

AMEE Guide No. 14: Outcome-based education: Part 5—From competency to meta-competency: a model for the specification of learning outcomes

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SUMMARY *Increased attention is being paid to the specification of learning outcomes. This paper provides a framework based on the three-circle model: what the doctor should be able to do ('doing the right thing'), the approaches to doing it ('doing the thing right') and the development of the individual as a professional ('the right person doing it'). Twelve learning outcomes are specified, and these are further subdivided. The different outcomes have been defined at an appropriate level of generality to allow adaptability to the phases of the curriculum, to the subject-matter, to the instructional methodology and to the students' learning needs. Outcomes in each of the three areas have distinct underlying characteristics. They move from technical competences or intelligences to meta-competences including academic, emotional, analytical, creative and personal intelligences. The Dundee outcome model offers an intuitive, user-friendly and transparent approach to communicating learning outcomes. It encourages a holistic and integrated approach to medical education and helps to avoid tension between vocational and academic perspectives. The framework can be easily adapted to local needs. It emphasizes the relevance and validity of outcomes to medical practice. The model is relevant to all phases of education and can facilitate the continuum between the different phases. It has the potential of facilitating a comparison between different training programmes in medicine and between different professions engaged in health care delivery.*

The importance of outcomes

Outcome assessment has become the buzzword of the 1990s (Tamblyn, 1999) and outcome-based education offers a powerful and appealing way of reforming and managing medical education (Harden *et al.*, 1999). Much of the focus in medical education has moved from the 'how' and 'when' to the 'what' and 'whether'. Identifying, defining and communicating the skills and qualities we want doctors to have is fundamentally important. It is a process we must go through if we are to be clear what our medical school or training programme is for and on which issues we shall be judged.

What sort of doctor are we aiming to produce? What are the expected learning outcomes? Doctors have a unique blend of different kinds of abilities that are applied to the practice of medicine. What is needed or valued at any time depends on the context—at times it may be a practical intervention, at other times, diagnostic abilities and at other times a caring attitude and understanding.

Learning outcomes are increasingly used as a focus for curriculum planning (Otter, 1995). How they are

conceptualized and presented is important. This paper presents a useful model that offers a number of advantages when applied in practice.

Criteria for specification of outcomes

Statements of learning outcomes can be judged against a number of criteria. Outcomes should be expressed in such a way that they:

- (1) *reflect the vision and mission* of the institution as perceived by the various stakeholders; the institution, the commissioners of the education and the public:
 - What sort of doctor is envisaged as the product of the educational programme encompassed by the set of learning outcomes?
- (2) *are clear and unambiguous*:
 - Can we look at the list of outcomes and know what attributes we expect to find in the doctor? Can the list of outcomes be easily understood and serve, for those who read it, as an overview of the curriculum?
- (3) *are specific* and address defined areas of competence:
 - Does the list have sufficient detail to allow a clarity of focus or is it so general that it is unhelpful in planning the curriculum and communicating the learning outcomes expected?
- (4) *are manageable* in terms of the number of outcomes:
 - Is the list sufficiently short that it can make a practical contribution to curriculum planning and serve as a framework for the organization of learning resources such as study guides and as a basis for the assessment, or will the learner and teacher feel overwhelmed by the details?
- (5) are defined at an appropriate *level of generality*:
 - Are the outcomes adaptable to the phases of the curriculum, to the subject-matter, to the instructional methodology and to the students' learning needs?
- (6) assist with *development of 'enabling' outcomes*:
 - Does the list of exit outcomes allow a 'designing-down' approach from the exit outcomes, so that one can see,

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for example, a progression from the enabling outcomes at the end of year 4 to the exit outcomes at the end of year 5?

- (7) indicate the *relationship between different outcomes*:
- Does the way in which the outcomes are expressed contribute to an understanding of how one outcome relates to another with a holistic approach to medicine or is each outcome seen in isolation?

The three-circle model

Harden *et al.* (1999) described a three-circle model for classifying learning outcomes (Figure 1). It is based on the three dimensions of the work of a doctor.

- (1) The inner circle represents what the doctor is able to do, e.g. the physical examination of a patient. This can be thought of as ‘doing the right thing’. It can be equated with technical intelligence, in line with Gardner’s multiple intelligences model (Gardner, 1983).
- (2) The middle circle represents the way the doctor approaches the tasks in the inner circle, e.g. with scientific understanding, ethically, and with appropriate decision taking and analytical strategies. This can be thought of as ‘doing the thing right’ and includes the academic, emotional, analytical and creative intelligences.
- (3) The outer circle represents the development of the personal attributes of the individual—‘the right person doing it’. It equates with the personal intelligences.

This model provides the basis for the development of the learning outcomes in medical education. The three categories that make up the three-circle model represent the first level in the outcome framework given in Table 1. The 12 key learning outcomes make up the second level. Seven of these are in the inner circle, three in the middle circle and two in the outer circle (Table 1).

The three dimensions in the three-circle model can be distinguished in a number of respects. Some fundamental differences are summarized in Table 2. We have likened the three-circle model to Handy’s inside-out doughnut, with the dough in the centre representing the core of what the doctor has to be able to do—finite, well defined, explicit and visible and a mastery requirement for all doctors (Harden *et al.*, 1999). Surrounding this is the unbounded space of the hole on the outside representing what we could do or could be—less well defined and explicit and more open-ended and yet core. It is particularly in this area that doctors may

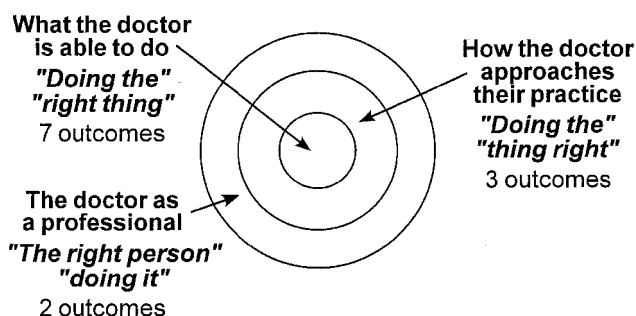


Figure 1. The three-circle model for outcome-based education.

excel and where one can distinguish the star performers from others. Outstanding professionals usually have special personal attributes. Goleman (1998) cites Ruth Jacobs—a senior consultant at Hay/McBer in Boston—“Expertise is a baseline competence. You need it to get the job and get it done, but how you do the job—the other competencies you bring to your expertise—determines performance.” He concludes that data from a number of studies suggest that, in general, “emotional and personal competencies play a far larger role in superior job performance than do cognitive abilities and technical expertise”. He emphasizes five basic competences: self-awareness, self-regulation, motivation, empathy and social skills.

A student or trainee may have all the technical competences in the inner circle, but not be a good doctor. The outcomes in the middle and outer circles mean that the student has to think as a doctor. Spady (1994) has recognized the importance of these higher-level outcomes:

To be a successful role performer, individuals must possess deeply internalized performance abilities that allow them to operate across a broad range of situations over extended periods of time. Developing these complex, broadly generalized performance abilities requires years of practice with a diversity of content in a variety of circumstances. It is not something a person accomplishes in a specific course or program. Increasingly, those implementing OBE are defining exit outcomes in terms of these complex kinds of role performance abilities because they see them as the forms of learning that do truly matter for students, their parents and society in the long run.

Professionalism and certain personal attributes are necessary in all doctors. “An important revolution is under way in UK medicine”, suggests Sir Donald Irvine, President of the General Medical Council (1999). “Concerted efforts are being made to find a modern expression of professionalism which if successful should bring the public and the medical profession closer together.” Implicit in this statement is the need to indicate the expected learning outcomes of a medical school and how professionalism features in these.

There is a danger that learning outcomes reflect only routine or lower level competences (as included in the inner circle in the model) and that personal qualities such as probity or values may be neglected (Ellis, 1995). Ellis cites the work of Edmonds & Teh (1990) in relating higher-level competences to outcome-based education in management. Personal qualities were identified which were seen as central to effective performance by the individual manager. Fleming (1991) has argued that many higher-level competences are in the nature of meta-competence, acting on other competences to produce flexibility and to utilize the competence in new situations. In the three-circle model the competences implicit in the outcomes in the middle and outer circles (columns B and C in Tables 1 and 2) transcend and act on or work through the competences identified in the outcomes in the inner circle (column A in Tables 1 and 2).

The model also reflects the response to change. The outcomes in the inner circle are anchored in the past and in the present and may have to be unlearned when circumstances change. The outcomes in the middle circle look to the future and give the doctor the flexibility to cope

Table 1. The learning outcomes for a competent and reflective practitioner; based on the three-circle model.

		A					B			C					
		What the doctor is able to do—'doing the right thing'					How the doctor approaches their practice—'doing the thing right'			The doctor as a professional—'the right person doing it'					
		<i>Technical intelligences</i>					<i>Intellectual intelligences</i>			<i>Emotional intelligences</i>		<i>Analytical and creative intelligences</i>		<i>Personal intelligences</i>	
		1	2	3	4	5	6	7	8	9	10	11	12		
Clinical skills	Practical procedures	Patient investigation	Patient management	Health promotion and disease prevention	Communication	Appropriate information handling skills	Understanding of social, basic and clinical sciences and underlying principles	Appropriate attitudes, ethical understanding and legal responsibilities	Appropriate decision-making skills, and clinical reasoning and judgement	Role of the doctor within the health service	Personal development				
		<ul style="list-style-type: none"> History Physical examination Interpretation of findings Formulation of action plan to characterize problem and reach a diagnosis 	<ul style="list-style-type: none"> Cardiology Dermatology Endocrinology Gastroenterology Haematology Musculo-skeletal Nervous system Ophthalmology Otolaryngology Renal/urology Reproduction Respiratory Surgery General 	<ul style="list-style-type: none"> General principles Clinical Imaging Biochemical medicine Haematology Immunology Microbiology Pathology Genetics 	<ul style="list-style-type: none"> General principles Drugs Surgery Psychological Physiotherapy Radiotherapy Social Nutrition Emergency medicine Acute care Chronic care Rehabilitation Alternative therapies Patient referral 	<ul style="list-style-type: none"> Recognition of causes of threats to health and individuals at risk Implementation where appropriate of basics of prevention Collaboration with other health professionals in health promotion and disease prevention 	<ul style="list-style-type: none"> With patient With relatives With colleagues With agencies With media/press Teaching Managing Patient advocate Mediation and negotiation By telephone In writing 	<ul style="list-style-type: none"> Patient records Accessing data sources Use of computers Implementation of professional guidelines Personal records (log books, portfolios) 	<ul style="list-style-type: none"> Normal structure and function Normal behaviour The life cycle Pathophysiology Psychosocial model of illness Pharmacology and clinical pharmacology Public health medicine Epidemiology Preventative medicine and health promotion Education Health economics 	<ul style="list-style-type: none"> Attitudes Understanding of ethical principles Ethical standards Legal responsibilities Human rights issues Respect for colleagues Medicine in multicultural societies Awareness of psychosocial issues Awareness of economic issues Appreciation of responsibility to contribute to advance of medicine Appropriate attitude to professional institution and health service bodies 	<ul style="list-style-type: none"> Clinical reasoning Evidence-based medicine Critical thinking Research method Statistical understanding Creativity/resourcefulness Coping with uncertainty Prioritization 	<ul style="list-style-type: none"> Understanding of healthcare systems Understanding of clinical responsibilities and role of doctor Acceptance of code of conduct and required personal attributes Appreciation of doctor as researcher Appreciation of doctor as mentor or teacher Appreciation of doctor as manager including quality control Appreciation of doctor as member of multi-professional team and of roles of other healthcare professional 	<ul style="list-style-type: none"> Self-learner Self-awareness enquires into own competence emotional awareness self-confidence Self-regulation self-care self-control adaptability to change personal time management Motivation achievement drive commitment initiative Carer choice 		

Table 2. A comparison of learning outcomes in the different areas of the three-circle model.

	A What the doctor is able to do <i>'What to do'</i>	B How the doctor approaches their practice <i>'How to do it'</i>	C The doctor as a professional <i>'What to be'</i>
(1) The theme	Doing the right thing	Doing the thing right	The right person doing it
(2) Intelligences	Technical intelligences	Academic, emotional, analytical and creative intelligences	Personal intelligences
(3) Definition	Well defined and understood A programme with a finite end	Less well defined and understood A continuous process of learning	Poorly defined and understood
(4) Scope	Basic threshold competences Training learner to follow prescriptions	Additional outcomes related to competent performance and quality care Teaches learner to make choices	Metacognition and personal development
(5) Level of attainment	Mastery requirement for all doctors	Core competences but open-ended—distinguishes star performers from others	Personal attributes greatest in outstanding practitioners
(6) Observability	Explicit—visible Actions	Explicit but less visible Thoughts and feelings	Implicit—implied Personal development
(7) Discreteness	Components of competence	Clinical performance	Overall professional performance 'Adaptable' practitioners
(8) Response to change	Anchored in past Has to be unlearned when circumstances change	Looks forward to future. Can be built upon in changing circumstances	
(9) Focus for attention	The clinical task	Interaction of task and doctor	The doctor
(10) Knowledge	Embedded in competences	Basis for understanding	Basis for further development
(11) Teaching/Learning	Acquisition of knowledge and skills, e.g. through lectures and clinical teaching	Reflection and discussion, e.g. with small-group work and problem-based learning	Role modelling and student-centred approaches to learning. May be the hidden curriculum
(12) Assessment	Assessment of mastery at points in time in specific areas	Developmental assessment of student change and growth over time	Overall developmental assessment of student professional growth

with changing circumstances. This is embraced by the notion of the 'adaptable' practitioner, which is reflected by the outcomes in the outer circle.

Knowledge is embedded in the seven outcomes in the inner circle, e.g. what the doctor needs to know to measure a patient's blood pressure or to manage a patient with thyrotoxicosis. In the middle circle, knowledge is a basis for understanding and for the caring reflective practitioner. In the outer circle, knowledge is a basis for the doctor's further development. A detailed discussion of the relation between knowledge and outcomes is beyond the scope of this paper. Davidoff (1996) describes how, in the USA, "the Residency Review Committee makes clear that it has moved beyond the traditional 'learning objectives' definition of curriculum of the classroom educator, and has faced up to the realities of clinical education They [the learners] need to 'put it all together', to perform at a high professional level."

The three-circle model also acknowledges the need for a range of strategies and approaches to both teaching and assessment. Approaches to learning, such as problem-based

learning (Davis & Harden, 1999), which encourage reflection and discussion, can contribute to the achievement of the learning outcomes in the middle circle, and role modelling and student-centred approaches such as portfolio assessments are important for the achievement of outcomes in the outer circle.

Thus the 12 criteria in Table 2 provide the conceptual justification for the grouping of the 12 outcomes into the three circles. The better the understanding of the underlying characteristics the better is likely to be the adaptation of this outcome model to local needs. Similar work was done in designing the Australian competence standards framework. Five criteria were developed to differentiate among eight levels of competence: discretion in the work, application of theoretical knowledge, complexity of tasks, supervision and responsibility for others and need for creativity and design (Curtain & Hayton, 1995). The underlying criteria for the Dundee three-circle model provide an educational continuum for the separate outcomes that in turn assist faculty in defining the outcomes for each of the three circles.

Development of the outcome model

The outcome model was developed in Dundee over a period of 12 months, with input from a number of sources, including:

- an analysis of learning outcomes as defined by bodies such as the General Medical Council in the UK (General Medical Council, 1993);
- a review of the approach adopted by the Association of American Medical Colleges (1998) and institutions such as Brown University (Smith & Dollase, 1999);
- a literature survey for reports of outcomes in medicine and other fields of professional practice;
- informal discussions with colleagues within and outwith Dundee;
- formal discussions in an outcome-based education working group within the context of the new Dundee Curriculum (Harden *et al.*, 1997) and discussions at meetings of the Undergraduate Medical Education Committee;
- a meeting of more than 100 National Health Service and university staff and students in Dundee at which the outcome model was presented and feedback obtained using an audience-response system.

The twelve outcomes

The seven learning outcomes corresponding to the inner circle describe what the doctor should be able to do. They can be clearly defined and are usually visible in terms of some type of performance. They are made up of discrete components of competence and can be taught as such and evaluated in performance assessments such as the objective structured clinical examination. They are:

- (1) *Competence in clinical skills*: The doctor should be competent to take a comprehensive, relevant medical and social history and perform a physical examination. He or she should be able to record and interpret the findings and formulate an appropriate action plan to characterize the problem and reach a diagnosis.
- (2) *Competence to perform practical procedures*: The doctor should be able to undertake a range of procedures on a patient for diagnostic or therapeutic purposes. This usually involves using an instrument or some device, e.g. suturing a wound or catheterization.
- (3) *Competence to investigate a patient*: The doctor should be competent to arrange appropriate investigations for a patient and where appropriate interpret these. The investigations are carried out on the patient or on samples of fluid or tissue taken from the patient. The investigations are usually carried out by personnel trained for the purpose, e.g. a clinical biochemist or radiographer, but may in some instances be carried out by the doctor.
- (4) *Competence to manage a patient*: The doctor is competent to identify appropriate treatment for the patient and to deliver this personally or to refer the patient to the appropriate colleague for treatment. Included are interventions such as surgery and drug therapy and contexts for care such as acute care and rehabilitation.
- (5) *Competence in health promotion and disease prevention*: The doctor recognizes threats to the health of individuals or communities at risk. The doctor is able to imple-

ment, where appropriate, the basic principles of disease prevention and health promotion. This is recognized as an important basic competence alongside the management of patients with disease.

- (6) *Competence in skills of communication*: The doctor is proficient in a range of communication skills, including written and oral, both face-to-face and by telephone. He or she communicates effectively with patients, relatives of patients, the public and colleagues.
- (7) *Competence to retrieve and handle information*: The doctor is competent in recording, retrieving and analysing information using a range of methods including computers.

The second group of outcomes correspond to the middle circle and describe how the doctor approaches the seven competences described in the first category.

- (1) *With an understanding of basic, clinical and social sciences*: Doctors should understand the basic, clinical and social sciences that underpin the practice of medicine. They are not only able to carry out the tasks described in outcomes 1 to 7, but do this with an understanding of what they are doing, including an awareness of the psychosocial dimensions of medicine and can justify why they are doing it. We have termed this the ‘academic intelligences’.
- (2) *With appropriate attitudes, ethical understanding and understanding of legal responsibilities*: Doctors adopt appropriate attitudes, ethical behaviour and legal approaches to the practice of medicine. This includes issues relating to informed consent, confidentiality, and the practice of medicine in a multicultural society. The importance of emotions and feelings is recognized as the ‘emotional intelligences’ (Goleman 1998).
- (3) *With appropriate decision-making skills and clinical reasoning and judgement*: Doctors apply clinical judgement and evidence-based medicine to their practice. They understand research and statistical methods. They can cope with uncertainty and ambiguity. Medicine requires, in some cases, instant recognition, response and unreflective action, and at other times deliberate analysis and decisions, and action following a period of reflection and deliberation. This outcome also recognizes the creative element in problem solving that can be important in medical practice.

The last two outcomes relate to the outer circle and are concerned with the personal development of the doctor as a professional—the ‘personal intelligences’.

- (1) *Appreciation of the role of the doctor within the health service*: Doctors understand the healthcare system within which they are practising and the roles of other professionals within the system. They appreciate the role of the doctor as physician, teacher, manager and researcher. It implies a willingness of the doctor to contribute to research even in a modest way and to build up the evidence base for medical practice. It also recognizes that most doctors have some management and teaching responsibility.
- (2) *Aptitude for personal development*: The doctor has certain attributes important for the practice of medicine. He or she is a self-learner and is able to assess his or her own

performance. The doctor takes responsibility for his or her own personal and professional development, including personal health and career development.

Advantages of the outcome model

The model described offers a number of advantages.

- (1) It offers an *intuitive, user friendly and transparent approach* to communicating the learning outcomes of an education programme. In our experience it can be readily understood by both doctors and students. It has sufficient detail to convey its meaning clearly but not too much to overwhelm the user.
- (2) The model provides a compelling statement of *significant exit outcomes* and provides a macro-perspective. A criticism of many current curricula is that they cover more and more material at increasingly superficial levels with no assurance of attainment of the exit learning outcomes.
- (3) The model emphasizes a *holistic and integrated approach* to medical education and the interaction between the different outcomes. The fact that it can be represented on a single A3 sheet allows the reader to see the broader picture and to assimilate this. It can then be used as a tool in curriculum planning and assessment. It highlights areas which have been relatively neglected and where there are omissions in the curriculum.
- (4) The specification of outcomes may be *adapted to suit the local context* and while the relative emphasis given to the different outcomes and the more detailed specification of the outcomes may vary from school to school, it is likely that the key 12 outcomes will be common to all schools.
- (5) The learning outcomes are *performance based* and relate to the work of the doctor. This relevance and validity makes them more likely to be accepted by the practising clinical teacher.
- (6) The model is a useful tool for *assessment* purposes. Howie *et al.* (2000) described the use of portfolio assessment in a final medical examination, structured round the 12 outcomes.
- (7) The model helps to *reconcile tensions between vocational and academic education*. It recognizes, in outcomes 1 to 7, competences necessary for effective medical practice. The doctor, however, may have the skills to carry out the tasks of a doctor but not the capability as reflected in outcomes 8, 9 and 10. Outcome 8 adds an important academic dimension. The sciences are seen not just as an introduction to the clinical part of the medical courses, to be learned and then forgotten, but as an important underpinning for medical practice and as part of the hallmark of the good doctor.
- (8) The model recognizes the concept of *graduateness*. The outcomes highlight the attributes underpinning the discipline of medicine and emphasize the coherent nature of the programme that students require to study and understand. With the outcome interrelated, the evidence-based and reflective nature of medical practice is emphasized.
- (9) The model emphasizes the *personal development* of the doctor as a professional including the doctor as an inquirer into his or her own competence (outcomes 11 and 12).

- (10) The emphasis on the 12 outcomes and on the '*design down*' approach to more detailed specifications facilitates curriculum planning. In the past, educational practice has concentrated on the more detailed lower-level specification of learning objectives usually in terms of knowledge, skills, attitudes, with the higher levels imposed by the organization of the curriculum. Agreement is likely at the level of the 12 outcomes, even if there is disagreement at the lower levels of outcomes. This then serves as a firm foundation for further work on the curriculum.
- (11) The framework is applicable at *all phases of education* and its use in undergraduate, postgraduate and continuing medical education may facilitate the continuum of medical education and the transition from one phase to the next.
- (12) Preliminary studies suggest that a similar framework can be applied to *other healthcare professions*. This may help in an understanding of the different professional roles and could facilitate the development of a multi-professional education programme.

Conclusion

The model described provides a useful tool when thinking about outcome-based education. The Dundee outcome model employs a broad definition of 12 outcomes. In all 12 outcomes, performance is underpinned by a number of cognitive and behavioural skills. The model encourages the holistic approach to outcome-based education with the outcome in the middle and outer circles acting through the outcomes in the inner circle. It can be of assistance in curriculum planning and offers a framework for teachers to develop outcomes relevant to their own needs. Modified appropriately, it is a powerful tool for teachers designing (or planning) and implementing the education programme, for examiners assessing the students' performance and not least for students who ultimately have the responsibility for learning.

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