPECIFIC COMPETENCES (REFERENCE POINTS)

INTRODUCTION

For the purposes of the Tuning Project (medicine) the following definitions were applied:

Learning objectives are set and described by teaching staff. They describe discrete items of learning related to a particular component of a degree programme, e.g. a lecture, PBL session or module.

Learning outcomes are also set and described by teaching staff, but refer to the whole degree programme and relate to the point of graduation.

Competences are acquired by, and belong to, students or graduates, rather than teachers. For a graduate who has successfully completed the degree programme, their competences should be at least equivalent to the prescribed learning outcomes, although they may be developed further. In that sense, when referring to the point of graduation, identical descriptors can be used.

EXISTING COMPETENCY FRAMEOWRKS IN MEDICINE

The Tuning Project (Medicine) differs from some other Tuning projects in that there is already a large body of work dealing with curriculum-level outcomes and competences for medical education. These have been developed at undergraduate and post-graduate level, and with institutional, national, regional and global applications. The principle of outcomes-based or competency-based education has been increasingly accepted and adopted in medical education in recent years.

Some examples are “Tomorrow’s Doctors” published by the UK General Medical Council in 2003 (GMC 2003); the “Scottish Doctor” document, published in 2002 (Simpson et al, 2002); the Global Minimum Essential Requirements published by the Institute for International Medical Education (Wojtczak & Schwarz 2000); the Association of American Medical Colleges outcomes (http://www.iime.org/gmer.htm); and the CANMEDS Competency Framework, which was designed primarily for postgraduate medical training (The Royal College of Physicians and Surgeons of Canada 2005). There are also many existing national and institutional outcomes frameworks in Europe and elsewhere.

These documents differ widely in their structure, content, and level of detail. Many of them have a multi-level, hierarchical structure, with between 2 and 4 levels of competency defined. They begin with a series of broad, general competences, usually between 6 and 12 in number. These are followed by more detailed, discrete competences which can be taught and assessed as individual items. While not all documents are structured in this way, it is becoming an accepted model for medical competences, and the most influential statements conform to this practice.

DEVELOPMENT OF SUBJECT SPECIFIC (LEVEL 1 & 2) COMPETENCES

The drafting of the initial Tuning learning outcomes/competency framework for medicine involved the following steps:

Review of existing outcomes / competency frameworks. A request was made to members of the MEDINE Thematic Network to forward existing institutional or national learning outcomes/competency frameworks in use in their medical school or country. These were reviewed and analysed by the Project steering group (Section 8). The group also conducted a review of other available learning outcomes/competency frameworks such as those mentioned above.

Development of draft framework. Based on this review, a preliminary draft learning outcomes/competency framework for Tuning (Medicine) was generated by the Project steering group.

Tuning workshops. A series of European workshop were held during which members of the Tuning (Medicine) Taskforce sequentially reviewed the draft document and progressively refined it in the light of expert opinion. These workshops were held in Budapest (April 2005), Amsterdam (September 2005), and Edinburgh (February 2006). In each of these workshops, the most up-to-date draft of the learning outcomes/competency framework was reviewed and discussed systematically item by item and appropriate amendments were made. The average attendance at workshops was 28, with representation from all relevant medical and scientific disciplines.

The consensus document from this series of workshops then formed the basis of the web-based Tuning questionnaire survey. A pilot trial of the survey was conducted before the main survey was activated, to ensure that the competences had face validity, that the instructions and associated comments were appropriate and useful, and that the practical logistics of the survey process were effective. The main survey was activated in April 2006, and the subsequent progress and results are documented in Sections 3 and 4 of this report.

Further Tuning workshops were held in Prague (May 2006) to review progress, and in Genoa (September 2006), when ways in which different competency frameworks can be mapped aginst each other using software tools were examined. In addition, presentations of the draft framework were made and feedback obtained at meetings of the Learning and Teaching Support Network UK (November 2005), the Chinese Association for Medical Education (December 2005), the European Medical Students Association (July 2006), and Rektors of German Medical Schools (October 2006).

6. APPROACHES TO TEACHING, LEARNING AND ASSESSMENT

INTRODUCTION

This section focuses on approaches to teaching, learning and assessment in undergraduate medical curricula (Bologna 1st and 2nd Cycles). In most curricula these are already constructively aligned with defined learning outcomes/competences. In addition to gaining knowledge and understanding, students are expected to develop skills in evaluating data, communication and practical procedures; and also to develop personally and professionally to ensure that they are competent to practise clinically as doctors at the point of graduation. Bologna 3rd Cycle teaching and learning typically consists of a project which may be in a clinical, laboratory or other context, with assessment consisting of a doctoral thesis. As highlighted in Section 2 however, the majority of post-graduate (post Bologna 2nd Cycle) Medical Education consists of clinical practice and professional assessments outwith the Higher Education sector, details of which are beyond the scope of the current report.

APPROACHES TO TEACHING

Medicine draws upon a large number of different academic disciplines, with a much larger cohort of teachers than most other undergraduate programmes. Teachers of medical undergraduates include biomedical scientists, behavioural and social scientist, generalist and specialist medical doctors working in clinical practice, allied health professionals and others. Consequently approaches to teaching are very diverse, including most of those common to other higher education subjects but also some which are specific to medicine such as certain practical skills and techniques. Typical teaching approaches therefore include:

- Traditional and interactive lectures
- Various types of small group tutorials
- Laboratory and dissection-room teaching
- Problem based learning
- Practical skills & resuscitation training in simulated environment
- Bedside and ambulatory care clinical teaching
- Communication skills training (often with simulated patients or actors)
- Group & individual projects
- Clinical placements
- Electronic teaching methods

APPROACHES TO LEARNING

Due partly to the variety of approaches to teaching, and to the diversity of learning outcomes, the approaches to learning are also numerous and varied. Knowledge may be learned in traditional ways from lectures, tutorials, books and private study, but may also be learned in a self-directed manner using problem-based learning as discussed in Section 2. Clinical skills (such as venepuncture or breast examination) are generally learned initially by didactic teaching and demonstration followed by simulated practice and then supervised practice in real clinical situations; with students gradually becoming more competent and proficient in the skill. Appropriate attitudes and professional behaviours are also generally learned in a progressive way

by instruction, observation of expert mentors, reflection on practice and significant events, and discussion with colleagues. Approaches to learning in typical undergraduate medical curricula therefore include:

- Problem-based and self-directed learning
- Task-based learning
- Portfolio-based learning
- Observation of expert mentors
- Experiential learning during clinical attachments
- Reflection in and on practice, sometimes with reflective diaries
- E-learning
- Inter-professional learning
- Peer-assisted learning

APPROACHES TO ASSESSMENT

Assessment methods and approaches are generally matched to the outcomes one wants to assess. Therefore knowledge and understanding outcomes may be tested with multiple choice questions, written papers and oral presentations. Skills are generally tested in simulated or real clinical contexts – for example using an Objective Structured Clinical Examination (see Section 2) or workplace assessments in practice. Attitudes are more difficult to assess, but typical approaches include assessments by tutors on clinical attachments, reflective essays and viva oral examinations. Approaches to assessment in typical undergraduate medical curricula therefore include:

- Multiple choice questions
- Reports and reflective essays
- Posters
- Creation of patient information leaflets
- Creation of websites
- Patient studies of various types
- Global & structured clinical assessment during attachments
- Assessments of professionalism
- Clinical cases and exams
- Objective Structured Clinical Examinations (OSCEs)
- Video interviews and consultations with real patients
- Oral presentations
- Viva oral examinations
- Project and 'elective' reports
- Portfolios
- E-assessment

CONSTRUCTIVE ALIGNMENT OF DIFFERENT APPROACHES

The principles of outcomes-based education have been widely adopted in Medicine, and approaches to teaching, learning and assessment are generally constructively aligned to these. Outcomes relating to skills and attitudes can be difficult to align, particularly in areas where these are being learned experientially but never formally 'taught'. There is a responsibility to ensure that the teaching, learning and assessment of all outcomes (both generic and subject specific) are aligned and appropriately mapped across the curriculum. This is helpful to staff and students, and is also increasingly requested or required by external regulating bodies and

others for quality assurance purposes. We believe that in this educational environment, the existence of a standard European set of learning outcomes will prove useful to medical schools when their curricula are being evaluated, internally or externally, and will provide useful “signposts” when curriculum development and innovation are being undertaken.

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SECTION 8: TUNING (MEDICINE) TASK FORCE, MEDINE THEMATIC NETWORK, 2004-2007

The full membership of the MEDINE Thematic Network is available at the Network website: http://www.bristol.ac.uk/medine/

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Michael Ross (UK)	(*Coordinator, 2005-7)*
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APPENDIX A: KNOWLEDGE OUTCOMES

A decision was taken, as part of the web-base questionnaire survey, to gather opinion about important areas of knowledge for medical graduates. The ranked results are shown in Table A.1. In general, the highest scores and rankings related to knowledge of traditional scientific disciplines which underpin medical practice, such as physiology, anatomy, biochemistry, and immunology, together with clinical sciences such as pathology, microbiology and clinical pharmacology. The lowest scores related to knowledge of "different types of complementary / alternative medicine and their use in patient care". It should be noted that these knowledge outcomes are highly selective examples only, and are not a comprehensive list of knowledge outcomes for a primary medical degree curriculum (e.g. no principles of surgery, ITU, and many other specialities).

Table A.1. Ranked knowledge outcomes (all respondents)

'Basic Sciences'	
Normal function (physiology)	3.55
Normal structure (anatomy)	3.35
Normal body metabolism and hormonal function (biochemistry)	3.13
Normal immune function (immunology)	3.07
Normal cell biology	2.61
Normal molecular biology	2.51
Normal human development (embryology)	2.36
'Behavioural and social sciences'	
Psychology	2.87
Human development (child/adolescent/adult)	2.76
Sociology	2.41
'Clinical Sciences'	
Abnormal structure and mechanisms of disease (pathology)	3.40
Infection (microbiology)	3.36
Immunity and immunological disease	3.04
Genetics and inherited disease	2.83
'Drugs and prescribing'	
Use of antibiotics and antibiotic resistance	3.42
Principles of prescribing	3.30
Drug side effects	3.22
Drug interactions	3.18
Use of blood transfusion and blood products	3.12
Drug action and pharmacokinetics	3.08

Individual drugs	2.89
Different types of complementary / alternative medicine + their use in patient care	2.26
'Public Health'	
Disease prevention	3.14
Lifestyle, diet and nutrition	2.98
Health promotion	2.83
Screening for disease and disease surveillance	2.79
Disability	2.72
Gender issues relevant to health care	2.64
Epidemiology	2.61
Cultural and ethnic influences on health care	2.55
Resource allocation and health economics	2.40
Global health and inequality	2.33
'Ethical and legal principles in medical practice'	
Rights of patients	3.30
Rights of disabled people	3.16
Responsibilities in relation to colleagues	3.11
'Role of the doctor in health care systems'	
Laws relevant to medicine	2.90
Systems of professional regulation	2.72
Principles of clinical audit	2.58
Systems for health care delivery	2.57

APPENDIX B: CLINICAL ATTACHMENTS AND EXPERIENTIAL LEARNING

A decision was taken, as part of the web-base questionnaire survey, to gather opinion about which areas of clinical medical practice were most important to be included as part of the core undergraduate medical school programme. The ranked results are shown in Table B.1. In general, the highest scores and rankings related to acute medical and surgical care settings, with community and primary care also scored as very important. This is of interest because not all medical school curricula include attachments to Casualty/ Accident and Emergency units for all students. The lowest score related to areas of more specialized surgical and medical practice. These scores and rankings will be analysed and discussed in detail in future reports.

Table B.1. Ranked responses to the question: "All medical graduates should have experienced clinical work in these areas"

Care of acutely ill patients in Casualty / Accident and Emergency units	3.51
Care of general (internal) medical patients in medical admission units	3.48
Care of general surgical patients in surgical admission units	3.20
Care in the community/family practice/primary care	3.13
Care for elderly patients	3.08
Care for sick children	3.04
Care for the dying, palliative care	2.91
Care for mentally ill patients	2.83
Obstetric and gynaecological care	2.81
Care for critically ill patients in Intensive Care Units	2.71
Care of patients with specialised medical conditions (eg haematology, renal)	2.56
Anaesthetic care	2.54
Rehabilitation medicine	2.40
Care of patients with specialised surgical conditions (eg cardiac surgery, urology)	2.39

APPENDIX C: MEDICAL DEGREES AND DEGREE STRUCTURES IN EUROPE

Based on survey results from MEDINE partners in April - May 2007

Prepared by Dr Anna-Lena Paulsson, Karolinska Institute, Sweden

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Country	Degree	Degree in English	Duration and Structure
Austria	Doctor medicinae universae (Dr.med.univ.)	MD - Doctor of Medicine/Medical doctor*	6 years, Continuum
Belgium	Flanders: Bachelor in Medicine/ Master in Medicine; French-speaking: Bachelier en médecine/ Mater en médecine	Degree of Bachelor in Medicine/ Degree of Master in Medicine	7 years: Ba / Ma structure (Ba 3 years/Ma 4 years)
Bulgaria	Magistrar po medicina	Master's Degree	6 years continuum
Czech Republic	MUDr. - Medicinae Universae Doctor	Doctor of General Medicine	6 years continuum
Croatia	Dr.med	Doctor of Medicine	6 years continuum
Denmark	Candidatus/candidata medicinae (cand.med)	Master of Science in Medicine	6 years: Ba/Ma structure (Ba 3 years/Ma 3 years)
Estonia	Arsti kraad	Degree in Medicine	6 years, continuum
Finland	Lääketieteen lisensiaatti	Licentiate of Medicine (Lic.Med)	6 years continuum
France	No formal degree after 6 years. *Doctorat d'Etat en médecine* based on thesis prepared during Residency.	State Doctorat in Medicine	6 years continuum
Germany	Approbation als Arzt/ Ärztin *Dr.med = Doctoral Degree (academic)*	Medical License	6 years, Continuum. Berlin - Ba/Ma
Greece	Ptychio Iatrikis	Medical Degree	6 years continuum
Hungary	általános orvos; "doctor medicinae universae" (dr.med.univ)	Doctor of Medicine (title: Medical Doctor)	6 years continuum
Iceland	Kandidatspróf	Cand. Med et Chir	6 years continuum

* Note that many 'Doctor of Medicine' degrees in this table are Bologna second cycle primary medical degrees, but some are third cycle (e.g. in the United Kingdom).

Country	Degree	Degree in English	Duration and Structure
Ireland		Bachelor in Medicine, M.B, Surgery, B.Ch, and Obstetrics, B.A.O	5 years, continuum MD, Doctor of Medicine is optional degree based on research with thesis
Italy	Laurea in Medicina e Chirurgia	Degree in Medicine and Surgery/ Doctor in Medicine	6 years, continuum
Kosovo	Doktor i Mjekësisë	Doctor of Medicine, M.D.	6 years continuum
Latvia	Ārsta grāds	Medical Doctor	6 years continuum
Lithuania	Medicinos magistras	Master in Medicine	6 years continuum Professional qualification: Gydytojas/Physician
Malta	MD, Doctor of Medicine & Surgery	MD, Doctor of Medicine & Surgery	5 years, continuum
Netherlands	Arts	Medical Doctor M.D	6 years continuum or 5 year Ba/Ma, or 3 year Ma
Norway	Candidatus/a medicinae (cand med)	Candidatus/a medicinae (cand med)	6 years continuum
Poland	Lekarz medycyny	Medical Physician	6 years, Continuum Doctor of Medicine (MD) for research with thesis
Portugal	Mestrado Integrado em Medicina	Integrated Masters in Medicine	6 years, heterogenous
Romania	Doctor Medic	General Practioner Degree	6 years continuum
Slovakia	MUDr. - doktor vseobecného lekárstva	Doctor of General Medicine	6 years, Continuum
Slovenia	Doktor medicine	Doctor of medicine	6 years, Continuum
Spain	Licenciado en Medicina	Licenciate in Medicine	6 years, Continuum
Sweden	Läkarexamen	Degree of Master of Science in Medicine	5,5 years continuum; Ba/Ma in Lund
Switzerland		Bachelor / Master of Medicine	6 years Ba/Ma (180 + 180 ECTS)
Turkey	Tip Doktoru	Doctor of Medicine	6 years, Continuum
UK		MBBS/MB ChB/ BM/ BChir - Bachelor of Medicine & Surgery	5 years, continuum MD (Doctor of Medicine) is optional degree based on research thesis.